

**Oracle® Enterprise Manager**

ASM Config Assistant Context-Sensitive Online Help

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## 1.1 About Oracle Automatic Storage Management (Oracle ASM)

Oracle Automatic Storage Management (ASM) is an integrated file system and volume manager built specifically for Oracle database files. It simplifies database administration by eliminating the need to directly manage thousands of Oracle database files. This is done by enabling the division of all available storage into units called disk groups. You need to manage only a small set of disk groups. ASM automates the placement of the database files within these disk groups and helps DBAs manage a dynamic database environment by allowing the adjustment of storage allocation without having to shutdown the database.

ASM facilitates non-intrusive storage configuration changes using automatic rebalancing. It spreads database files across all available storage to optimize performance and resource utilization. Rebalancing of the database storage occurs automatically whenever the storage configuration changes.

Automatic Storage Management allows the administrator to define a pool of storage called a disk group. The Oracle kernel manages the file naming and placement of the database files on that pool of storage. The administrator can change the storage allocation (adding or removing disks) with new SQL commands (create diskgroup, alter diskgroup, and drop diskgroup).

### 1.1.1 Components of Oracle Automatic Storage Management

The components of Automatic Storage Management (ASM) comprise of the following:  
NOTE TO WRITER: The links were lost in conversion for the following list items.

- ASM Files
- ASM Disks
- ASM Disk Groups
- ASM Templates
- Failure Groups

#### 1.1.1.1 ASM Files

Automatic Storage Management automates and simplifies the layout of datafiles, control files, and log files. Database files are automatically distributed across all available disks, and database storage is rebalanced whenever the storage configuration changes. It provides redundancy through the mirroring of database files, and it

improves performance by automatically distributing database files across all available disks.

#### **1.1.1.2 ASM Disks**

The disks belonging to a disk group are referred to as ASM disks. On Windows operating systems, an ASM disk is always a partition. On all other platforms, an ASM disk can be:

- A partition of a logical unit number (LUN)
- A network-attached file

#### **1.1.1.3 ASM Disk Groups**

A disk group consists of a collection of disks that are managed together as a unit. It is a primary component of ASM. You can configure ASM by creating disk groups which in turn stores database files. Oracle provides SQL statements to create and manage disk groups, their contents, and metadata. ASM feature provides a virtualization layer between the database and storage so that multiple disks can be treated as a single disk group. Disks can be dynamically added or removed while keeping databases online. Existing data is automatically spread across available disks for increasing performance and optimizing utilization.

#### **1.1.1.4 ASM Templates**

Templates are collections of file attribute values, used to set mirroring and striping attributes of each type of database file (datafile, control file, redo log file, and so on) created in ASM disk groups. Each disk group has a default template associated with each file type. You can also create your own templates to meet unique requirements. You can then include a template name when creating a file, thereby assigning desired attributes on an individual file basis rather than on the basis of file type.

#### **1.1.1.5 Failure Groups**

Failure groups are ASM disks that share a common potential failure mechanism. Failure groups are used to determine which ASM disks to use for storing redundant copies of data. For example, if two-way mirroring is specified for a file, ASM automatically stores redundant copies of file extents in separate failure groups. Failure groups apply only to normal and high redundancy disk groups. You define the failure groups in a disk group when you create or alter the disk group.

### **1.1.2 What is an ASM Instance?**

ASM is implemented as a special kind of Oracle instance, with its own System Global Area and background processes, called the ASM instance. The ASM instance is tightly integrated with the database instance. Every server running one or more database instances that use ASM for storage has an ASM instance. In a Real Application Clusters environment, there is one ASM instance for each node, and the ASM instances communicate with each other on a peer-to-peer basis. Only one ASM instance is required for each node regardless of the number of database instances on the node.

### **1.1.3 Concepts of Striping, Mirroring, and Rebalancing**

ASM provides the following features:

### 1.1.3.1 Striping

ASM spreads data evenly across all disks in a disk group to optimize performance and utilization. This even distribution of database files eliminates the need for regular monitoring and I/O performance tuning. For example, if there are six disks in a disk group, pieces of each ASM file are written to all six disks. These pieces come in 1 MB chunks known as extents. When a database file is created, it is striped (i.e. divided into extents and distributed) across the six disks, and the allocated disk space on all six disks grows evenly. While reading the file, file extents are read from all the six disks in parallel, thus greatly improving the performance.

### 1.1.3.2 Mirroring

Mirroring means keeping redundant copies, or mirrored copies, of each extent of the file, to help avoid data loss caused by disk failures. The mirrored copy of each file extent is always kept on a different disk from the original copy. If a disk fails, ASM can continue to access affected files by accessing mirrored copies on the surviving disks in the disk group. ASM can increase availability by optionally mirroring any file. ASM mirrors at the file level, unlike operating system mirroring, which mirrors at the disk level. ASM supports 2-way mirroring, where each file extent gets one mirrored copy, and 3-way mirroring, where each file extent gets two mirrored copies.

### 1.1.3.3 Rebalancing

ASM permits you to add or remove disks from your disk storage system while the database is operating. When you add a disk, ASM automatically redistributes the data so that it is evenly spread across all disks in the disk group, including the new disk. This redistribution is known as rebalancing. It is done in the background and with minimal impact to database performance. When you request to remove a disk, ASM first rebalances by evenly relocating all file extents from the disk being removed to the other disks in the disk group. Whether you remove disks or add disks to your disk group, all your database files will be redistributed across the disks automatically, while the database is running.

## 1.1.4 Related Links

[ASM Disks](#)

[ASM Disk Groups](#)

## 1.2 About ASMCA

Automatic Storage Management Configuration Assistant (ASMCA) allows the user to create, configure, or migrate ASM instances that take advantage of the new 11g features such as Volumes and ASM Cluster File systems. These, along with other storage management services such as Secure Backup and on-line HSM, comprise the Automatic Storage Management (ASM) service that lets the user store Oracle installation binaries and all their application data on an ASM instance running on a single host or in a cluster environment.

ASMCA may be run to configure an ASM instance and the Disk Groups, Volumes, and ACFS that are part of it. It may also be used to create ACFS DB homes on Disk Groups prior to creating or installing a database instance that makes use of USM features.

## 1.3 Creating an ASM Volume

To create an ASM Volume:

1. Navigate to the Volumes page.
2. Select **Create**. The Create ASM Volume Page appears.
3. Specify a name for the ASM volume.
4. From the drop-down box, select the disk group that you wish to associate with the ASM volume.
5. You can specify the size of the ASM volume in units of TB, GB, MB and KB.
6. Click **Show Advanced Options** to set the redundancy and striping attributes for the disk group. To hide these advanced options, select **Hide Advanced Options**.
7. By default, an ASM volume inherits its redundancy attribute from the disk group. If you want to change the default value, select any of the redundancy options **High**, **Normal**, or **External**.
8. Set the **Stripe Width** and **Stripe Columns** attributes for striping.
9. Click **OK** to save the settings. ASMCA creates an ASM volume based on the values specified.

#### **Related Links**

Create ASM Volume Page

## **1.4 Creating a Disk Group**

To create a disk group:

1. Navigate to the Disk Groups page.
2. Select **Create**. The Create Disk Group Page appears.
3. Specify a name for the disk group.
4. Select one of the redundancy types among **High**, **Normal**, and **External**, to set the redundancy for the disk group.
5. Select the member disks that you want to add to the disk group. Click **Show Candidates** to view all the disks that have a header status of CANDIDATE. To view all the disks that are discovered, click **Show All**.
6. Click **Change Disk Discovery Path** to provide a new path.
7. Provide the versions for **Database Compatibility** and **ASM Compatibility**. Make sure that the version entered for **Database Compatibility** is lower than that of **ASM Compatibility**.
8. Click **OK**. ASMCA now creates a disk group.

#### **Related Links**

Create Disk Group Page

Changing Disk Discovery Path

## **1.5 Creating a New ASM Instance**

To create a new ASM instance:

1. Specify the password in the **SYS Password** field.

2. Specify the **Monitoring User Name** and **Password**. These credentials will help you start monitoring the ASM instance.
3. If you want to view or change the default setting for ASM parameters, click **ASM Parameters**.
4. Click **Create ASM**. The new ASM instance is now created.

### Related Topics

USM Configuration Assistant: Create ASM Page

USM Configuration Assistant: Migrate ASM Page

## 1.6 Add Disks Page

A disk group consists of a collection of ASM disks that are managed together as a unit. An ASM disk can be a disk device, a partition, or a network-attached file. When an ASM instance starts, it automatically discovers all the available ASM disks.

Use the Add Disks page to:

- Add disks

Element	Description
Disk Group Name	Name of the disk group.
Redundancy	<p>ASM requires at least two failure groups to create a normal redundancy disk groups and at least three failure groups to create a high redundancy disk group. This implies that if you do not explicitly define failure groups, a normal redundancy disk group requires at least two disks, and a high redundancy disk group requires at least 3 disks.</p> <p>Choose one of the following redundancy types to set the redundancy for the disk group:</p> <ul style="list-style-type: none"> <li>■ <b>High.</b> The contents of the disk group are three-way mirrored by default. To create a disk group with high redundancy, you must specify at least 3 failure groups (a minimum of 3 devices). Although high-redundancy disk groups provide a high level of data protection, you must consider the higher cost of additional storage devices before deciding to use this redundancy level.</li> <li>■ <b>Normal.</b> By default, ASM uses two-way mirroring for datafiles and three-way mirroring for control files, to increase performance and reliability. Alternatively, you can use two-way mirroring or no mirroring. A normal redundancy disk group requires a minimum of two failure groups (or two disk devices) if you use two-way mirroring. The effective disk space in a normal redundancy disk group is half the sum of the disk space in all of its devices. For most installations, Oracle recommends that you use normal redundancy disk groups.</li> <li>■ <b>External.</b> Files in an external redundancy disk group have no ASM mirroring. Requires a minimum of one disk device. The effective disk space in an external redundancy disk group is the sum of the disk space in all of its devices. If you select this option, ASM does not mirror the contents of the disk group.</li> </ul>

Element	Description
Select Member Disks	<p>Click the <b>Show Candidates</b> option to view all the disks that have a header status of CANDIDATE. Click the <b>Show Members</b> option to view all the disks that have a header status of MEMBER. To view all the disks that are discovered, click <b>Show All</b>.</p> <ul style="list-style-type: none"> <li>■ <b>Disk Path.</b> Physical path of the disk in the host system.</li> <li>■ <b>Header Status.</b> ASM instance ensures that any disk being included in the newly created disk group is addressable and is not already a member of another disk group. Disks that already belong to a disk group have a header status of MEMBER. Disks that were discovered but that are not yet assigned to a disk group have a header status of CANDIDATE. Disks that were previously assigned to a disk group but are free now have a header status of FORMER.</li> <li>■ <b>Disk Name.</b> Name of the Disk.</li> <li>■ <b>Size (MB).</b> Size of the disk in MB.</li> <li>■ <b>Failure Group.</b> Failure groups define ASM disks that share a common failure mechanism. Failure groups are used to determine which ASM disks to use for storing redundant copies of data. For example, if 2-way mirroring is specified for a file, ASM automatically stores redundant copies of file extents in separate failure groups. Failure groups apply only to normal and high redundancy disk groups. Failure groups are defined for a disk group when you create or alter the disk group.</li> <li>■ <b>Force.</b> If the disk header indicates that it is part of another disk group, you can force it to become a member of the disk group you are creating by specifying the FORCE option. This option is used only if the disk group to which the disk belongs to has failed, and cannot be used otherwise. For example, a disk with an ASM header might have failed temporarily, so that its header could not be cleared when it was dropped from its disk group. After the disk is repaired, it is no longer part of any disk group, but it still has an ASM header. To use this disk in a new disk group, use the Force option. The operation fails if the original disk group is mounted, or if the disk does not have a disk group header. If a disk of a dismounted but properly working diskgroup is added by force, the former diskgroup cannot be used further.</li> <li>■ <b>Quorum.</b> Quorum failure groups are used to store voting files in extended clusters and do not contain any user data.</li> <li>■ <b>Failure Group Type.</b> Failure group type of the disk ( Regular or Quorum)</li> </ul>
Change Disk Discovery Path	<p>Click <b>Change Disk Discovery Path</b> to discover additional disks that can be used by this ASM instance.</p> <p><b>Note:</b> Changing the disk discovery path will affect all the disk groups.</p>

**Related Links**

Creating a Disk Group

Change Disk Discovery Path Page

## 1.7 ASM Instances

Use the ASM Instances Page to:

- View the ASM instance names for each node
- View ASM status (up/down) and ASM driver status (Installed, Loaded, or Not Installed).



Option	Description
Node	Name of the node in the cluster
Instance Name	Name of the ASM instance
Status	Status of the ASM instance
ADVM Driver Status	Status of the ADVM driver

To perform Volumes related operations, the ADVM driver must be loaded on all nodes.

### Related Topics

Creating a New ASM Instance

ASM Parameters

## 1.8 ASM Parameters Page

Use the ASM Parameters page to review or configure the values of the various initialization parameters defined for the ASM instance. You can retain the default settings, or choose to modify the settings for the ASM parameters.

Element	Description
Name	Name of the ASM initialization parameter. For e.g., diagnostic_dest
Value	Value allotted to the ASM initialization parameter. For e.g., the value of the ASM parameter diagnostic_dest is the path specified for this parameter.
Override Default	Use this option to override the default value of the ASM initialization parameter.
Basic	A check mark against this field indicates that the corresponding ASM initialization parameter is a basic parameter. This field is non-editable.
Category	Denotes the category to which the ASM initialization parameter belongs to. This field is non-editable.

Click **Show Description** to view a detailed definition of each ASM parameter. To save the changes made to the ASM parameters and return to the Create ASM page, click **Close**.

### Related Topics

ASM Configuration Assistant: Create ASM Page

ASM Configuration Assistant: Migrate ASM Page

## 1.9 Change Disk Discovery Path Page

When an ASM instance initializes, ASM discovers and examines the contents of all of the disks that are in the location designated in the ASM\_DISKSTRING initialization parameter. Disks that belong to a disk group - that is, that have a disk group name in the disk header - have the header status, MEMBER. Disks that were discovered but that are not yet assigned to a disk group, have a header status of CANDIDATE. Disks that were previously assigned to a disk group but are free now have a header status of FORMER.

Type the new disk discovery path in the field provided and click **OK** to save the changes and return to the Add Disks page.

**Note:** Changing the disk discovery path affects all the disk groups.

#### **Related Links**

Create Disk Group Page

## **1.10 Clear Labels**

Clear Labels stops a disk from being used and managed by Oracle AFD.

To clear labels from the disks:

1. Navigate to the Disk Groups page.
2. Click **Create**, and then click **Clear Labels**.
3. Select the devices with label names from the list and click **Clear Labels and close Window**.
4. Click **Yes** in the Confirm label clearing dialog box.

#### **Related Links**

Label Disks

## **1.11 Configuring ASM: Disk Groups Page**

Use the Configure ASM: Disk Groups page to:

- Create a new disk group
- Add disks to an existing disk group
- Edit the disk compatibility attributes for a disk group
- Manage the templates of any disk group
- Mount, dismount, mount all, dismount all, and drop diskgroups

### **1.11.1 Configure ASM: Disk Groups Page Sections**

Configure ASM: Disk Groups page is arranged into the following sections. To access help for a particular section of the page, click the **Help** button for that section, or click one of the following links.

- Creating a Disk Group
- Edit Attributes for Disk Group Page
- Manage Templates Page

Disk groups are mounted automatically at ASM instance startup. This makes them available to all database instances running on the same node as ASM. The disk groups are dismounted at ASM instance shutdown. ASM also automatically mounts a disk group when you initially create it, and dismounts a disk group if you drop it.

<b>Element</b>	<b>Description</b>
Disk Group Name	Name of the disk group
Size (GB)	Size of the disk group in GB.

Element	Description
Free (GB)	Reflects the free space in GB after taking mirroring into account.
Redundancy	<p>Values can be any of the following:</p> <ul style="list-style-type: none"> <li>▪ <b>EXTERNAL.</b> Requires a minimum of one disk device. The effective disk space in an external redundancy disk group is the sum of the disk space in all of its devices. If you select this option, ASM does not mirror the contents of the disk group.</li> <li>▪ <b>NORMAL.</b> By default ASM uses two-way mirroring for datafiles and three-way mirroring for control files, to increase performance and reliability. Alternatively, you can use two-way mirroring or no mirroring. A normal redundancy disk group requires a minimum of two failure groups (or two disk devices) if you use two-way mirroring. The effective disk space in a normal redundancy disk group is half the sum of the disk space in all of its devices. For most installations, Oracle recommends that you use normal redundancy disk groups.</li> <li>▪ <b>HIGH.</b> The contents of the disk group are three-way mirrored by default. To create a disk group with high redundancy, you must specify at least 3 failure groups (a minimum of 3 devices). Although high-redundancy disk groups provide a high level of data protection, you must consider the higher cost of additional storage devices before deciding to use this redundancy level.</li> </ul>
State	<p>Values can be any of the following:</p> <ul style="list-style-type: none"> <li>▪ <b>MOUNTED.</b> Disk groups are mounted automatically at ASM instance startup. This makes them available to all database instances running on the same node as ASM. To unmount a disk group whose state is originally set to MOUNT, right click to select the option <b>DISMOUNT</b>.</li> <li>▪ <b>DISMOUNTED.</b> The disk groups are dismounted at ASM instance shutdown. ASM also automatically mounts a disk group when you initially create it, and dismounts a disk group if you drop it. To mount disk groups whose state is originally set to UNMOUNT, by right click the selected diskgroup and select <b>MOUNT</b>.</li> </ul>

Click **Mount All** to mount all the disk groups, and click **Unmount All** to dismount all the disk groups together.

Right-click a disk group to add a disk group, edit attributes for the disk group, manage templates, drop or dismount the disk group.

### 1.11.2 Related Links

[Creating a Disk Group](#)

[Edit Attributes for Disk Group Page](#)

[Manage Disk Group Templates Page](#)

## 1.12 Configuring ASM: ASM Cluster File System Page

Use the Configure ASM: ASM Cluster File System page to:

- Create a new ASM Cluster File System
- Generate the command to mount or dismount a file system
- Create a new volume device

- Resize a mounted file system
- Add or remove a volume device and mount point to or from the cluster registry
- Configure security

The following table describes the elements that appear on the File System Page:

Option	Description
Active Mount Point	Location at which the OFS file is mounted. This field is displayed only when the volume is associated with an OFS and OFS is in the "MOUNTED" state.
Availability State	Indicates the availability of the system. Values can be any of the following: <ul style="list-style-type: none"> <li>■ <b>MOUNTED.</b> ASM Cluster File systems are attached to a mountpoint that is a path name of a directory on the host system. An ACFS should be mounted before it is used. The mount command returns an error if the file system is already mounted on this node. On Linux platforms, ASMCA generates the mount command that has to be executed manually as root by the user.</li> <li>■ <b>DISMOUNTED.</b> A DISMOUNTED file system is one that is detached from its mountpoint. If the file system is busy, the dismount operation will fail.</li> </ul>
Volume Device	Indicates the OS dependent device file normally used to access disk-type devices.
Disk Group	Name of the ASM disk group for the volume.
Volume	Displays the name of the volume.
Size	The new size for the volume. Enter a size in this field to resize the ASM volume. You can choose one of the following units: M(Megabytes), G(Gigabytes), or T(Terabytes).
All Mount Points	Displays the location of all mount points.

### 1.12.1 Configure ASM: ASM Cluster File System Page Sections

Configure ASM: ASM Cluster File System page is arranged into the following sections. To access help for a particular section of the page, click the **Help** button for that section, or click one of the following links.

- Create ASM Cluster File System
- Resize ASM Cluster File System
- Mount ASM Cluster File System
- Create ASM Volume

Right-click an ASM Cluster file system to generate the mount or dismount command, resize, delete the file system, or set up security.

ASM Cluster File System (ACFS) is a new multi-platform, scalable file system and storage management design. It leverages ASM functionality to achieve dynamic file system resizing, maximized performance through ASM automatic distribution, balancing and striping of ACFS files across all available disks, and storage reliability through ASM mirroring and parity protection in the delivery of an Oracle storage management stack.

## 1.12.2 Configuring Security and Encryption

Oracle ASM Configuration Assistant enables you to configure security and encryption for an Oracle ACFS file system. You can generate commands and then run these commands as a privileged user. The commands prompt for credentials when you attempt to run them.

To configure security, you need to designate a user as the Security Administrator. Then you must enter the Security Admin User and Group. Optionally you can configure ACFS encryption by creating a password protected wallet. If you turn on the Set Encryption option, the Select Algorithm dialog box appears where you must choose **Select Algorithm** and the **Algorithm Keylength** from the corresponding drop-down lists. If you click **Show Command**, the ACFS Security Command dialog box appears and shows all generated commands.

You must initialize the security system as the first step in configuring security for an Oracle ACFS file system. You must also initialize the encryption system as the first step in encrypting an Oracle ACFS file system.

When you right click on a file system , the ASM Configuration Assistant displays a menu with the following options:

Option	Description
Set Encryption	Use this option to set encryption for the Oracle ACFS file system. Oracle ACFS encryption protects data stored on secondary storage against the threat of theft or direct access to the storage medium. Data is never written to secondary storage in plaintext. Even if physical storage is stolen, the data stored cannot be accessed without the encryption keys. The encryption keys are never stored in plaintext. The keys are either obfuscated or encrypted using a user-supplied password.  When you select Set Encryption, the Select Algorithm dialog box appears where you must choose <b>Select Algorithm</b> and the <b>Algorithm Keylength</b> from the corresponding drop-down lists. Press OK to close.
Enable Encryption	Choose this option to enables encryption for a file system or individual directories and files after encryption parameters have been configured.
Disable Encryption	Disables encryption for a file system or individual directories and files. Only an administrator can run this command.
Prepare and Enable Security	Use this option to configure storage for security credentials and specify the first security administrator and the security group to which the administrator belongs. This command must be run before any other security command and requires root privileges to run.
Disable Security	Use this option to disable the security features on a file system if you want to temporarily remove security restrictions. Only an existing security administrator can run this command.
Enable Security	Use this option to enable security features set up for an Oracle ACFS file system. Only an existing security administrator can run this command.

## 1.12.3 Related Links

[About ASM](#)

[ASM Cluster File System](#)

## 1.13 Configuring ASM: Volumes Page

Use the Configure ASM: Volumes page to:

- Create an ASM volume device
- Resize an existing ASM volume
- Enable, Disable, Enable All, Disable All, and Delete Volumes

Element	Description
Volume	Lists the names of the ASM volumes that are available.
Volume Device	OS dependent device file normally used to access disk-type devices.
Disk Group	Name of the disk group associated with the ASM volume.
State	Current state of the volume. Can be ENABLED or DISABLED.
Usage	ACFS formatted volumes have a default value of ACFS.
Mount Point	Location where the ACFS file is mounted. This field is displayed for mounted as well as dismounted file systems. For dismounted file systems, the last known mount point is displayed.
Size (GB)	Size of the ASM volume in GB.

Right-click an ASM volume to enable, disable, enable all, disable all, resize, and delete volumes.

### 1.13.1 Configure ASM: Volumes Page Sections

Configure ASM: Volumes page is arranged into the following sections. To access help for a particular section of the page, click the Help button for that section, or click one of the following links.

- [Create ASM Volume Page](#)
- [Resize ASM Volume Page](#)

### 1.13.2 Related Links

[Create ASM Volume Page](#)

[Creating ASM Volume](#)

[Resize ASM Volume Page](#)

[ASM Volume Device](#)

## 1.14 Convert to Oracle Flex ASM Page

Oracle Flex ASM enables an Oracle ASM instance to run on a separate physical server from the database servers. With this deployment, larger clusters of Oracle ASM instances can support more database clients while reducing the Oracle ASM footprint for the overall system.

The following table describes the fields on this page:

Element	Description
ASM Listener Port	Port number used for ASM listener.

Element	Description
Networks	Select one or more networks for communication among flex ASM instances.
Configure Oracle Flex ASM to run cluster-wide	By selecting this option, ASM will be running cluster-wide although Oracle Flex ASM is enabled. This option helps to install prior versions of Oracle database using Oracle Flex ASM.

**Note:** Oracle Flex ASM conversion converts a local Oracle ASM (upgraded from Oracle ASM version lower than 12.1 or created using local Oracle ASM option when installing Oracle Grid Infrastructure version 12.1) into Oracle Flex ASM. Conversion requires restart of Oracle Grid Infrastructure node by node.

#### Related Topics

[Mount ASM Cluster File System Page](#)

[Resize ASM Cluster File System Page](#)

## 1.15 Create ACFS Hosted Database Home Page

Use this page to create ACFS for database home.

Specify the following details:

Element	Description
Database Home Volume Name	Name of the volume containing the database home.
Database Home Mount Point	Mount point where the ACFS created for the database home will be mounted.
Database Home Size	Size of the ACFS for database home in GB.
Database Home Owner Name	User who owns the ACFS mount point for hosting the database home.
Database Home Owner Group	Group to which the user who owns the ACFS mount point for hosting the database home belongs.

For single instance ASM, ACFS will be created and mounted on the mount point with the specified ownership and permissions. For Oracle Real Application Clusters, the ACFS created will be added as a Clusterware resource.

#### Related Topics

[Mount ASM Cluster File System Page](#)

[Resize ASM Cluster File System Page](#)

## 1.16 ASM Configuration Assistant: Create ASM Page

The ASM Configuration Assistant: Create ASM Page appears when ASMCA cannot detect any ASM instance running in your host or cluster.

Use the ASM Configuration Assistant: Create ASM Page to:

- Create a new ASM instance to store your database files

- Specify the authentication credentials for managing or monitoring the ASM instance
- Change the settings for ASM Parameters

**Note:**

- The system first checks if an ASM instance is already present. If no ASM instance is running on your host or cluster, then use this screen to create a new one. You can then connect to the ASM instance as an administrator.
- In case of RAC, to create a RAC ASM, a disk group to store ASM SPFILE is required. Use the "Specify Disk Group" button to provide the disk group details.

## 1.16.1 Accessing an ASM Instance

You will require the following authentication credentials for accessing an ASM instance:

- SYS Password File Authentication
- SYSDBA System Authentication

### 1.16.1.1 SYS User

You can manage your ASM instance using SYS password file authentication. The SYS user account is automatically created when ASM is created and is granted the SYSASM role. Like a database password file, the only user added to the password file upon creation is SYS.

To start managing the ASM instance, specify the password in the **SYS Password** field. If you want to add other users to the password file, share the password file with a database instance and add the users to the database.

### 1.16.1.2 ASMSNMP User

You can monitor your ASM instance using the SYSDBA system authentication. You can create at least one additional SYSDBA user with lower privileges and grant that user only the appropriate monitoring role to perform routine administrative tasks.

Specify the **ASMSNMP User Name** and **Password** to start monitoring the ASM instance.

## 1.16.2 ASM Parameters

You can retain the default settings defined for ASM Parameters. In case you want to view the default setting, or change it, click **ASM Parameters**.

## 1.16.3 Related Topics

Creating a New ASM Instance

ASM Parameters

## 1.17 Create Disk Group

A disk group consists of a collection of ASM disks that are managed together as a unit. An ASM disk can be a disk device, a partition, or a network-attached file. When an ASM instance starts, it automatically discovers all the available ASM disks.

Use the Create Disk Group page to:



- Create a new disk group
- Specify the disks that are to be formatted as ASM disks that belong to the disk group
- Create disk labels
- Clear disk labels

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Element	Description
Disk Group Name	Name of the disk group.
Redundancy	<p>ASM requires at least two failure groups to create a normal redundancy disk groups and at least three failure groups to create a high redundancy disk group. This implies that if you do not explicitly define failure groups, a normal redundancy disk group requires at least two disks, and a high redundancy disk group requires at least 3 disks.</p> <p>Choose one of the following redundancy types to set the redundancy for the disk group:</p> <ul style="list-style-type: none"> <li>■ <b>High.</b> The contents of the disk group are three-way mirrored by default. To create a disk group with high redundancy, you must specify at least 3 failure groups (a minimum of 3 devices). Although high-redundancy disk groups provide a high level of data protection, you must consider the higher cost of additional storage devices before deciding to use this redundancy level.</li> <li>■ <b>Normal.</b> By default ASM uses two-way mirroring for data files and three-way mirroring for control files, to increase performance and reliability. Alternatively, you can use two-way mirroring or no mirroring. A normal redundancy disk group requires a minimum of two failure groups (or two disk devices) if you use two-way mirroring. The effective disk space in a normal redundancy disk group is half the sum of the disk space in all of its devices. For most installations, Oracle recommends that you use normal redundancy disk groups.</li> <li>■ <b>External.</b> Files in an external redundancy disk group have no ASM mirroring. Requires a minimum of one disk device. The effective disk space in an external redundancy disk group is the sum of the disk space in all of its devices. If you select this option, ASM does not mirror the contents of the disk group.</li> </ul>

Select Member Disks	<p>Click the <b>Show Candidates</b> option to view all the disks that have a header status of CANDIDATE. To view all the disks that are discovered, click <b>Show All</b>.</p> <ul style="list-style-type: none"> <li>■ <b>Disk Path.</b> Physical path of the disk in the host system.</li> <li>■ <b>Header Status.</b> ASM instance ensures that any disk being included in the newly created disk group is addressable and is not already a member of another disk group. Disks that already belong to a disk group have a header status of MEMBER. Disks that were discovered but that are not yet assigned to a disk group have a header status of CANDIDATE. Disks that were previously assigned to a disk group have a header status of FORMER.</li> <li>■ <b>Disk Name.</b> Name of the Disk</li> <li>■ <b>Size (MB).</b> Size of the disk in MB.</li> <li>■ <b>Failure Group.</b> Failure groups define ASM disks that share a common failure mechanism. Failure groups are used to determine which ASM disks to use for storing redundant copies of data. For example, if 2-way mirroring is specified for a file, ASM automatically stores redundant copies of file extents in separate failure groups. Failure groups apply only to normal and high redundancy disk groups. Failure groups are defined for a disk group when you create or alter the disk group.</li> <li>■ <b>Force.</b> If the disk header indicates that it is part of another disk group, you can force it to become a member of the disk group you are creating by specifying the FORCE option. This option is used only if the disk group to which the disk belongs to has failed, and cannot be used otherwise. For example, a disk with an ASM header might have failed temporarily, so that its header could not be cleared when it was dropped from its disk group. After the disk is repaired, it is no longer part of any disk group, but it still has an ASM header. To use this disk in a new disk group, use the Force option. The operation fails if the original disk group is mounted, or if the disk does not have a disk group header. If a disk of a dismounted but properly working disk group is added to the disk groups being created by force, the former disk group cannot be used further.</li> <li>■ <b>Quorum.</b> Quorum failure groups are used to store voting files in extended clusters and do not contain any user data.</li> </ul>
Change Disk Discovery Path	<p>Click <b>Change Disk Discovery Path</b> to discover additional disks that can be used by this ASM instance.</p> <p><b>Note:</b> Changing the disk discovery path will affect all the disk groups.</p>
Allocation Unit Size	<p>An allocation unit (AU) is a measure of the contiguous disk space allocated to ASM files.</p>
Compatibility	<p>Compatibility decides whether a user can leverage features in a new version of the product. ASM Compatibility is the minimum software version required for an ASM instance to mount this disk group (version 10.1 and above). Database Compatibility is the minimum software version required for a database instance to use files in this disk group (version 10.1 and above). ADVN Compatibility is the minimum software version required for an ASM volume to use this disk group (version 11.2 and above).</p> <p>The Database and ADVN compatibility have to be less than or equal to the ASM compatibility. ASM compatibility must be atleast 11.1 to set database compatibility and 11.2 to set ADVN compatibility.</p>

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**Related Links**

[Creating a Disk Group](#)

[Change Disk Discovery Path Page](#)

## 1.18 Create ASM Cluster File System Page

ASM Cluster File System is used to store Oracle database files and application files, including executables, database data files, database trace files, database alert logs, application reports, BFILEs, and configuration files. The following table describes the fields in the Create ASM Cluster File System page.

Element	Description
Volume	Select the volume from the drop down list, on which you want to create the ASM Cluster File System. If there are no volumes, or if you want to create a new volume, select <b>Create Volume</b> from the drop down list.
Database Home Mount Point	Mount point where the ACFS created for the database home is mounted.
Database Home Owner Name	User who owns the ACFS mount point for hosting the database home.
Database Home Owner Group	Group to which the user who owns the ACFS mount point for hosting the database home belongs.
Mount Point	This is the mount point of the ACFS database home.

Click **Show Command** to view the command to create the ASM Cluster file system.

### Related Topics

[Mount ASM Cluster File System Page](#)

[Resize ASM Cluster File System Page](#)

## 1.19 Create ASM Cluster File System Page

ASM Cluster File System is used to store Oracle Database home, Oracle Database files, non-database files such as executables, Oracle trace files, alert logs, application configuration files and so on. ASM Cluster File System can be created as Cluster File System or as a Node Local File System.

The following table describes the fields in the Create ASM Cluster File System page.

Element	Description
Type of ACFS	Can be Cluster File System or Node Local File System. Cluster File System can be used for Oracle Database home install or database files. A Cluster File System uses a single volume. Node Local File System can be used for application files or Oracle trace and alert logs. A Node Local File System needs one volume for each node in the cluster.
Mount Point	Mount point where the ACFS created will be mounted.
Auto Mount	Select this option if the ACFS should be mounted when node reboots.
Mount Options	Operating system-specific mount options used when ACFS is mounted.
User Name	User who owns the ACFS mount point.
Group Name	Group to which the user who owns the ACFS mount point belongs.
Description	Description of the ACFS created.
Application Identifier	This field is applicable only for node local file system. The application identifier helps in grouping the node local file system.

Element	Description
Volume	Select the volume from the drop down list, on which you want to create the ASM Cluster File System. If there are no volumes, or if you want to create a new volume, use the Create Volume functionality in the Volumes tab.

Click **Show Command** to view the command to create the ASM Cluster file system.

**Note:** For all UNIX operating systems, ASMCA will create a script that should be run as a privileged user. The script registers the ACFS with Oracle Grid Infrastructure as a managed resource.

### Related Topics

[Mount ASM Cluster File System Page](#)

[Resize ASM Cluster File System Page](#)

## 1.20 Create Volume Page

Use the Create Volume page to:

- Create a new ASM volume by specifying its name and size
- Set the redundancy and striping attributes for the ASM Volume in the **Show Advanced Options** section.

Element	Description
Volume	Specify a name for the ASM volume.
Disk Group Name	ASM disk group name for the volume. Select a disk group on which you want to create the ASM volume, from the drop-down box.
Disk Group Free Space (GB)	Indicates the amount of free space (in GB) available in the disk group that can be safely utilized.
Disk Group Usable Space (GB)	Indicates the usage (in GB) that is specified for this volume. It need not be ACFS only.
Size	ASM volume size in GB, MB, or TB.
Redundancy	By default, an ASM volume inherits its redundancy attribute from the disk group. You can also change the default value set to High, Normal, or External redundancy.  External Redundancy disk groups support only UNPROTECTED volumes and High Redundancy disk groups support only high redundancy volumes.
Striping	The following attributes can be set for striping. <ul style="list-style-type: none"> <li>■ <b>Stripe Width.</b> Specified in units of KB and MB. The values are powers of two ranging from 4KB to 1MB. The default value is 128K.</li> <li>■ <b>Stripe Columns.</b> The values can range from 1 through 8. The default value is 1.</li> </ul>

### Related Topics

[ASM Volume Device](#)

[Creating ASM Volumes](#)

[Configuring ASM Volumes using ASMCA](#)

## 1.21 Edit Attributes for Disk Group Page

Use this page to edit the following attributes for a disk group:

- Disk Group Compatibility
- Disk Repair Time
- ASM Compatibility
- ADVM Compatibility

### 1.21.1 Disk Group Compatibility Attributes

Compatibility decides whether a user can leverage features in a new version of the product. ASM Compatibility is the minimum software version required for an ASM instance to mount this diskgroup (version 10.1 and above). Database Compatibility is the minimum software version required for a database instance to use files in this diskgroup (version 10.1 and above). ADVM Compatibility is the minimum software version required for an ASM volume to use this diskgroup (version 11.2 and above).

### 1.21.2 Disk Repair Time Attributes

You can specify a time period that you feel is sufficient for carrying out the disk repair. During this period, the ASM instance modifies the redundancy of the disk group.

In the **Disk Repair Time** box, type or select the disk repair time, and click on Hours or Days from the list to set the duration.

### 1.21.3 Related Links

[Configuring ASM: Disk Groups Page](#)

[Create Disk Groups Page](#)

## 1.22 Label Disks

Setting a label provisions a disk to be used and managed by Oracle AFD. Use the Label Disks page to label the disks.

To label disks:

1. Navigate to the Disk Groups page.
2. Click **Create**, and then click **Label Disks**.
3. Configure the following elements:

Element	Description
AFD Discovery String	The Oracle AFD disk discovery string that is used to identify the disks to be managed by Oracle AFD. Click <b>Update</b> to update the list of disks with the discovery string.
Show Candidate or Show All	Choose one of the following: <ul style="list-style-type: none"> <li>■ <b>Show Candidate</b>. Select this option to see the all the AFD enabled disks, that don't have an associated label.</li> <li>■ <b>Show All</b>. Select this option to see the all the AFD enabled disks.</li> </ul>
Label Prefix	The label prefix you want to add to the disks. Select the disks from the list, to apply the prefix.

Element	Description
Apply Prefix	Click <b>Apply Prefix</b> to apply the prefix to all the selected disks.
Label Disks and close Window	Sets the labels as listed in the Label Name column, to all the selected disks.

**Related Links**

Clear Labels

## 1.23 Manage Templates Page

Use the Manage Templates page to:

- Add new templates to a disk group or drop templates
- Set redundancy (mirroring) and striping attributes for the files created in an ASM disk group

When a file is created, redundancy and striping attributes are set for that file based on the system template, which is the default template for the file type.

When a disk group is created, ASM creates a set of default templates for that disk group. The set consists of one template for each file type (data file, control file, redo log file, and so on) supported by ASM. Default template settings depend on the disk group type. For example, the default template for datafiles for a normal redundancy disk group sets 2-way mirroring, while the corresponding default template in a high redundancy disk group sets 3-way mirroring. The table below lists the default templates and the attributes that they apply to matching files. As the table shows, the initial redundancy value of each default template depends on the type of disk group that the template belongs to.

The following table shows the elements defined for ASM templates, and their description:

Element	Description
Name	Name of the ASM template. For e.g., diagnostic_dest
Redundancy	<p>Mirroring attribute of templates applies only to normal redundancy disk groups, and is ignored for high-redundancy disk groups (where every file is always 3-way mirrored) and external redundancy disk groups (where no files are mirrored by ASM). Nevertheless, each type of disk group gets a full set of templates, and the redundancy value in each template is always set to the proper default for the disk group type.</p> <p>Permitted redundancy values for ASM templates are the following:</p> <ul style="list-style-type: none"> <li>■ <b>MIRRORED</b></li> <li>■ <b>HIGH</b></li> <li>■ <b>UNPROTECTED</b></li> </ul> <p>If no redundancy attribute is specified, the default value is set to MIRROR for a normal redundancy disk group, HIGH for a high redundancy disk group, and UNPROTECTED for an external redundancy disk group. There are no mirror zones for diskgroups of external redundancy.</p>

Element	Description
Striped	<p>The striping attribute of templates applies to all disk group types (normal redundancy, high redundancy, and external redundancy). Permitted values for the striping attribute of ASM templates are the following:</p> <ul style="list-style-type: none"> <li>■ <b>FINE</b>. Striping in 128KB chunks.</li> <li>■ <b>COARSE</b>. Striping in 1MB chunks.</li> </ul> <p>If no striping attribute is specified, the default value is set to COARSE</p>
Primary Extent Zone	If the data is frequently accessed, read-only or updated, put the Primary Extent in the hot zone.
Mirror Extent Zone	If the data is frequently accessed and is mostly read-only, put the Mirror Extent in the cold zone. If the data is frequently accessed and updated, put the Mirror Extent in the hot zone.

You can right click on the user-defined template to drop it from a disk group. You can only drop templates that are user-defined; you cannot drop the default system templates.

#### Related Topics

Configuring ASM: Disk Groups Page

## 1.24 ASM Configuration Assistant: Migrate ASM Page

If the ASM instance running on your system is of a version lower than 11.2, then you must migrate your ASM instance to a 11.2 compatible version. This helps you to make use of 11.2 features such as Volumes and ASM Cluster File System.

Use the USM Configuration Assistant: Migrate ASM Page to:

- Migrate your ASM instance to the latest version available
- Specify the authentication credentials for monitoring the ASM instance

### 1.24.1 Accessing an ASM Instance

You can connect to the ASM instance as an administrator. You require the following authentication credentials for accessing an ASM instance:

- SYS password file authentication
- SYSDBA system authentication user privileges for monitoring the ASM instance

### 1.24.2 SYS User

You can manage your ASM instance using SYS password file authentication. To enable the migration of ASM, you must use the SYS password. The SYS user account is automatically created when ASM is created and is granted the SYSASM role. Like a database password file, the only user added to the password file upon creation is SYS. If you want to add other users to the password file, you must share the password file with a database instance and add the users to the database. This authentication allows you to connect to the ASM from a remote location.

### 1.24.3 Monitoring User

You can create at least one additional monitoring user and grant that user an appropriate administrative role to use while performing daily administrative tasks. This user can be a SYSDBA user with less administrative privileges.

Click **Upgrade ASM** to migrate the ASM Instance.

### 1.24.4 Related Topics

[ASM Parameters](#)

## 1.25 Mount ASM Cluster File System Page

The Mount ASM Cluster File System Page is used to attach an ASM Cluster file system to a directory. The mount command returns an error if the file system is already mounted on this node. On Linux platforms, ASMCA generates the mount command that has to be executed manually as root by the user.

Element	Description
Oracle File System Volume Device	Location of the ACFS volume device file
Disk Group	Name of the disk group
Size	Size of the ACFS (GB)
Mount Point	<b>Mount Point</b> is the directory in which you want the file system to be mounted. This directory must already exist before you mount the ACFS.

#### Related Topics

[Create ASM Cluster File System Page](#)

[Resize ASM Cluster File System Page](#)

[ASM Cluster File System](#)

[ASM Volume Device](#)

## 1.26 Resize ASM Volume Page

Use the Resize ASM Volume page to expand or shrink the ASM volume.

**Note:** If the volume is formatted as an ASM Cluster File System (ACFS), it has to be resized as an Oracle File System. The Resize option is disabled for ACFS volumes.

Element	Description
Volume	Name of the ASM volume that you want to resize.
Disk Group	Name of the ASM disk group for the volume.
Disk Group Usable Space (GB)	Indicates the usage (in GB) that is specified for this volume. It need not be ACFS only.
Disk Group Free Space (GB)	Indicates the amount of free space (in GB) available in the disk group that can be safely utilized.
Usage	Name of the ACFS that the volume is formatted as.



Element	Description
Mount Point	Location at which the ACFS file is mounted This field is displayed only when the volume is associated with an ACFS and ACFS is in the "MOUNTED" state.
Size	The new size for the volume. Enter a size in this field to resize the ASM volume. You can choose one of the following units: M(Megabytes), G(Gigabytes), or T(Terabytes).

**Related Topics**

ASM Volumes

Create Volume Page

## 1.27 Resize ASM Cluster File System Page

The Resize ASM Cluster File System Page helps you to augment or reduce the mounted ACFS file system and its corresponding ASM volume to match the specified size. The disk group must have enough free storage to accommodate the requested increase to the file system size. Reducing a file system size returns unused storage space located at the end of the files system to the disk group. Using the Resize ACFS option, you can resize the ACFS filesystem and the ASM volume device in one step.

Element	Description
Volume Device	Location of the ASM volume device that is added to the file system.
Volume	Name of the ASM volume.
Disk Group	Name of the disk group.
Disk Group Usable Space (GB)	Indicates the usage (in GB) that is specified for this disk group.
Disk Group Free Space (GB)	Free space available in the disk group (GB).
Size	The new size for the mounted ACFS file system. The size specified is the absolute new size. You can choose one of the following units: M(Megabytes), G(Gigabytes), or T(Terabytes).

**Related Topics**

Create ASM Cluster File System Page

Mount ASM Cluster File System Page

ASM Cluster File System

## 1.28 Show Mount/Dismount Command Page

This dialog shows the mount or dismount command and asks the user to run it as root manually.

**Related Topics**

Create ASM Cluster File System Page

Resize ASM Cluster File System Page

ASM Cluster File System

## 1.29 Warning

This page provides a warning when usage is of type ACFS or ACFS Primary.

## 1.30 ASM Disk Groups

A disk group comprises of a set of Automatic Storage Management (ASM) disks that are managed together as a logical unit. Rather than managing hundreds, possibly thousands of files, the administrators create and administer the disk group, by using ASM. The data structures in a disk group are self contained and consume some of the disk space in a disk group. ASM disks can be added or dropped from a disk group while the database is running. ASM rebalances the data to ensure an even I/O load to all disks in a disk group even when the configuration of the disk group changes.

Any single ASM file is contained in a single disk group. However, a disk group can contain files belonging to several databases, and a single database can use storage from multiple disk groups. One or more disk groups can be specified as the default disk group for files created in a database. ASM ensures that a file is evenly spread across all disks in a disk group when the file is allocated.

There are three types of disk groups: normal redundancy, high redundancy, and external redundancy. With normal and high redundancy, ASM provides redundancy for all files in the disk group according to the attributes specified in the disk group templates. High redundancy provides a greater degree of protection. With external redundancy, ASM does not provide any redundancy for the disk group. The underlying disks in the disk group should provide redundancy (for example, using a storage array), or the user must be willing to tolerate loss of the disk group if a disk fails (for example, in a test environment).

## 1.31 ASM Disks

An ASM disk can be a disk device, a partition, or a network-attached file. When an ASM instance starts, it automatically discovers all available ASM disks. Discovery is the process of finding all disks that have been prepared for ASM by your system administrator, examining their disk headers, and determining which disks belong to disk groups and which are available for assignment to disk groups.

A disk group consists of a grouping of disks that are managed together as a unit. The disks in a disk group are referred to as ASM disks. On Windows operating systems, an ASM disk is always a partition. On all other platforms, an ASM disk can be:

- A partition of a logical unit number (LUN)
- A network-attached file

When an ASM instance starts, it automatically discovers all available ASM disks. Discovery is the process of determining every disk device to which the ASM instance has been given I/O permissions (by some operating system mechanism), and of examining the contents of the first block of such disks to see if they are recognized as belonging to a disk group. ASM discovers disks in the paths that are listed in an initialization parameter, or if the parameter is NULL, in an operating system-dependent default path.

**Note:** Although you can also present a volume for management by ASM, it is not recommended to run ASM on top of another host-based volume manager.

## 1.32 ASM Instance

The Automatic Storage Management (ASM) instance is a special Oracle instance that manages the disks in disk groups. The ASM instance must be configured and running for the database instance to access Automatic Storage Management files. This configuration is done automatically if the Database Configuration Assistant was used for database creation. ASM is implemented as a special kind of Oracle instance, with its own System Global Area (SGA) and background processes. The ASM instance typically has a much smaller SGA than a database instance.

ASM instances cannot mount databases. The ASM instances simply coordinate data layout for database instances. Database instances do direct I/O to disks in disk groups without going through an ASM instance.

Multiple and separate database instances can share disk groups for their files. On a single node, there is typically a single ASM instance on the node, which manages all disk groups. In a Real Application Clusters environment, there is typically one Automatic Storage Management instance on each node managing all disk groups for its node in a coordinated manner with the rest of the cluster.

An Oracle instance that mounts ASM disk groups and performs management functions necessary to make ASM files available to database instances. ASM instances do not mount databases.

## 1.33 ASM Mirroring

Maintaining identical copies of data on one or more disks. Typically, mirroring is performed on duplicate hard disks at the operating system level, so that if one of the disks becomes unavailable, the other disk can continue to service requests without interruptions.

ASM mirroring is more flexible than operating system mirrored disks because ASM mirroring enables the redundancy level to be specified on a per-file basis. Thus two files can share the same disk group with one file being mirrored while the other is not. Mirroring takes place at the extent level. If a file is mirrored, depending upon redundancy level set for the file, each extent has one or more mirrored copies, and mirrored copies are always kept on different disks in the disk group. the three mirroring options that ASM supports on a per-file basis.

Automatic Storage Management's native mirroring mechanism is an option that can be set in the process of creating a disk group. You can specify the redundancy protection for that group, and if you prefer to use an external mirroring system or you have no need for fault-tolerance, you can set the redundancy to external, in which case ASM will not mirror at all. Unless otherwise specified, redundancy defaults to normal, in which case ASM mirrors each 1 MB extent. For the highest level of fault tolerance, you can specify high redundancy, which provides three-way mirroring. If mirroring is selected for an ASM disk group, failure groups can provide an additional level of data. A failure group is a set of disks in a disk group sharing a common resource whose failure you wish to protect against. Once the DBA has configured a failure group, ASM will intelligently place the redundant copies of the data in separate failure groups to ensure that the loss of one failure group will not result in loss of data. The higher in the stack that one can enable redundancy protection the larger the failures they can survive. The use of failure groups enables larger loss of storage components to not result in any lost data.

## 1.34 ASM Striping

ASM striping is the process of dividing a file into 1 MB extents and spreading the extents evenly across all disks in the disk group. An extent is a specific number of contiguous data blocks, obtained in a single allocation, used to store a specific type of information. This optimizes performance and disk utilization, making manual I/O performance tuning unnecessary. ASM enhances the concept of striping by providing additional flexibility for changes in the disk configuration. Spreading the workload across as many disks as possible results in less contention and high I/O throughput.

ASM automatically distributes ASM files across disks in an ASM diskgroup using file extents. An allocation unit is the smallest contiguous disk space that ASM allocates. The allocation unit size is set at ASM diskgroup creation time and it is typically one megabyte.

For striping, or the interleaving of a related block of data across disks, the following parameters need to be defined:

- **Stripe depth** is the size of the stripe, sometimes called stripe unit.
- **Stripe width** is the product of the stripe depth and the number of drives in the striped set.

For situations where performance requires more throughput than one disk per extent provides, extent striping can be used. ASM currently only supports fine (128K X 8) and coarse grain striping. The AVD driver supports stripe widths that are different than the ASM allocation unit to support better efficiency when an ASM volume file is used with a filesystem. This attribute can be specified at ASM volume file creation time and cannot be changed.

**Note:** Stripe widths other than the ASM allocation unit (coarse grain) in a diskgroup may not be supported in the first release for ASM volume files.

## 1.35 ASM Volume Device

An ASM volume device is the OS dependent device file that is normally used to access disk-type devices. The naming of the ASM volume device will include the ASM diskgroup name and the ASM volume file name specified by the administrator at volume file creation time. For example, an ASM volume named vol1 in diskgroupa and another ASM volume named vol1 in diskgroupb would have their device name in Unix variants as: /dev/asm/diskgroupa/vol1 /dev/asm/diskgroupb/vol1 The ASM volume device file will be created automatically when an ASM volume is created. Also once a diskgroup is mounted in an ASM instance and contains ASM volume files, volumes can be enabled which will cause the corresponding volume device files to be created. The disk group mount and volume enable can happen automatically upon ASM instance startup. The volume device file names are cluster wide unique and persistent across all nodes in the cluster which have an ASM instance running with the diskgroup mounted and volumes enabled. When a node boots into the cluster and the ASM instance is started, the cluster wide unique volume device files are created once the diskgroup is mounted which contains volume files and the volumes are enabled.

## 1.36 Oracle File System

ASM Cluster file systems are created on ASM volumes that are presented as disk devices. ASM volumes are constructed from ASM files that distribute segments of each ASM file across multiple disks configured within each disk group, for increased parallelism. ACFS supports a multiple storage device model where an individual ACFS file system may optionally span multiple device files. This facilitates the

management of the physical storage devices independently from the ACFS directory hierarchy and thus enables file data management operations such as migration of files and file regions from one storage device to another, without impacting the file path or the ACFS name space. In addition, storage devices may be dynamically inserted and deleted from an ACFS file system, enabling dynamic resizing and transparent, on-line storage technology upgrades.

