Disks

System Manager Classic

NetApp
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Disks

You can use System Manager to manage disks.

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Reassigning disks to nodes

You can use System Manager to reassign the ownership of spare disks from one node to another node to increase the capacity of an aggregate or storage pool.

About this task

- You can reassign disks if the following conditions are true:
  - The container type of the selected disks must be “spare” or “shared”.
  - The disks must be connected to nodes in an HA configuration.
  - The disks must be visible to the node.
- You *cannot* reassign a disk if the following conditions are true:
  - The container type of the selected disk is “shared”, and the data partition is not spare.
  - The disk is associated with a storage pool.
- You cannot reassign the data partition of shared disks if storage failover is not enabled on the nodes that are associated with the shared disks.
- For partition disks, you can reassign only the data partition of the disks.
- For MetroCluster configurations, you cannot use System Manager to reassign disks.

  You must use the command-line interface to reassign disks for MetroCluster configurations.

Steps

1. Click **Storage** > **Aggregates & Disks** > **Disks**.
2. In the **Disks** window, select the **Inventory** tab.
3. Select the disks that you want to reassign, and then click **Assign**.
4. In the **Warning** dialog box, click **Continue**.
5. In the **Assign Disks** dialog box, select the node to which you want to reassign the disks.
6. Click **Assign**.

Viewing disk information

You can use the Disks window in System Manager to view the name, size, and container details of disks along with graphical information about capacity disks and cache disks.

Steps

1. Click **Storage** > **Aggregates & Disks** > **Disks**.
2. Select the disk that you want to view information about from the displayed list of disks.
3. Review the disk details.

Related information

Disks window

How ONTAP reports disk types

ONTAP associates a type with every disk. ONTAP reports some disk types differently than the industry standards; you should understand how ONTAP disk types map to industry standards to avoid confusion.

When ONTAP documentation refers to a disk type, it is the type used by ONTAP unless otherwise specified. *RAID disk types* denote the role that a specific disk plays for RAID. RAID disk types are not related to ONTAP disk types.

For a specific configuration, the disk types that are supported depend on the storage system model, the shelf type, and the I/O modules that are installed in the system.

The following tables show how ONTAP disk types map to industry standard disk types for the SAS and FC storage connection types, and for storage arrays.

SAS-connected storage

ONTAP disk type	Disk class	Industry standard disk type	Description
BSAS	Capacity	SATA	Bridged SAS-SATA disks with added hardware to enable them to be plugged into a SAS-connected storage shelf
FSAS	Capacity	NL-SAS	Near Line SAS
MSATA	Capacity	SATA	SATA disk in multi-disk carrier storage shelf
SAS	Performance	SAS	Serial-Attached SCSI
SSD	Ultra-performance	SSD	Solid-state drives

FC-connected storage

ONTAP disk type	Disk class	Industry standard disk type
ATA	Capacity	SATA
FCAL	Performance	FC

Storage arrays

ONTAP disk type	Disk class	Industry standard disk type	Description
LUN	N/A	LUN	Logical storage device that is backed by storage arrays and used by ONTAP as a disk These LUNs are referred to as *array LUNs* to distinguish them from the LUNs that ONTAP serves to clients.

Related information

NetApp Hardware Universe

NetApp Technical Report 3437: Storage Subsystem Resiliency

Minimum number of hot spares required for disks

Having insufficient spares increases the risk of a disk failure with no available spare, resulting in a degraded RAID group. A spare disk is also required to provide important information (a *core file*) to technical support in case of a controller disruption.

MSATA disks, or disks in a multi-disk carrier, should have four hot spares during steady state operation, and you should never allow the number of MSATA hot spares to dip below two.

For RAID groups composed of SSDs, you should have at least one spare disk.

For all other ONTAP disk types, you should have at least one matching or appropriate hot spare available for each kind of disk installed in your storage system. However, having two available hot spares for all disks provides the best protection against disk failure. Having at least two available hot spares provides the following benefits:

- When you have two or more hot spares for a data disk, ONTAP can put that disk into the maintenance center if required.

  ONTAP uses the maintenance center to test suspect disks and to take offline any disk that shows problems.

- Having two hot spares means that when a disk fails, you still have a spare disk available if another disk fails before you replace the first failed disk.

A single spare disk can serve as a hot spare for multiple RAID groups. However, if any disk in those RAID groups fails, then no spare disk is available for any future disk failures or for a core file until the spare disk is replaced. Therefore, it is a best practice to have more than one spare.

Spare requirements for multi-disk carrier disks

Maintaining the proper number of spares for disks in multi-disk carriers is critical for optimizing storage redundancy and minimizing the amount of time that ONTAP must spend copying disks to achieve an optimal disk layout.

You must maintain a minimum of two hot spares for multi-disk carrier disks at all times. To support the use of the Maintenance Center and to avoid issues caused by multiple concurrent disk failures, you should maintain at least four hot spares for steady state operation, and replace failed disks promptly.

If two disks fail at the same time with only two available hot spares, ONTAP might not be able to swap the contents of both the failed disk and its carrier mate to the spare disks. This scenario is called a *stalemate*. If this happens, you are notified through EMS messages and AutoSupport messages. When the replacement carriers become available, you must follow the instructions that are provided by the EMS messages or you must contact technical support to recover from the stalemate.

Shelf configuration requirements for multi-disk carrier storage shelves

You can combine multi-disk carrier disk shelves with single-disk carrier disk shelves (standard disk shelves) on the same storage system and within in the same stack.

Determine when it is safe to remove a multi-disk carrier

Removing a multi-disk carrier before it is safe to do so can result in one or more RAID groups becoming degraded, or possibly even a storage disruption. System Manager enables you to determine when it is safe to remove a multi-disk carrier.

When a multi-disk carrier has to be replaced, the following events must have occurred before you can remove the carrier safely:

- An AutoSupport message must have been logged indicating that the carrier is ready to be removed.
- An EMS message must have been logged indicating that the carrier is ready to be removed.
- The state of both disks in the carrier must be displayed as `broken` in the Disks window.

  You must remove the disks only after the carrier mate of a failed disk is evacuated. You can click Details to view the disk evacuation status in the Properties tab of the Disks window.
- The fault LED (amber) on the carrier must be lit continuously indicating that it is ready for removal.
- The activity LED (green) must be turned off indicating there is no disk activity.
- The shelf digital display only shows the shelf ID number.

You cannot reuse the carrier mate of a failed disk. When you remove a multi-disk carrier that contains a failed disk, you must replace it with a new carrier.

Considerations for sizing RAID groups

Configuring an optimum RAID group size requires a trade-off of factors. You must decide which factors—speed of RAID rebuild, assurance against risk of data loss due to drive failure, optimizing I/O performance, and maximizing data storage space—are most important for the aggregate that you are configuring.

When you create larger RAID groups, you maximize the space available for data storage for the same amount of storage used for parity (also known as the “parity tax”). On the other hand, when a disk fails in a larger RAID group, reconstruction time is increased, impacting performance for a longer period of time. In addition, having more disks in a RAID group increases the probability of a multiple disk failure within the same RAID group.

HDD or array LUN RAID groups

You should follow these guidelines when sizing your RAID groups composed of HDDs or array LUNs:

- All RAID groups in an aggregate should have the same number of disks.

  While you can have up to 50% less or more than the number of disks in different raid groups on one aggregate, this might lead to performance bottlenecks in some cases, so is best avoided.

- The recommended range of RAID group disk numbers is between 12 and 20.

  The reliability of performance disks can support a RAID group size of up to 28, if needed.

- If you can satisfy the first two guidelines with multiple RAID group disk numbers, you should choose the larger number of disks.

SSD RAID groups in Flash Pool aggregates

The SSD RAID group size can be different from the RAID group size for the HDD RAID groups in a Flash Pool aggregate. Usually, you should ensure that you have only one SSD RAID group for a Flash Pool aggregate, to minimize the number of SSDs required for parity.

SSD RAID groups in SSD aggregates

You should follow these guidelines when sizing your RAID groups composed of SSDs:

- All RAID groups in an aggregate should have a similar number of drives.

  The RAID groups do not have to be exactly the same size, but you should avoid having any RAID group that is less than one half the size of other RAID groups in the same aggregate when possible.

- For RAID-DP, the recommended range of RAID group size is between 20 and 28.

Disks window

You can use the Disks window to view all the disks in your storage system.

Command buttons

- **Assign**

  Assigns or reassigns the ownership of the disks to a node.

  This button is enabled only if the container type of the selected disks is unassigned, spare, or shared.

- **Zero Spares**

  Erases all the data, and formats the spare disks and array LUNs.

- **Refresh**

  Updates the information in the window.

Tabs

Summary

Displays detailed information about the disks in the cluster, including the size of the spare disks and assigned disks. The tab also graphically displays information about spare disks, aggregates, and root aggregates for HDDs and information about spare disks, disks in a storage pool, aggregates, Flash Pool aggregates, and root aggregates for cache disks (SSDs).

The HDD panel is not displayed for systems with All Flash Optimized personality.

The details panel provides additional information about partitioned and unpartitioned spare disks (disk type, node, disk size, RPM, checksum, number of available disks, and spare capacity), in tabular format.

Inventory

- **Name**

  Displays the name of the disk.

- **Container Type**

  Displays the purpose for which the disk is used. The possible values are Aggregate, Broken, Foreign, Label Maintenance, Maintenance, Shared, Spare, Unassigned, Volume, Unknown, and Unsupported.

- **Partition Type**

  Displays the partition type of the disk.

- **Node Name**

  Displays the name of the node that contains the aggregate.

  This field is available only at the cluster level.

- **Home owner**

  Displays the name of the home node to which this disk is assigned.

- **Current owner**

  Displays the name of the node that currently owns this disk.

- **Root owner**

  Displays the name of the node that currently owns the root partition of this disk.

- **Data Owner**

  Displays the name of the node that currently owns the data partition of this disk.

- **Data1 Owner**

  Displays the name of the node that currently owns the data1 partition of the disk.

- **Data2 Owner**

  Displays the name of the node that currently owns the data2 partition of the disk.

- **Storage Pool**

  Displays the name of the storage pool with which the disk is associated.

- **Type**

  Displays the type of the disk.

- **Firmware Version**

  Displays the firmware version of the disk.

- **Model**

  Displays the model of the disk.

- **RPM**

  Displays the effective speed of the disk drive when the option `raid.mix.hdd.rpm.capacity` is enabled, and displays the actual speed of the disk drive when the option `raid.mix.hdd.rpm.capacity` is disabled.

  This field is not applicable to SSDs.

- **Effective Size**

  Displays the usable space available on the disk.

- **Physical Space**

  Displays the total physical space of the disk.

- **Shelf**

  Displays the shelf on which the physical disks are located.

This field is hidden by default.

- **Bay**

  Displays the bay within the shelf for the physical disk.

  This field is hidden by default.

- **Pool**

  Displays the name of the pool to which the selected disk is assigned.

  This field is hidden by default.

- **Checksum**

  Displays the type of the checksum.

  This field is hidden by default.

- **Carrier ID**

  Specifies information about disks that are located within the specified multi-disk carrier. The ID is a 64-bit value.

  This field is hidden by default.

Inventory details area

The area below the inventory tab displays detailed information about the selected disk, including information about the aggregate or volume (if applicable), vendor ID, zeroing state (in percent), serial number of the disk, and error details in case of a broken disk. For shared disks, the Inventory details area displays the names of all the aggregates, including the root and the non-root aggregates.

Related information

Viewing disk information