NetApp

Storage array administration

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Concepts

Storage array overview

A storage array is a storage entity that is managed by the System Manager software. A storage array consists of a collection of both physical components and logical components.

Physical components

The physical components of a storage array are described in this table.

Component	Description
Controller	A controller consists of a board, firmware, and software. It controls the drives and implements the System Manager functions.
Shelf	A shelf is an enclosure installed in a cabinet or rack. It contains the hardware components for the storage array. There are two types of shelves: a controller shelf and a drive shelf. A controller shelf includes controllers and drives. A drive shelf includes input/output modules (IOMs) and drives. (i) If your storage array contains different media types or different interface types, a drive shelf for each drive type appears.
Drive	A drive is an electromagnetic mechanical device or solid state memory device that provides the physical storage media for data.
Host	A host is a server that sends I/O to a volume on a storage array.
Host bus adapter (HBA)	A host bus adapter (HBA) is a board that resides in a host and contains one or more host ports.
Host port	A host port is a port on a host bus adapter (HBA) that provides the physical connection to a controller and is used for I/O operations.
Management client	A management client is the computer where a browser is installed for accessing System Manager.

Logical components

The drives in the storage array provide the physical storage capacity for data. Use System Manager to configure the physical capacity into logical components, such as pools, volume groups, and volumes. These components are the tools that you use to configure, store, maintain, and preserve data on the storage array. The logical components of a storage array are described in this table.

Component	Description
Pool	A pool is a set of drives that is logically grouped. You can use a pool to create one or more volumes accessible to a host. (You create volumes from either a pool or a volume group.)
Volume group	A volume group is a container for volumes with shared characteristics. A volume group has a defined capacity and RAID level. You can use a volume group to create one or more volumes accessible to a host. (You create volumes from either a volume group or a pool.)
Volume	A volume is a container in which applications, databases, and file systems store data. It is the logical component created for the host to access storage on the storage array.
Logical unit number (LUN)	A logical unit number (LUN) is the number assigned to the address space that a host uses to access a volume. The volume is presented to the host as capacity in the form of a LUN. Each host has its own LUN address space. Therefore, the same LUN can be used by different hosts to access different volumes.

Administrator password protection

You must configure the storage array with an administrator password to protect it from unauthorized access.

Setting an administrator password

Setting an administrator password for your storage array protects it from users who unknowingly or maliciously run destructive commands. You are required to set an administrator password when you start System Manager for the first time.

There is one administrator password that is shared among all users. Any user who has this password can make configuration changes to the storage array, such as adding, changing, or removing objects or settings.

Entering your password

The system prompts you for the password only once during a single management session. A session times out after 20 minutes of inactivity, at which time, you must enter the password again.

If another user managing the same storage array from another management client changes the password while your session is in progress, you are prompted for a password the next time you attempt a configuration operation or a view operation.

For security reasons, you can attempt to enter a password only five times before the storage array enters a "lockout" state. In this state, the storage array will reject subsequent password attempts. You must wait 10 minutes for the storage array to reset to a "normal" state before you try to enter a password again.

Removing drives with password protection

The password is stored on a reserved area of each drive on the storage array. If you remove all drives from a storage array, its password will no longer work. To correct this condition, re-install one of the original drives to the storage array.

Removing password protection

If you no longer want to have commands password-protected, enter the current administrator password, and leave the new password text boxes blank.

> ℹ️ Running configuration commands on a storage array can cause serious damage, including data loss. For this reason, you should always set an administrator password for your storage array. Use a long administrator password with at least 15 alphanumeric characters to increase security.

Problem notification

System Manager uses icons and several other methods to notify you that problems exist with the storage array.

Icons

System Manager uses these icons to indicate the status of the storage array and its components.

Icon	Description
✅	Optimal
❌	Non-optimal or failed
🔧	Needs attention or fixing
⚠️	Caution

System Manager displays these icons in various locations.

- The Notifications area on the Home page displays the failed icon and a message.
- The Home page icon in the navigation area displays the failed icon.
- On the Components page, the graphics for drives and controllers display the failed icon.

Alerts and LEDs

In addition, System Manager notifies you of problems in other ways.

- System Manager sends SNMP notifications or email error messages.
- The Service Action Required LEDs on the hardware come on.

When you receive notification of a problem, use the Recovery Guru to help you fix the problem. Where necessary, use the hardware documentation with the recovery steps to replace failed components.

Operations in progress

The Operations in Progress page allows you to view a list of long-running operations that are currently running or are in a suspended, stopped, or failed state. You can take action on certain types of operations.

Long-running operations can affect system performance. For some operations, you have the option to stop the operation or change its priority so that more important operations complete first.

Operations that appear on the Operations in Progress page include the following:

Operation	Possible status of the operation	Actions you can take
Volume copy	Completed	Clear
Volume copy	In progress	• Change priority • Stop
Volume copy	Pending	Clear
Volume copy	Failed	• Clear • Re-copy
Volume copy	Stopped	• Clear • Re-copy
Volume create (thick pool volumes larger than 64TiB only)	In progress	*none*
Volume delete (thick pool volumes larger than 64TiB only)	In progress	*none*
Asynchronous mirror group initial synchronization	In progress	Suspend
Asynchronous mirror group initial synchronization	Suspended	Resume
Synchronous mirroring	In progress	Suspend
Synchronous mirroring	Suspended	Resume
Snapshot image rollback	In progress	Cancel
Snapshot image rollback	Pending	Cancel

Operation	Possible status of the operation	Actions you can take
Snapshot image rollback	Paused	• Cancel • Resume
Drive evacuation	In progress	Cancel (depends on the drive evacuation type)
Add capacity to pool or volume group	In progress	*none*
Change a RAID level for a volume	In progress	*none*
Reduce capacity for a pool	In progress	*none*
Thin volume reclamation	In progress	*none*
Check the time remaining on an instant availability format (IAF) operation for pool volumes	In progress	*none*
Check the data redundancy of a volume group	In progress	*none*
Defragment a volume group	In progress	*none*
Initialize a volume	In progress	*none*
Increase capacity for a volume	In progress	*none*
Change segment size for a volume	In progress	*none*
Drive copy	In progress	*none*
Data reconstruction	In progress	*none*
Copyback	In progress	*none*

How tos

Set default units for capacity values

System Manager can display capacity values in either gibibytes (GiB) or tebibytes (TiB).

About this task

Abbreviation	Value
GiB	$1{,}024^3$ bytes
TiB	$1{,}024^4$ bytes

Preferences are stored in the browser's local storage so all users can have their own settings.

Steps

1. Select **Preferences › Set preferences**.

2. Click the radio button for either **Gibibytes** or **Tebibytes**, and confirm that you want to perform the operation.

Set default time frame for performance graphs

You can change the default time frame shown by the performance graphs.

About this task

Performance graphs shown on the Home page and on the Performance page initially show a time frame of 1 hour. Preferences are stored in the browser's local storage so all users can have their own settings.

Steps

1. Select **Preferences › Set preferences.**

2. In the drop-down list, select either **5 minutes**, **1 hour**, **8 hours**, **1 day**, or **7 days**, and confirm that you want to perform the operation.

Recover from problems using Recovery Guru

The Recovery Guru is a component of System Manager that diagnoses storage array problems and recommends recovery procedures to fix the problems.

Steps

1. Select **Home**.

2. Click the link labeled **Recover from n problems** in the center-top of the window.

   The Recovery Guru dialog appears.

3. Select the first problem shown in the summary list, and then follow the instructions in the recovery procedure to correct the problem. Where necessary, use the replacement instructions to replace failed components. Repeat this step for each listed problem.

   Multiple problems within a storage array can be related. In this case, the order in which the problems are corrected can affect the outcome. Select and correct the problems in the order that they are listed in the summary list.

   Multiple failures for a power-supply canister are grouped and listed as one problem in the summary list. Multiple failures for a fan canister are also listed as one problem.

4. To make sure that the recovery procedure was successful, click **Recheck**.

If you selected a problem for an asynchronous mirror group or a member of an asynchronous mirror group, click **Clear** first to clear the fault from the controller, and then click **Recheck** to remove the event from the Recovery Guru.

If all of the problems have been corrected, the storage array icon eventually transitions from Needs Attention to Optimal. For some problems, a Fixing icon appears while an operation, such as reconstruction, is in progress.

5. **Optional:** To save the Recovery Guru information to a file, click the **Save** icon.

   The file is saved in the Downloads folder for your browser with the name `recovery-guru-failure-yyyy-mm-dd-hh-mm-ss-mmm.html`.

6. **Optional:** To print the Recovery Guru information, click the **Print** icon.

View and act on operations in progress

To view and take action on long-running operations, use the Operations in Progress page.

About this task

For each operation listed on the Operations in Progress page, a percentage of completion and estimated time remaining to complete the operation are shown. In some cases, you can stop an operation or place it at a higher or lower priority. You can also clear a completed Volume copy operation from the list.

Steps

1. On the **Home** page, select **Show operations in progress**.

   The **Operations in Progress** page appears.

2. If desired, use the links in the **Actions** column to stop or change priority for an operation.

   > ⚠ Read all cautionary text provided in the dialog boxes, particularly when stopping an operation.

   You can stop a volume copy operation or change its priority.

3. Once a volume copy operation is complete, you can select **Clear** to remove it from the list.

   At the top of the **Home** page, an informational message and yellow wrench icon appear when an operation is complete. This message includes a link that allows you to clear the operation from the **Operations in Progress** page.

FAQs

Where can I find more information about display preferences?

You can find information about the available display options in the following help topics.

- To read more about the default units for displaying capacity values, see Set default units for capacity values.

- To read more about the default time frame for displaying performance graphs, see Set default time frame for performance graphs.

What are the supported browsers?

System Manager supports these browser versions.

Browser	Minimum version
Google Chrome	47
Microsoft Internet Explorer	11
Microsoft Edge	EdgeHTML 12
Mozilla Firefox	31
Safari	9

What are the keyboard shortcuts?

You can navigate around System Manager using the keyboard alone.

Overall navigation

Action	Keyboard shortcut
Move to the next item.	Tab
Move to the previous item.	Shift + Tab
Select an item.	Enter
Drop-down list—Move to the next or previous item.	Down arrow or up arrow
Check box—Select an item.	Spacebar
Radio buttons—Toggle between items.	Down arrow or up arrow
Expandable text—Expand or contract item.	Enter

Table navigation

Action	Keyboard shortcut
Select a row.	Tab to select a row, then press Enter

Action	Keyboard shortcut
Scroll up or down.	Down arrow/up arrow or Page Down/Page Up
Change the sort order of a column.	Tab to select a column heading, then press Enter

Calendar navigation

Action	Keyboard shortcut
Move to the previous month.	Page Up
Move to the next month.	Page Down
Move to the previous year.	Control + Page Up
Move to the next year.	Control + Page Down
Open the date picker if closed.	Control + Home
Move to the current month.	Control / Command + Home
Move to the previous day.	Control / Command + Left
Move to the next day.	Control / Command + Right
Move to the previous week.	Control / Command + Up
Move to the next week.	Control / Command + Down
Select the focused date.	Enter
Close the date picker and erase the date.	Control / Command + End
Close the date picker without selection.	Escape