



VFM (Virtual File Manager) v5.8

Optimize Storage

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Preface

What the guide covers

This guide describes how you can use VFM® (Virtual File Manager) technology to optimize your storage.

The guide is divided into the following sections:

- **Chapter 1 Introduction** – Provides an overview to archival migration policies.
- **Chapter 2 Archival Migration Policies** – Explains how to use VFM to migrate directories containing older and less-frequently accessed data to more cost-effective storage and to update links in your namespace or update references to automount files you specify.
- **Chapter 3 Storage Load Balancing Policies** – Explains how to load balance a pool of storages
- **Appendix** – A list and description of the VFM documents.
- **Glossary** – Definitions of terms used in this guide.

Audience

This guide is for network administrators who are familiar with Windows NT®, Windows® 2000, Windows Server™ 2003, and DFS. It does not cover basic system or network administration topics.

Typographic conventions

- **Bold text** - Items on a dialog box or page on the VFM console that you are instructed to click.
- *<text in italics>* - Substitute the text within the greater than and less than symbols with the value requested.

Using the online help

- Certain icons appear to the left of a topic title to indicate that the information provided applies only to a specific operating system, type of DFS root, or data transfer protocol.

Icon	Description
	Indicates that the information applies only to DFS roots on Windows 2000 or Windows Server 2003, Enterprise Edition.
	Indicates that the information applies only to domain-based roots.
	Indicates that the information applies only to DFS roots on Windows Server 2003.
	Indicates that the information applies only to CIFS data transfer.

- In the table of contents, a new topic is represented as a page with a red

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asterisk , and an entire section of new topics is represented as a book with a red asterisk .

- Definitions of new terms are available wherever they appear in help topics. The first time a new term appears in a help topic, it appears as a [green hyperlink](#).
- Context help contains detailed information about a dialog box or view, and might include links to related topics. Press **F1** or click  **Help**.

Support

Contact NetApp® technical support, 24 x 7.

Support is either through the web at <http://now.netapp.com> or by phone. See <http://www.netapp.com/support> for details.

Support phone numbers:

- 888 4-NETAPP (US and Canada)
- (1-888-463-8277)
- (408) 822-4700
- 800-44-NETAPP (EMEA/Europe)
- 800-800-0800 (Asia/Pacific)

Notes:

- You can also contact technical support by clicking **Support** on the **Help** menu.
- To get your product build number and license information, click **About Virtual File Manager** on the **Help** menu.

Enter new license key

Enter a new license key for the VFM client and server components when you want to extend the VFM evaluation period or when you purchase additional licenses from VFM.

1. Contact NetApp to request a new license key.
2. On the **Help** menu, click **About Virtual File Manager**.
3. Click **Edit Serial Numbers**.
4. In the License Type list, click the appropriate item.
5. If you selected "Evaluation" as the license type, type the new activation key.
6. If you selected "Full" as the license type, select a product number from the Product list and type the new activation key.
7. Click **OK**.

Chapter 1 Introduction

This guide provides detailed instructions about how to optimize storage by creating and managing archival migration and storage load balancing policies.

- **Archival migration policies** facilitate the creation of a tiered storage architecture. Directories containing older and less-frequently accessed data can be automatically selected and migrated to more cost-effective storage allowing primary storage to be available for frequently accessed data. VFM provides policy-based selection criteria using size, age, access or modification dates or custom user-specified selection criteria to identify migration candidates. You can automatically migrate the directories to secondary storage or view a list of directories that meet the criteria and manually migrate selected directories.
- **Storage load balancing policies** enable you to automatically balance the storage space among a group of storage locations containing directories that are targets of links in your namespace. The policy periodically evaluates the space distribution of the group of storage locations, calculates a solution, and automatically creates and runs migration tasks to move directories and retarget links to balance the storages. You can view migration suggestions and decide which suggestions you want to use to create migration tasks.

Chapter 2 Archival migration policies

VFM enables you to specify replication, file security, and replication differencing options for CIFS data. You can also maintain exclusion and inclusion lists for CIFS and NFS data.

Integrated namespace management

When the source participates in the namespace, VFM enables you to update the namespace.

DFS namespace management

- Retarget link - The destination directory becomes the new link target.
- Add link replicas - The destination directory is added as a new replica of the link.

UNIX namespace management

VFM updates the references to the automount files you specify.

Planning considerations

Review the following rules before you add source and destination pairs to an archival migration policy.

- Data transfer must occur within the same protocol (for example, CIFS to CIFS or NFS to NFS).
- A policy can contain CIFS source and destination pairs and NFS source and destination pairs.
- If you uninstall a monitoring agent, ensure that archival migration policies that formerly used the uninstalled agent are reassigned to a currently available agent. Do this by selecting the desired agent through the properties dialog box for the policy.
- See "Running batch files" for detailed information about configuring batch files to run in VFM storage policies.
- To configure default options for all archival migration policies, click **Options** on the **Tools** menu, and then click **Archival Migration** or any menu item under **Archival Migration**. The changes only affect new policies. Existing policies are not affected.

CIFS requirements

- You cannot configure more than one search path with the same source. This rule is illustrated in the following table:

Steps	Source	Destination
1. Search path A is configured.	\\serverA\shareA	\\serverB\shareB

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2. Search path B is configured.	\\serverA\shareA	\\serverC\shareC
3. VFM replaces search path A with B	~~\\serverA\shareA~~ \\serverA\shareA	~~\\serverB\shareB~~ \\serverC\shareC

- The source can be a physical (for example, \\server\share\subdir) or logical path (for example, a path in the namespace).
- Links selected as the source must only have one target.
- The destination must be a physical path.
- When the source is a physical path, VFM scans for subdirectories. The shared folder named in the source path must contain subdirectories because VFM scans for directories under the share as possible migration candidates. If the directories match the selection criteria, each subdirectory is listed as a migration candidate.
- When the source is a logical path, VFM scans the target of a link. If the link target matches the selection criteria, it is listed as a migration candidate.

NFS requirements

- The source and destination must be UNIX fully qualified paths (for example, <hostname>:/<UNIX local path>).
- NFS 3 or later must be running on the source and destination.
- The source and destination can be an export or a folder under an export. VFM scans for subdirectories. The export named in the source path must contain subdirectories because VFM scans for directories under the export as possible migration candidates. If the directories match the selection criteria, each subdirectory is listed as a migration candidate.
- You cannot configure more than one search path with the same source.

Steps	Source	Destination
1. Search path A is configured.	hostname:/root/subdirectoryA	hostname:/root/subdirectoryB
2. Search path B is configured.	hostname:/root/subdirectoryA	\\hostname:/root/subdirectoryC
3. VFM replaces search path A with B	~~hostname:/root/subdirectoryA~~ \\hostname:/root/subdirectoryA	~~hostname:/root/subdirectoryB~~ \\hostname:/root/subdirectoryC

Create and manage archival migration policies

To create your first policy, follow the basic steps listed below:

1. Give the policy a name and add source and destinations.
2. Specify the migration criteria that describe how VFM determines whether a directory should be migrated.
3. Select migration task options that describe how VFM executes an archival migration policy.
4. Define how VFM runs all the scheduled tasks associated with the policy.
5. Schedule when VFM scans for directories to migrate.
6. Schedule when VFM migrates data.

Create a policy

Create an archival migration policy to automatically migrate directories from primary to secondary storage. You configure the policy with the criteria you want VFM to use to select directories to migrate. You can transfer CIFS and NFS directories. When you transfer CIFS directories, you can automatically update the namespace to reference the data at the new location, and when you transfer NFS directories, you can automatically update references to the directories in automount files.

1. Perform one of the following actions:
 - On the **Tools** menu, point to **New Policy**, point to **Data Lifecycle Automation Policy**, and then click **Archival Migration Policy**.
 - Right-click the **Data Lifecycle Automation Policies** folder, point to **New**, and then click **Archival Migration Policy**.
 - Right-click the **Archival Migration Policies** folder and click **New Archival Migration Policy**.
2. Type a word or phrase in the **Name** field that best describes this policy. The name appears under the **Data Lifecycle Automation Policies\Archival Migration Policies** folder and on the **Properties** tab of items that are members of the policy.
3. Click **Add** to include the source and destination you want to migrate.
4. Repeat Step 3 to include additional source and destination paths.
5. Optionally type directory exclusions delimited by double quotes, or click **Expand** to specify multiple directories to exclude. See the table of examples of valid formats in the Notes section of "Exclude directories from migration."
6. Optionally type directory inclusions delimited by double quotes, or click **Expand** to specify multiple directories to include. See the table of examples of valid formats in the Notes section of "Exclude directories from migration."
7. In the **Use the Monitor on** list, select the machine hosting the agent that you want to use to process the policy. By default, VFM uses the current VFM server to process the policy. If you installed VFM monitoring agents on other machines, you can select one of the locations where VFM monitoring agents are installed as the location from which this policy is processed.
8. Optionally select **Run batch before scan** and type the path of, or browse for, a script you

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want to run before scanning for migration candidates. VFM provides sample batch files that you can modify. The sample batch files are in the **Examples\Scripts\Archival** directory in the VFM server installation directory.

9. Optionally select **Run batch after scan** and type the path of, or browse for, a script you want to run after scanning is complete. VFM provides sample batch files that you can modify. The sample batch files are in the **Examples\Scripts\Archival** directory in the VFM server installation directory.
10. Click **OK**.

Specify selection criteria

VFM enables you to specify the migration criteria that determine whether a directory should be migrated. You can configure the criteria provided by VFM or you can specify your own criteria. You can migrate all directories found or search for directories that match the search criteria you specify.

1. Perform one of the following actions:
 - Right-click an archival migration policy and click **Properties**.
 - Select an archival migration policy and click  **Edit** on the **Properties** tab that appears in the right pane.
2. Click **Migration Criteria** to display a dialog box on the right pane.
3. Normally, **Always migrate** is selected when you want to migrate all the directories found in the source listed in the policy. This option enables you to migrate directories without using migration criteria. VFM calculates and displays the size and size on disk for each migration candidate. Calculating this data might take time, depending on the size of the migration candidates. Network traffic is generated as VFM gathers the information.

The actual amount of disk space used by the selected folder or file.

The size of a file or folder.

4. Select **Migrate directories when** to search for directories that match the criteria you specify. When you specify multiple items, VFM connects the items with the "OR" Boolean logic.
 - **% of files have not been accessed within the last...** - Migrate directories when a specified percentage of the files in the directories are not accessed within a specified time.
 - **% of files have not been modified within the last...** - Migrate directories when a specified percentage of the files in the directories are not modified within a specified time.
 - **(CIFS only) % of files have not been created within the last...** - Migrate directories when a specified percentage of the files in the directories are not created within a specified time.
 - **(CIFS only) Directory is more than...old** - Migrate directories that reach a specified age.
 - **Directory size or size on disk is greater than MB** - Migrate directories with size or size on disk greater than a specified size.
 - **Directory contains more than... files** - Migrate directories based on responses

from the specified script. This option enables you to create custom scripts to evaluate which directories in your environment you want to migrate.

- **Confirmed by user selection criteria script** - Migrate a directory based on the criteria in the script file listed.

6. Click **OK**.

Note: VFM provides a sample migration criteria batch file that you can modify. The sample batch file is in the `Examples\Scripts\Archival` directory in the VFM server installation directory.

Select migration actions

Define how VFM executes all the tasks associated with the policy.

1. Right-click the policy and click **Properties**.
2. Click **Actions**.
3. Optionally select **Run batch file** and type the name of a script file, or browse for a script file to run before the migration operation. VFM provides sample batch files that you can modify. The sample batch files are in the `Examples\Scripts\Migration` directory in the VFM server installation directory.
4. Optionally select **Scan for potential problems copying the data** to check for potential problems, such as loss of file attributes and permission problems, before data is migrated.
5. By default, **Copy data** is selected. VFM copies the data to the destination.
6. By default, **Update Namespace** is selected. Clear this option if you want to migrate data that does not participate in the namespace.
7. **(CIFS only)** By default, **Hide the source share** is selected. VFM renames the source share to "hide" it from users during the migration process.
8. By default, **Do a final replication prior to deleting the source data** is selected. VFM performs data synchronization before the source data is deleted.
9. By default, **Delete the source data** is selected. The source data is deleted after the data is copied to the destination.
10. **(CIFS only)** By default, **Stop sharing the source share** is selected. The source data is not accessible through its former share, but the data is retained. Only the specified source share is unshared. If there are multiple shares of the source directory, the other shares remain in effect.
11. Optionally select **Run batch file** and type the name of a script file, or browse for a script file to run after the migration operation. VFM provides sample batch files that you can modify. The sample batch files are in the `Examples\Scripts\Migration` directory in the VFM server installation directory.

Specify namespace options

If you selected to update the namespace as part of the migration process, you must specify namespace options. See "Specify namespace options" in the VFM [Transfer Data](#) guide for instructions.

Select migration task options

Select how you want VFM to execute the policy. Decide how you want to manage migration candidates.

1. Perform one of the following actions:
 - Right-click an archival migration policy and click **Properties**.
 - Select an archival migration policy and click  **Edit** on the **Properties** tab that appears in the right pane.
2. Click **Task Options** to display a dialog box in the right pane.
3. Select **Automatically add migration tasks for migration candidates** when you want VFM to automatically create migration tasks after scanning is complete. When this option is cleared, VFM shows a list of migration candidates. You can manually create migration tasks for all or selected candidates.
 - Select **Calculate total size for migration candidates** when you want VFM to calculate and display the size and size on disk for each migration candidate. Calculating this data might take time, depending on the size of the migration candidates. Network traffic is generated as VFM gathers the information.
The actual amount of disk space used by the selected folder or file.
The size of a file or folder.
4. Select **Automatically delete completed tasks** when you want VFM to delete tasks after they are completed. Clear this option when you want to keep a record of completed migration tasks. VFM provides visual cues to indicate that a task  was completed successfully.
5. Select **Only migrate data referenced through the namespace (CIFS only)** when you want VFM to only search for directories referenced by links in the roots in the "Search these DFS roots for links targeting migration candidates" list. Clear this option when you want to search for all directories that match the selection criteria. VFM shows a list of migration candidates and indicates which candidates are referenced by links.
6. Click **Add** to include DFS roots in the **Search these DFS roots for links targeting migration candidates (CIFS only)** list. As part of the migration, VFM updates the links to reference the new location. Users are shielded from changes in the location of the data.
7. Click **OK**.

Schedule scanning for directories to migrate

Normally VFM automatically scans for directories that match the policy migration criteria and shows a list of migration tasks when scanning is complete.

1. Perform one of the following actions:
 - Right-click an archival migration policy and click **Properties**.
 - Select an archival migration policy and click  on the **Properties** tab that appears in the right pane.
2. Click **Policy Scan Schedule**.
3. Click **New** and configure a new schedule or select a schedule from the list to update.
4. Click **OK**.

Note: If no migration candidates are found when the policy scans for directories, running the migration will have no effect.

Schedule migration

Schedule to run all the migration tasks of a policy. After a migration task is complete, VFM does not run the task again.

1. Perform one of the following actions:
 - Right-click an archival migration policy and click **Properties**.
 - Select an archival migration policy and click  on the **Properties** tab that appears in the right pane.
2. Click **Migration Schedule**.
3. Click **New** and configure a new schedule or select a schedule from the list to update.
4. Click **OK**.

Select additional options

VFM enables you to configure replication, file security, replication differencing, and file attributes options. See the following migration policy topics in the VFM [Transfer Data](#) guide:

- "Select replication options"
- "Select file security replication options"
- "Select differential replication options"
- "Select file attribute replication options"

Note: When transferring data between NTFS source and destination, you need to think about inherited permissions and how they will affect permissions on the source and destination. If the source and destination are inheriting different permission settings from their parents, the result will be different file permissions between the source and destination.

Add source and destination paths

Quickly include additional source and destination paths to an archival migration policy by dragging items to the policy. VFM provides a wizard that steps you through the process. You can drag items from the Logical View, Physical View, or Windows Explorer to a policy.

1. Drag one of the following items to an archival migration policy:
 - A logical folder or link in the Logical View
 - A shared folder in the Physical View
 - An export in the Physical View
 - A shared folder or subfolder of a share in Windows Explorer

A dialog box appears with the path of the item you dragged in the source field.

2. Type a destination path or click **Browse** to find a destination.
3. Click **Next**.
4. Optionally clear the items you do not want to add to the policy.
5. Optionally select an item and click **Rebase** to change the destination path.
6. Click **Next**.
7. Click **Finish**.

Exclude directories from migration

VFM makes it easy for you to maintain an exclusion list of directories you do not want to migrate.

1. Perform one of the following actions:
 - Right-click an archival migration policy and click Properties.
 - Select an archival migration policy to show a Properties tab in the right pane.
Click  **Edit**.
2. Click **General**.
3. Type directory exclusions delimited by double quotes, or click **Expand** to specify multiple directories to exclude. The UNC paths and UNIX fully qualified paths can include DOS wild cards (* or ?).
4. Click **OK**.

Notes:

- When you exclude a migration candidate, VFM automatically adds the path of the candidate to the policy exclusion list.
- To exclude a migration candidate:
 1. Select the archival migration policy to show a Properties tab in the right pane.
 2. Right-click a migration candidate and click **Exclude**.
- You can also maintain an inclusion list for a policy. Directory inclusions follow the same rules as directory exclusions.
- After a migration candidate appears in the exclusion list, you cannot include it as a candidate by adding it to an inclusion list. You must first remove the candidate from the exclusion list.
- The following table provides a list of valid exclusion and inclusion formats and includes an explanation for each format.

Item	Format	Description
1	*	Match everything.
2	*exp*	Match any path containing the string "exp".
3	Listing???	Match folders whose name begins with "listing" followed by three characters.
4	G*	Match folders whose name begins with "g".
5	"G*" "L*"	Match folders whose name begins with "G" and folders whose name begins with "L".
6	\\server\directory\folder (Windows) server:/root/directory (UNIX)	Exclude/include absolute path.

Run customized commands before and after scanning

VFM enables you to specify batch files to run before and after migration criteria evaluation.

1. Perform one of the following actions:
 - Right-click an archival migration policy and click **Properties**.
 - Select an archival migration policy and click  **Edit** on the **Properties** tab that appears in the right pane.
2. Click **General** to display a dialog box in the right pane.
3. Select **Run batch file before scan** or **Run batch file after scan**.
4. Type the name of, or browse for, the batch file that you want to run.
5. Click **OK**.

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Notes:

- See "Running batch files" in the VFM [Advanced Configuration and Technique](#) guide for detailed information about configuring batch files to run in VFM storage policies.
- See "Batch files" in the VFM [Advanced Configuration and Technique](#) guide for detailed information about the example scripts provided by VFM.

Scan for data immediately

Manually scan for directories that match the migration criteria of an archival migration policy. By default, VFM displays a list of migration tasks.

1. Perform one of the following actions:
 - Right-click an archival migration policy and click **Start Scan Now**.
 - Select an archival migration policy to show a Properties tab in the right pane. Right-click anywhere on the tab and click **Start Scan Now**.
 - Select the Archival Migration Policies folder to show a list of policies in the right pane. Right-click a policy and click **Start Scan Now**.
2. To view a list of migration tasks, select the policy you scanned to show a Properties tab in the right pane.

Note: If you cleared the policy task option to "automatically add migration tasks for migration candidates", VFM adds migration candidates after scanning. This enables you select which candidates you want to migrate. Candidates you do not select for migration are automatically added to the policy exclusion list.

Update the properties of a policy

Update the properties of an archival migration policy.

1. Perform one of the following actions:
 - Right-click an archival migration policy and click **Properties**.
 - Select an archival migration policy and click  **Edit** on the Properties tab that appears on the right pane.
2. Click a menu item to show a dialog box.
3. Click **OK** when you finish updating the policy.

Note: To configure default options for all archival migration policies, click **Options** on the **Tools** menu, and then click **Archival Migration** or any item under Archival Migration. Changes you make only affect new policies. Existing policies are not affected.

Delete a policy

If a migration task is in progress when you delete an archival migration policy, the migration task runs until it is complete.

1. Perform one of the following actions:
 - Right-click the policy and click **Delete**.
 - Select the Archival Migration Policies folder to view a list of policies in the right pane. Right-click a policy and click **Delete**.
2. Click **Yes**. A status report appears.
3. Click **Done**.

View a list of migration candidates

VFM enables you to view the results of a criteria evaluation and enables you to select which candidates you want to migrate.

1. Right-click an archival migration policy and click **Properties**.
2. Click **Task Options**.
3. Clear **Automatically add migration tasks for migration candidates**.
4. Click **OK**.
5. Right-click the policy and click **Start Scan Now**.
6. When scanning is complete, select the policy to show a Properties tab in the right pane.
7. Use the scroll bar to browse the list of migration candidates.

View properties of a migration candidate

View the source and destination of a migration candidate. The appearance of some properties depends on task options you select (for example, size and size on disk.)

1. Select an archival migration policy to show a Properties tab in the right pane.
2. On the **Properties** tab, right-click a migration candidate and click **Properties**.
3. Close the dialog box when you finish viewing the information about the candidate.

Note: Calculating size and size on disk might take time, depending on the size of the migration candidates, and it generates network traffic as VFM gathers the information.

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View a list of migration tasks

VFM enables you to view all the migration tasks for a policy and a source.

To view all the migration tasks for a policy:

Select the policy to show a Properties tab in the right pane.

To view the migration tasks for a source:

Perform one of the following actions:

- Select the source folder under an archival migration policy to show a Properties tab in the right pane.
- Open the source folder to show a list of tasks under the folder.

Notes:

- If the policy task option to "automatically delete completed tasks" is selected, VFM removes the migration task after it is completed successfully.
- VFM uses visual cues to indicate the state of a migration task. See "Migration task indicators" for more details.

Add a migration task immediately

VFM enables you to manually add a migration task to an archival migration policy.

1. Select an archival migration policy to show a Properties tab in the right pane.
2. Right-click a migration candidate and click **Add Task**. The candidate is removed from the Migration Candidates list and a new migration task  for the candidate appears under Tasks.

Note: To view a list of migration candidates, you must clear the "Automatically add migration tasks for migration candidates" task option.

1. Right-click the policy and click **Properties**.
2. Click **Task Options**.
3. Make sure that "Automatically add migration tasks for migration candidates" is not selected.

Start a migration task immediately

You can bypass the migration schedule and manually start a task.

Perform one of the following actions:

- Double-click an archival migration policy, double-click a source to show a list of migration tasks, right-click a task, and then click **Start task now**.
- Select an archival migration policy to show a Properties tab in the right pane. Under Tasks, right-click a task and click **Start task now**.

Additional migration task topics

See the following migration policy topics in the VFM [Transfer Data](#) guide:

- "Update the properties of a migration task"
- "Start all tasks for a policy immediately"
- "View progress of a migration task"
- "User action required"
- "Suspend a migration task"
- "Remove a migration task"

Chapter 3 Storage load balancing policies

This section explains how you can create storage load balancing policies to optimize storage a pool of storages.

How to create and manage storage load balancing policies

To create your first policy, follow the basic steps listed below:

1. Create a storage load balancing policy.
2. Add storage locations.
3. Schedule scanning.
4. Select replication options.
5. Schedule migration.

Create a storage load balancing policy

A storage load balancing policy enables you to automatically balance the storage load among a group of storage locations you specify.

1. Perform one of the following actions:
 - On the **Tools** menu, point to **New Policy**, point to **Data Movement Policy**, and then click **Storage Load Balancing Policy**.
 - Right-click  **Admin View**, point to **New**, point to **Data Movement Policy**, and then click **Storage Load Balancing Policy**.
 - Under Admin View, right-click the **Data Movement Policies** folder, point to **New**, and then click **Storage Load Balancing Policy**.
 - Under the Data Movement Policies folder, right-click the **Storage Load Balancing Policies** folder and click **New Storage Load Balancing Policy**.
2. Type a word or phrase that best describes this policy. The name appears under the Storage Load Balancing Policies folder and on the **Properties** tab of items that are members of the policy.
3. Optionally change the default **High-mark**. The **High-mark** is the maximum percentage of used disk space allowed. When a disk exceeds this limit, the disk is excluded as a destination.
4. Optionally change the default **Low-mark**. The **Low-mark** is the minimum percentage of used disk space allowed. When a disk falls below this limit, the disk is excluded as a source.
5. Optionally change the default **Threshold**. The threshold is the maximum allowed variance between the current disk usage (percent full) and the **ideal balance**. A pool of storage devices in a Load Balancing policy is not balanced when the variance between

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the current disk space usage level of any drive in the pool containing targets of links and the ideal balance exceeds the threshold. This imbalance triggers a load-balancing operation. The policy reports the current variance in the event manifest logged when the scan phase is complete. The note at the end of this topic provides an example that illustrates the threshold load balancing setting.

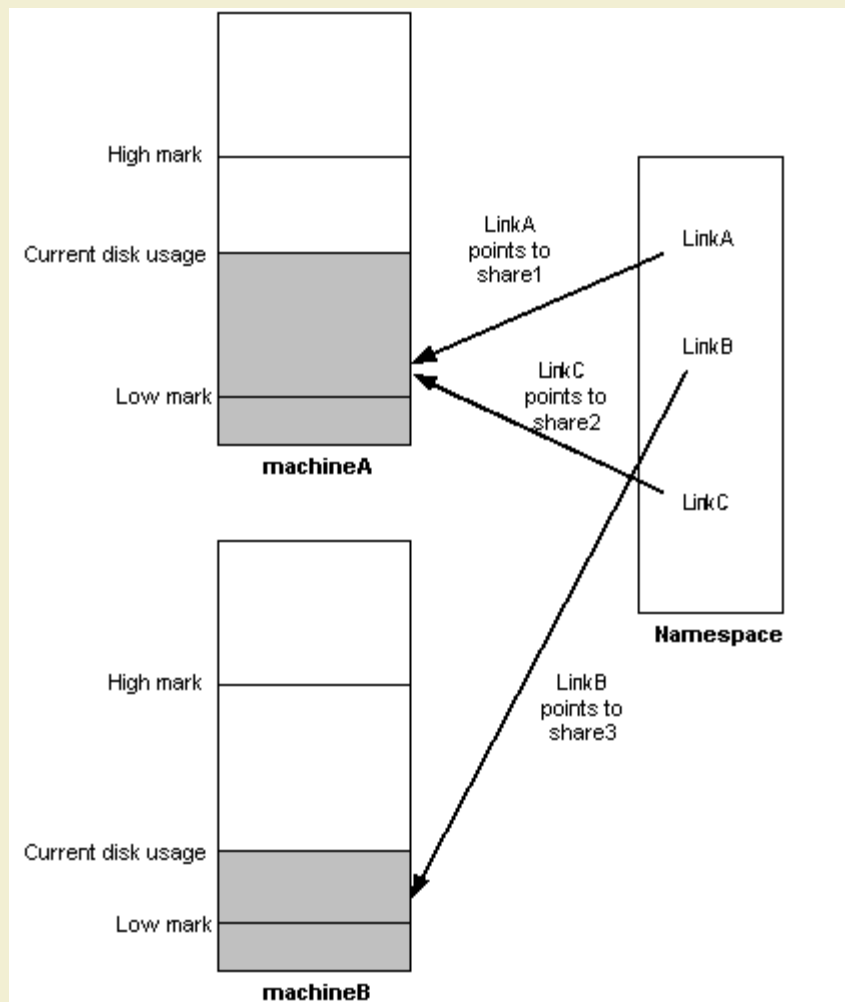
6. Select the **Load balance data even when no machine is above high mark** option when you want any device in the pool above the low-mark to be considered as a possible input or source device. When this option is not selected, the policy only considers devices above the high-mark as possible input or source devices.
7. Select the **Automatically add migration tasks for data move suggestions** option when you want the policy to automatically balance storage. When this option is not selected, the policy shows a list of link targets and suggests where to migrate data. You can accept or delete a suggestion. When you accept a suggestion, the policy creates a migration task.
8. Click **Add** to list a root that contains link targets you want to load balance.
9. Repeat Step 8 to add more roots.
10. In the **Use the Monitor on** list, select the machine that contains the agent that you want to use to process the policy. By default, VFM uses the current VFM server to process the policy. If you installed VFM monitoring agents on other machines, you can select one of the locations where VFM monitoring agents are installed as the location from which this policy is processed.
11. Click **OK**.

Notes:

- If you uninstall a monitoring agent, ensure that storage load balancing policies that formerly used the uninstalled agent are reassigned to a currently available agent. Do this by selecting the desired agent through the properties dialog box for the policy.
- The following example illustrates the threshold load balancing setting. In this example a storage load balancing policy monitors the disk space usage of drive C on *machineA* and *machineB*. *Share1* and *Share2* are link targets on *machineA* and *Share3* is a link target on *machineB*. The ideal balance of the pool was determined to be 41 percent (41%). The policy threshold is set to 30 percent (30%).

1

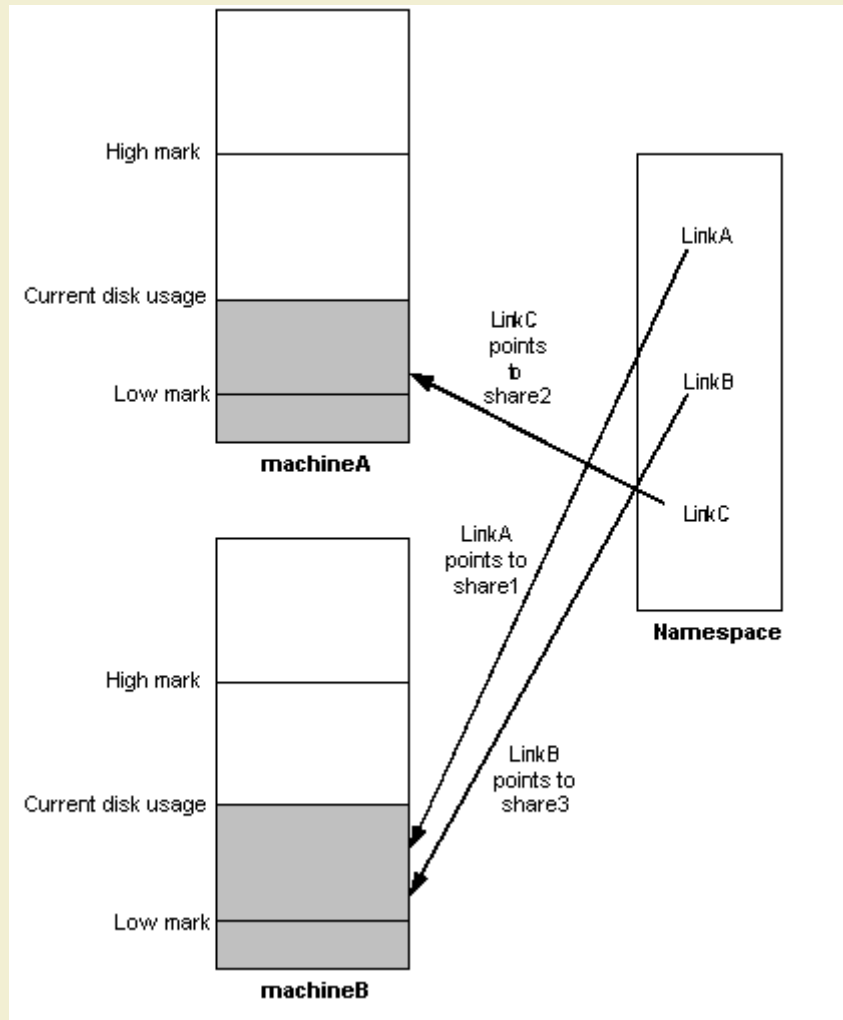
The policy monitors the disk space of drive C on *machineA* and *machineB* and finds that the used disk space on *machineA* is 80 percent (80%) and the used disk space on *machineB* is 20 percent (20%). The variance between the percentage used disk space and the ideal balance for *machineA* is 39 percent (39%) and for *machineB* it is twenty-one percent (21%). *MachineA* triggers a load-balancing attempt because the variance from the ideal balance (39%) exceeds the threshold.



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2

The policy evaluates the space usage and determines that to load balance the devices, the data contained in *Share1* must migrate to *machineB*. A migration task is created. When the migration schedule runs, the data contained in *Share1* is migrated to the C drive on *machineB* and linkA pointing to *Share1* is retargeted to point to *Share1* on *machineB*.

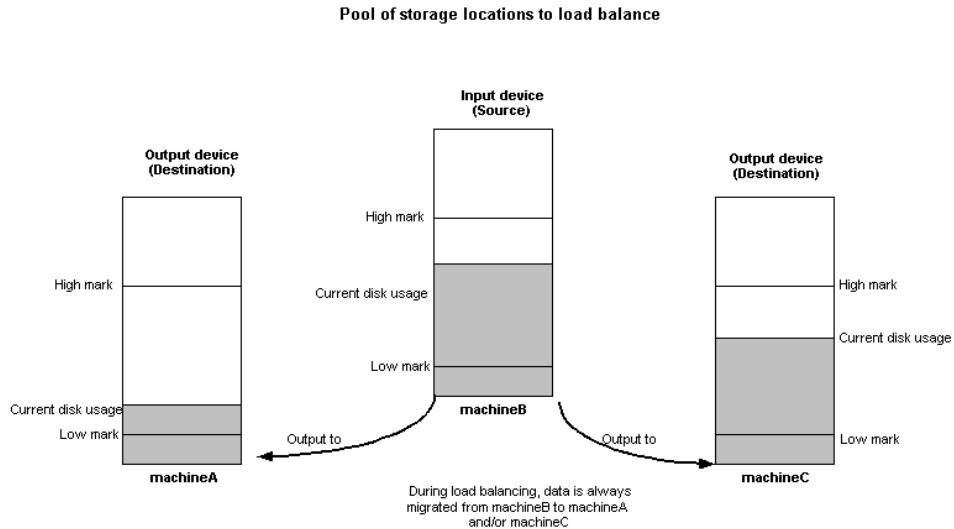


Add storage locations

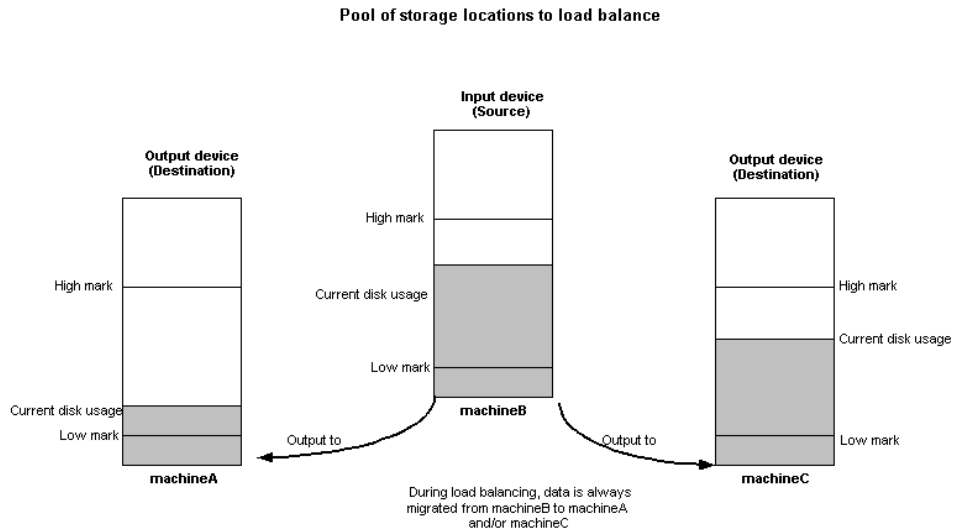
Add the storage locations you want the storage load balancing policy to load balance.

1. Right-click the policy and click **Properties**.
2. Click **Pool**.
3. Click **Add** and select a shared folder in the Physical View or a shared folder, volume, or qtree in your network.
4. Repeat Step 3 to add at least one more shared folder.

5. Optionally select whether data is migrated to or from the storage location during load balancing:
 - **Policy decides at run-time** - When the policy evaluates disk space usage, it decides whether the storage location should be an input (source) or output (destination) device.
 - **Input device only** - When the policy evaluates disk space usage, data is always migrated from this storage location. The storage location must be a link target or must contain at least one link target.



- **Output device only** - When the policy evaluates disk space usage, data is always migrated to the storage location. Show me



6. Click **OK**.

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Notes:

- Storage load balancing policies do not support qtree quotas on pool members.
- When you do not designate any storage location in the pool to be an input (source) device, the storage location with the highest load becomes the input device when the policy load balances the pool.
- When you designate more than one storage location as an input (source) device, only one storage location is selected as the input device when the policy load balances the pool.
- If an output (destination) device exceeds the high-mark specified by the policy, VFM selects another storage location as the output device. A storage location that exceeds the high-mark cannot be an output device.
- If an input (source) device falls below the low-mark specified by the policy, VFM selects another storage location as the input device. A storage location that falls below the low-mark cannot be an input device.

Schedule scanning

Schedule how frequently you want the storage load balancing policy to scan the current size of disk space of the storage locations to determine whether load balancing is required. If load balancing is required, the policy suggests directories to migrate.

1. Perform one of the following actions:
 - Right-click a storage load balancing policy and click **Properties**.
 - Select a storage load balancing policy and click  on the **Properties** tab that appears in the right pane.
2. Click **Policy Scan Schedule**.
3. Click **New** and configure a new schedule or select a schedule from the list to update.
4. Click **OK**.

Note: During scanning, VFM ignores storage locations that contain parent and child directories that are targets of links.

Example:

A DFS root `\\ilus.com\PriamRoot` is a member of a storage load balancing policy. The root contains *LinkA* targeting directory `\\server\share\folder1` and *LinkB* targeting subdirectory `\\server\share\folder1\subfolder`. When VFM scans for storage locations to migrate, it ignores *LinkA* and *LinkB*.

Select replication options

VFM enables you to configure replication, file security, and replication differencing options for a storage load balancing policy, as well as other storage policies. See the following migration policy topics in the VFM [Transfer Data](#) guide:

- "Select replication options"
- "Select file security replication options"
- "Select differential replication options"

Schedule migration

Schedule how frequently you want VFM to migrate directories referenced by links in your namespace to load balance the storage pool.

1. Perform one of the following actions:
 - Right-click a storage load balancing policy and click **Properties**.
 - Select a storage load balancing policy and click  on the **Properties** tab that appears in the right pane.
2. Click **Migration Schedule**.
3. Click **New** and configure the schedule.
4. Click **OK**.

Run customized commands

VFM enables you to specify batch files to run before and after a migration operation.

1. Perform one of the following actions:
 - Right-click a storage load balancing policy and click **Properties**.
 - Select a storage load balancing policy and click  on the **Properties** tab that appears in the right pane.
2. Click **Script**.
3. Select **Run batch file** and type or browse for the batch files that you want to run.
4. Click **OK**.

Notes:

- See "Running batch files" in the VFM [Advanced Configuration and Techniques Guide](#) for detailed information about configuring batch files to run in VFM storage policies.
- See "Batch files" in the VFM [Advanced Configuration and Techniques Guide](#) for detailed information about the example scripts provided by VFM.

Start scanning immediately

Manually scan the current size of disk space of the storage locations to determine whether load balancing is required. If load balancing is required, the policy shows a list of suggested directory migrations. This enables you to select which directories you want to migrate. You can manually exclude suggestions or you can leave rejected suggestions in the list. The current list of suggestions is replaced with a new list when the scheduled policy scan runs or you manually scan again.

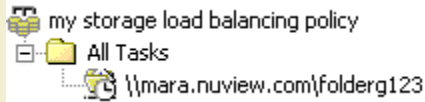
1. Perform one of the following actions:
 - Right-click a storage load balancing policy and click **Start Scan Now**.
 - Select a storage load balancing policy to show a Properties tab in the right pane. Right-click anywhere on the tab and click **Start Scan Now**.
 - Select the Storage Load Balancing Policies folder to show a list of policies in the

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right pane. Right-click a policy and click **Start Scan Now**.

2. To view a list of migration suggestions, select the policy you scanned to show a Properties tab in the right pane.

Note: If you selected the policy option to "Automatically add migration tasks for data move suggestions", VFM automatically adds migration tasks after scanning. To view the migration tasks, double-click the policy to show the All Tasks folder.



Start migration immediately

You can bypass the migration schedule and manually start migration tasks.

To start one migration task:

Double-click the All Tasks folder under a storage load balancing policy, right-click a migration task and click **Start Migration Now**.

To start all migration tasks for a policy immediately:

Perform one of the following actions:

- Right-click a storage load balancing policy and click **Start Migration Now**.
- Select a storage load balancing policy to show a Properties tab in the right pane. Right-click anywhere on the page and click **Start Migration Now**.
- Select the Storage Load Balancing Policies folder to show a Properties tab in the right pane. Right-click a policy and click **Start Migration Now**.

View migration suggestions

By default, a storage load balancing policy scans the current size of disk space of the storage locations to determine whether load balancing is required. If load balancing is required, the policy shows a list of suggested directory migrations.

1. Select a storage load balancing policy to show a Properties tab in the right pane. The suggested directory migrations are listed under Data Move Suggestion.
2. To view detailed information about a suggestion, right-click the suggestion and click **Properties**.
3. Perform one of the following actions:
 - To accept a suggestion and create a migration task to migrate a directory to the suggested location and retarget the link referencing the directory, right-click the suggestion and click **Add Task**. VFM shows the migration task in the All Tasks folder under the policy.
 - To refuse a suggestion, right-click the suggestion and click **Exclude**.

Notes:

- If you selected the policy option to "Automatically add migration tasks for data move suggestions", VFM automatically adds migration tasks after scanning.
- A suggestion that is excluded might appear again as a suggestion on subsequent policy scans.

Manage migration tasks

VFM enables you to manage migration tasks. See the following migration policy topics in the VFM [Transfer Data](#) guide:

- Update the properties of a migration task
- View progress of a task
- Suspend a migration task
- User action required
- Remove a migration task

Delete a storage load balancing policy

If a migration task is in progress when you delete a storage load balancing policy, the migration task runs until it is complete.

1. Perform one of the following actions:
 - Under the **Storage Load Balancing Policies** folder, right-click a policy and click **Delete**.
 - Click a policy to show a **Properties** tab in the right pane. Right-click anywhere on the page and click **Delete**.
 - Click the **Storage Load Balancing Policies** folder to show a **Properties** tab in the right pane. Right-click a policy and click **Delete**.
2. Click **Yes**.

Appendix

The following table lists the VFM guides. The list is arranged in ascending order by document title.

No.	Title	File name	Contents
1.	Advanced Configuration and Techniques	VFMAdvConfig.pdf	• Explains how to use VFM to configure security permissions • Explains how to manage replication and monitoring agents • Explains how to run batch files in policies and reports • Explains how to make the VFM server highly available
2.	Create and Manage Namespaces	VFMNamespace.pdf	Explains how to create a DFS namespace (roots, links, and link targets), how to quickly populate the namespace, make the namespace highly available, create multiprotocol namespaces, virtualize user home directories, and back up the namespace.
3.	Getting Started	VFMGettingStarted.pdf	A tutorial to get you started using VFM. It explains how to install VFM and steps you through the process of creating a logical namespace, making the namespace highly available, making data highly available, transferring CIFS and NFS data, creating multiprotocol namespaces, virtualizing user home directories, and backing up data and the namespace.
4.	Make Data Highly Available	VFMMakeDataAvailable.pdf	Explains how to make data highly available by creating client, filer, and server disaster recovery policies
5.	Manage Physical Resources	VFMPhysicalResources.pdf	Explains how to use VFM to Work with NetApp filers, set replication properties, and work with Windows and UNIX machines

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No.	Title	File name	Contents
6.	Manage Snapshots on Filers	VFMSnapshots.pdf	Explains how to use VFM to manage snapshots on NetApp filers using snapshot access and snapshot scheduling policies
7.	Optimize Storage	VFMOptimizeStorage.pdf	- Explains how to create and manage archival migration policies to optimize storage. - Explains how to load balance Windows servers by creating storage load balancing policies
8.	Reports	VFMReports.pdf	Explains how to create and publish reports
9.	Transfer Data	VFMTransferData.pdf	- Explains how to transfer CIFS and NFS data by creating migration and replication policies - Explains how to transfer data between NetApp filers by creating SnapMirror policies
10.	Troubleshooting	VFMTroubleshooting.pdf	- Includes diagnostic information, such as troubleshooting, event IDs, migration, replication, and status indicators - Provides examples of file exclusions and inclusions

Glossary

A

ACE: Access Control Entry, an entry in an Access Control List.

ACL: Access Control List, a list associated with a file that contains information about which users or groups have permission to access or modify the file.

Alternate volume: SEE Replica.

C

Child node: SEE DFS link.

CIFS: Common Internet File System. A file-sharing protocol based on the Microsoft Server Message Block (SMB). It enables you to share file systems over the Internet and Intranet. The CIFS protocol is used primarily for file sharing by Windows platforms.

Client: The user interface component of the application.

Consolidation DFS root: A special stand-alone DFS root that has its configuration information stored locally on a member server. The root must be hosted on Windows Server 2003.

D

Dependencies: The servers, drives, and shared folders that together contain the data published through the DFS namespace

DFS: Microsoft Distributed File System consists of software residing on network servers and clients that transparently links shared folders on different file servers into a single namespace for improved load balancing and data availability. NOTE: This should not be confused with Transarc's DFS product, which is a separate distributed file system product that is not interoperable with the Microsoft product.

DFS branch: SEE Shared folder.

DFS leaf: SEE Shared folder.

DFS link: Located under the DFS root. Forms a connection to one or more shared folders, DFS links, or another DFS root. NOTE: In Windows NT 4 terminology, this is referred to as a child node, a junction point, or an inter-DFS link.

DFS namespace: The logical view of shared file resources seen by users.

DFS path: A UNC path starting at a DFS root. Stand-alone DFS paths are rooted at a stand-alone root, while domain-based paths are rooted at a domain-based DFS root.

DFS root: The share at the top of the DFS topology. The starting point for the DFS links and shared folders that make up the DFS namespace.

DFS topology: Overall logical hierarchy of a distributed file system, including elements such as roots, links, shared folders, and replica sets.

DFS tree: The consolidated DFS view provided by the application, which includes the Admin View, Logical View, Physical View, and Reports.

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DFS volume: SEE Shared folder.

Domain-based DFS root: A DFS root that has its configuration information stored in Active Directory. The root can have multiple root targets, which offers fault tolerance and load sharing at the root level.

E

Export: SEE NFS export

F

Fault-tolerant DFS: SEE Domain-based DFS root

FQDN: Fully-qualified Domain Name. A host, domain name, and a top-level domain. For example, www.brocade.com is a fully-qualified domain name where www is the host, .brocade is the second-level domain, and .com is the top-level domain.

FRS: Microsoft File Replication Service.

G

GID: Group Identification Number. A unique number assigned to identify a group of users in UNIX environments.

I

Inter-DFS link: SEE DFS link.

J

Junction point: SEE DFS link.

K

Key-pair: Consists of a public key and a corresponding private key. It is safe to distribute a public key, but a private key must be kept secret.

L

Link target: A DFS link can have as targets: 1 to N shared folders, OR 1 to N stand-alone DFS paths, OR only 1 domain-based DFS path.

M

Migration candidates: Items that match migration criteria in an archival migration policy. You can select which items you want to migrate. Items not selected for migration are automatically added to the exclusion list of the archival migration policy.

Migration tasks: Items to be migrated during a scheduled migration or manually at any time.

Monitoring agent: The component that can be installed to evaluate storage policies from a

different machine than the one where the application server is installed.

N

NFS: Network File System developed by Sun Microsystems. A file-sharing protocol that enables you to share file systems over the Internet and Intranet. NFS is used with both UNIX and non-UNIX computers.

NFS export: A directory that is published for access by NFS clients. The export specifies a directory to be exported and which machines have access to the directory. NFS exports are similar to CIFS shares in that they provide access to directories.

P

Pool: A group of storage locations.

Primary server: An active application server or monitoring agent.

Primary target: In a disaster recovery policy, this is the active target to which users are referred by the DFS root.

Q

qtree: A special directory of the root of a volume that behaves like a virtual subvolume with special attributes.

R

RAID: Redundant Array of Independent Disks enables file access even when a disk in a RAID group is damaged.

References: The DFS link targeting the selected physical item. For example, when you click a server under the Physical View tree, properties and associated DFS links appear.

Replica: A DFS root or DFS shared folder that provides an alternate path for a DFS link. NOTE: In Windows NT 4 terminology, this is referred to as an alternate volume.

Replica set: Two or more DFS roots or DFS shared folders that provide alternate paths for a DFS link.

Replication agent: The component deployed by the application server or monitoring agent component during configuration of storage policies that transfer CIFS data, or when you run a file differencing report. NOTES: Deployment of replication agents can be controlled through a machine's properties dialog box accessible from the Physical View. For data transfer using the NFS protocol, the replication agent must be installed manually.

Report schedule group: Enables you to set a schedule to automatically gather information. A report schedule group can be configured to start during off hours to offload network and computing resources during business hours. You can produce multiple reports from the data gathered without generating additional network traffic.

Report source group: Specifies the location where you want to gather information. It is assigned to a report schedule group. A report source group also enables you to specify batch files to run before and/or after the information is gathered.

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Report type: Determines what information is gathered. Report types are assigned to report source groups.

S

Secondary target: SEE Standby target.

Server: The component that responds to requests from the client component, monitors the DFS namespace, and processes storage policies.

Shared folder: File or folder in the DFS namespace that can be accessed by users who have proper permissions. NOTE: In Windows NT 4, this is referred to as a DFS volume, leaf, or branch.

SID: Security identifier that uniquely identifies a Windows user or group.

Stand-alone DFS root: A DFS root that has its configuration information stored locally on the host server. The root has a single root target. When the root target is unavailable, the data referenced by links under the root is inaccessible.

Standby target: A target in a disaster recovery policy that is offline. During a failover, a standby target can become the active target.

Storage location: A combination of a server UNC path and the local path pointing to a directory in the file system. For example, \\rama:c:\ is a storage location representing the C drive on machine "rama" and \\secure.npb.com:/vol/vol0/myqtree is a storage location representing the qtree "myqtree" on volume vol0 on secure.npb.com.

T

Target: LINK TARGET: A shared folder, a DFS link, or a DFS root that is referenced by a DFS link. ROOT TARGET: A shared folder that is referenced by a DFS root. SEE ALSO Link target.

Trustee: The user account, group, or logon session to which an Access Control Entry (ACE) applies.

U

UID: User Identification Number. A unique number assigned to identify a user in UNIX environments.

UNIX file permissions: Control access to files and directories. Permissions can be applied to the owner of a file, a group, or everyone on the UNIX network.

W

Widelink namespace: A logical namespace hosted on a NetApp filer CIFS share that provides the benefits of a namespace without requiring additional Windows servers.

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