VFM (Virtual File Manager) v6.0

Optimize Storage

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Preface

What the guide covers

This guide describes how you can use Network Appliance® VFM® 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 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.

`code_text_in_italics` – Variable; replace with actual value.

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
Win2K	Indicates that the information applies only to DFS roots on Windows 2000 or Windows Server 2003, Enterprise Edition.
domain root	Indicates that the information applies only to domain-based roots.
W2K3	Indicates that the information applies only to DFS roots on Windows Server 2003.

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. For details, see http://www.netapp.com/support.

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**.

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Chapter 1 Introduction

This guide provides instructions about how to create policies to optimize storage. Select the policy that best meets your needs.

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. The policy enables you to use 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

Integrated namespace management

When the source participates in the namespace, you can 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

The references to the automount files you specify are updated.

Planning considerations

Before you create archival migration policies to move directories, review the following information:

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 storage policies.

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

CIFS requirements

This section provides information you need to know when you add CIFS source and destination paths.

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`
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 path (for example, `\\server\share\subdir`) or a logical path (for example, a path in the namespace).

Links selected as the source must have one target.

The destination must be a physical path.

When the source is a physical path, the policy scans for subfolders. The shared folder named in the source path must contain subfolders because the policy scans for directories under the share as possible migration candidates. If the directories match the selection criteria, each subfolder is listed as a migration candidate.

When the source is a logical path, the policy scans the target of a link. If the link target matches the selection criteria, it is listed as a migration candidate.

NFS requirements

This section provides information you need to know when you add NFS source and destination paths.

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. The policy scans for subfolders. The export named in the source path must contain subfolders because the policy scans for directories under the export as possible migration candidates. If the directories match the selection criteria, each subfolder 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 con-figured.	`hostname:/root/subdirectoryA`	`hostname:/root/subdirectoryB`
2. Search path B is con-figured.	`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`

Archival migration policy checklist

To create a policy, follow the basic steps listed below:

1. Give the policy a name and add source and destinations.
2. Specify the migration criteria that determines whether a directory should be migrated.
3. Configure migration phases.
4. Schedule migration.
5. (Optional) Specify how you want to update the namespace.
6. Define how you what to manage migration candidates.
7. Schedule when the policy scans for directories to migrate.

You can specify replication, file security, and replication differencing options for CIFS data. You can also maintain exclusion and inclusion lists for CIFS and NFS 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 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. When you transfer NFS directories, you can automatically update references to the directories in automount files.

Before you create your first archival migration policy, review the requirements.

1. Perform one of the following actions:

   On the **Tools** menu, point to **New Policy**, point to **Data Lifecycle Automation Policy** and click **Archival Migration Policy**.

   Right-click the **Data Lifecycle Automation Policies** folder, point to **New**, and 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. (Optional) 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. (Optional) 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, the current VFM server is used to process the policy. If you installed monitoring agents on other machines, you can select one of the locations where monitoring agents are installed as the location from which this policy is processed.

8. (Optional) Select **Run batch before scan** and type the path of or browse for a script you 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. (Optional) 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

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. The size and size on disk is calculated and displayed for each migration candidate. Calculating this data might take time, depending on the size of the migration candidates. Network traffic is generated as the information is gathered.
4. Select **Migrate directories when** to search for directories that match the criteria you specify. When you specify multiple items, the items are connected with 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 have not been 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 have not been created within a specified time.

   (CIFS only) **Directory is more than...old -** Migrate directories that have reached 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 a directory that contains more than a specified number of files.

Confirmed by user selection criteria script - Migrate a directory based on the criteria in the script file listed. VFM provides a sample batch file that you can modify.

5. Click **OK**.

Notes:

A sample migration criteria batch file is located in the `Examples\Scripts\Archival` directory in the VFM server installation directory.

For detailed information about configuring batch files to run in VFM storage policies, see "Running batch files."

For detailed information about the example scripts provided by VFM, see "Batch files."

Configure migration phases

Define how you want to run all the migration tasks associated with the policy. The migration operation is divided into three phases; initial, incremental, and final. For instructions on how to configure the phases, see the following migration policy topics in the VFM *Transfer Data* guide:

Configure the initial phase

Configure the incremental phase

Configure the final phase

Specify namespace options

If you selected to update the namespace as part of the migration process, you must specify namespace options. For instructions, see the Migration policies topic, "Specify namespace options" in the VFM *Transfer Data* guide.

Select migration task options

Select how you want to execute the policy. Decide how you what 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

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 to automatically create migration tasks after scanning is complete. When this option is cleared, you see a list of migration candidates. You can manually create migration tasks for all or selected candidates.

4. Select **Calculate total size for migration candidates** when you want 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 the information is gathered.
5. Select **Automatically delete completed tasks** when you want to delete tasks after they are completed. Clear this option when you want to keep a record of completed migration tasks. VFM provides a visual cue to indicate that a task was completed successfully.
6. Select **Only migrate data referenced through the namespace (CIFS only)** when you want to search only 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. You see a list of migration candidates and which candidates are referenced by links.
7. 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, the links are updated to reference the new location. Users are shielded from changes in the location of the data. See the Notes in "Add source and destination paths" for more information.
8. Click **OK**.

Schedule scanning for directories to migrate

Normally the policy 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 Edit 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 when you want to run the initial, incremental, and final phases for all the migration tasks of a policy. Before you configure migration schedules, review the information in "Scheduling considerations." For instructions about how to schedule the migration, see the following migration policy topics in the VFM *Transfer Data* guide:

Schedule the initial phase

Schedule the incremental phase

Schedule the final phase

Select additional options

To configure replication options, such as, file security, replication differencing, and file attributes options, see the following migration policy topics in the VFM *Transfer Data* guide:

Select replication options

Specify replication filters

Select a replication agent

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. A wizard steps you through the process. You can drag items from the Logical View, Physical View, or Windows Explorer to a policy.

Notes:

Review the requirements for transferring CIFS and NFS data.

When you want to update the namespace after a migration, make sure that the UNC paths of the source and the link targets you want to update match. If the UNC paths do not match, the namespace cannot be updated. Example

This example illustrates what happens when the UNC path of a migration source and link targets that match the search criteria do not match.

You create a migration task and specify a source and destination.

Source	Destination
`\\Saturn.npb.com\c$\Sales\Reports`	`\\Pluto.npb.com\Sales`

You scan for migration candidates and find one candidate.

Migration candidate
`\\Saturn.npb.com\c$\Sales\Reports\HoustonRegion`

The namespace contains a link named Sales that targets the migration candidate. Notice the difference in the UNC paths between the migration candidate and the link target.

Namespace link	Target of link
Sales	`\\Saturn.npb.com\Sales\Reports\HoustonRegion`

You run the policy to start the migration. VFM successfully migrates the data to the destination but does not update the link target because the UNC paths of the migration candidate and the link target do not match.

Destination after migration
`\\Pluto.npb.com\Sales\HoustonRegion`

Namespace link	Target of the link after migration is not updated to target the destination
Sales	`\\Saturn.npb.com\Sales\Reports\HoustonRegion`

After migration, the target for the link Sales does not contain any data because the data was migrated to the destination.

To avoid this problem, the source path should match the link target path.

Correct source path
`\\Saturn.npb.com\Sales\Reports`

Migration candidate
`\\Saturn.npb.com\Sales\Reports\HoustonRegion`

Namespace link	After migration, the target of the link is updated to target the destination
Sales	`\\Pluto.npb.com\Sales\HoustonRegion`

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

Maintain an exclusion list of directories that 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, the path of the candidate is added automatically 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

Specify batch files to run before and after migration criteria evaluation, before and after a replication operation, and before and after a migration operation.

To run batch files before and after migration criteria evaluation (scanning)

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**.

To run batch files before and after a replication action

For instructions about how to specify scripts to run before and after a replication action of a migration operation, see the migration policy topic "Run customized commands" in the VFM *Transfer Data* guide.

Notes:

For detailed information about configuring batch files to run in VFM storage policies, see "Running batch files" in the VFM *Advanced Configuration and Techniques* guide.

For more information about the example scripts provided by VFM, see "Batch files" in the VFM *Advanced Configuration and Techniques* guide.

Scan for data immediately

Manually scan for directories that match the migration criteria of an archival migration policy. By default, the policy 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**, the policy 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 click **Archival Migration** or any item under Archival Migration. Changes you make affect only 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

View the results of a criteria evaluation and 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 the information is gathered.

View a list of migration tasks

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, the migration task is removed after the task 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

You can 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 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

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

1. Create a storage load balancing policy.
2. Add storage locations.
3. (Optional) Configure the initial phase.
4. (Optional) Configure the incremental phase.
5. (Optional) Configure the final phase.
6. Schedule scanning.
7. Select replication options.
8. 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 click **Storage Load Balancing Policy**.

   Right-click Admin View, point to **New**, point to **Data Movement Policy**, and click **Storage Load Balancing Policy**.

   Under Admin View, right-click the **Data Movement Policies** folder, point to **New**, and 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. (Optional) Change the default **High-mark**. The **High-mark** is the maximum percentage of used disk space allowed. When disk use exceeds this limit, the disk is excluded as a destination.
4. (Optional) Change the default **Low-mark**. The **Low-mark** is the minimum percentage of used disk space allowed. When disk use falls below this limit, the disk is excluded as a source.
5. (Optional) 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 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.

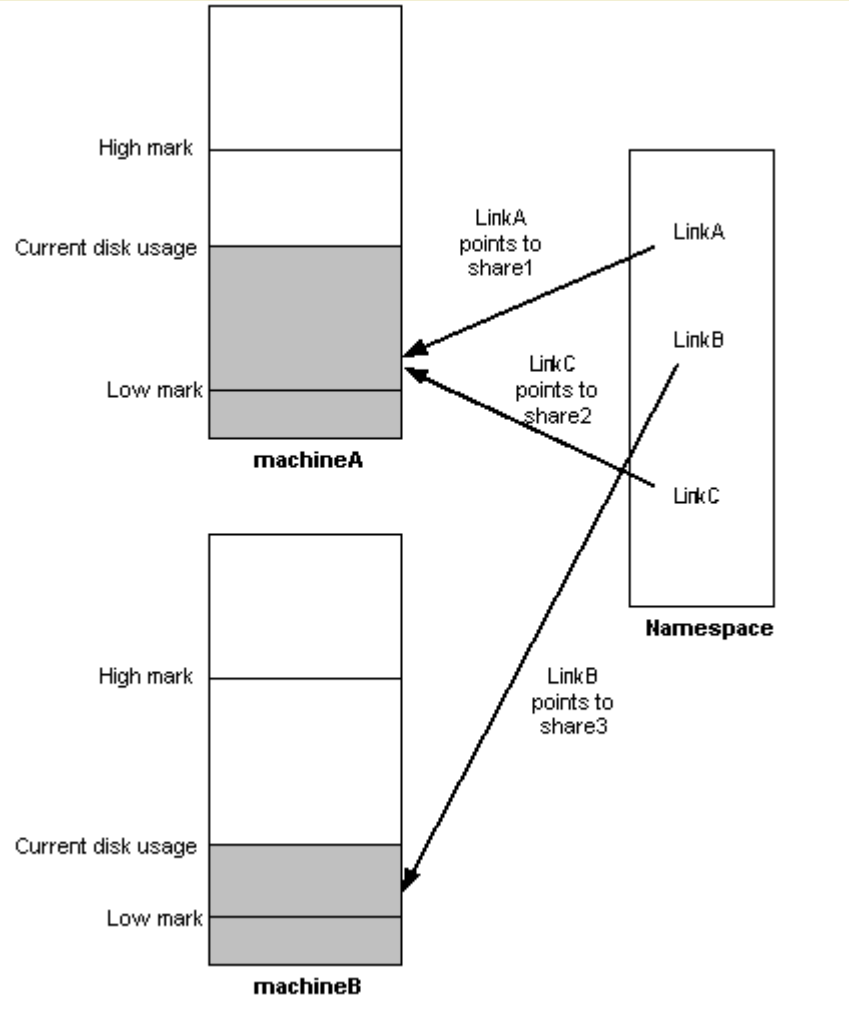
6. Select the **Load balance data even when no machine is above high mark** option when you want any device in the pool above the low-mark to be considered as a possible input or source device. When this option is not selected, the policy considers only devices above the high-mark as possible input or 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 that 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, the current VFM server is used to process the policy. If you installed monitoring agents on other machines, you can select one of the locations where monitoring agents are installed as the location from which this policy is processed.
11. Click **OK**.

Notes:

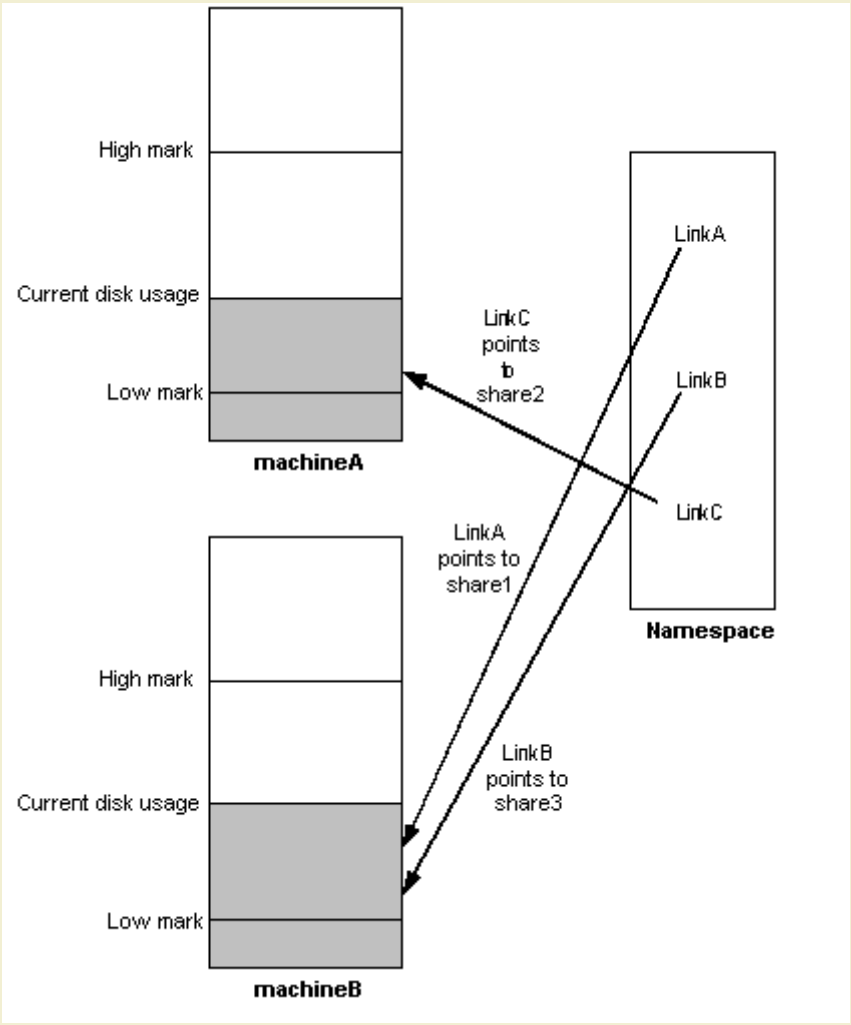
If you uninstall a monitoring agent, ensure that storage load balancing policies that formerly used the uninstalled agent are reassigned to a currently available agent. Do this by selecting the desired agent through the properties dialog box for the policy.

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.



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*.


High mark
Current disk usage
Low mark
machineA
LinkC
points
to
share2
LinkA
LinkB
LinkC
Namespace
LinkA
points to
share1
High mark
Current disk usage
Low mark
machineB
LinkB
points to
share3

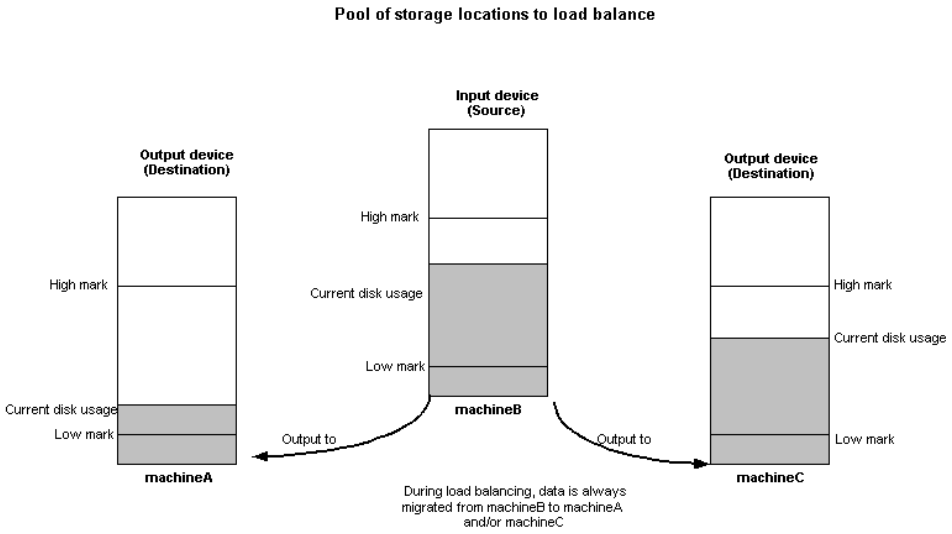
Add storage locations

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

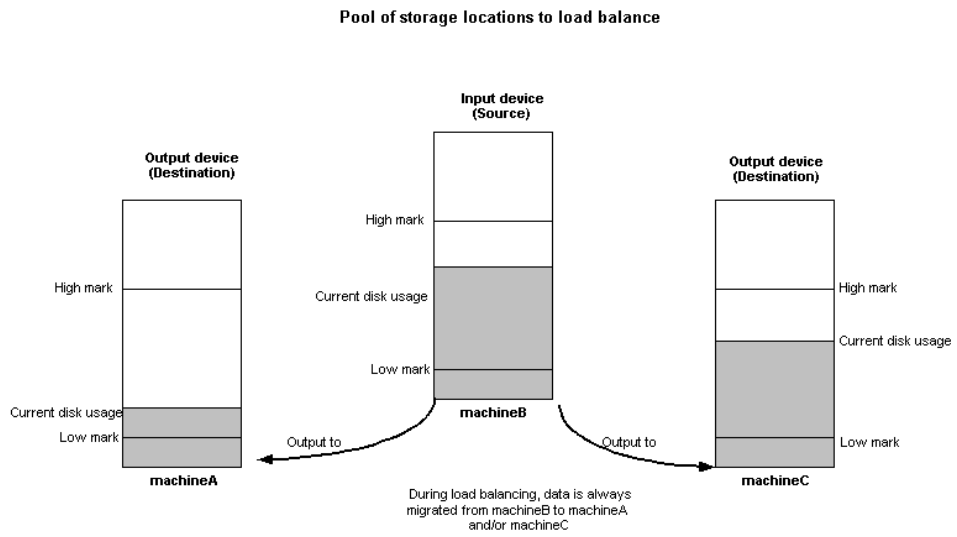
1. Right-click the policy and click **Properties**.
2. Click **Pool**.
3. Click **Add** and select a shared folder in the Physical View or a shared folder, volume, or qtree in your network.
4. Repeat Step 3 to add at least one more shared folder.
5. Optionally select whether data is migrated to or from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



6. Click **OK**.

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, another storage location is selected 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, another storage location is selected as the input device. A storage location that falls below the low-mark cannot be an input device.

Configure the initial phase

You have the option of specifying a script to run before each migration task is executed. The policy automatically scans for potential problems copying the data and performs a baseline copy of the data.

1. Right-click the policy and click **Properties**.
2. Click **Initial Phase**.
3. (Optional) Select the **Run batch file** check box and type the name of a script file, or browse for a script file. 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. (Optional) Select to pause only if errors occur during the execution of the script, suspend the migration operation after completing the script, or continue the migration operation after completing the script.

Notes:

When an action is suspended or paused after an error occurs, you must resume the migration operation manually. For instructions, see "User action required."

For information about configuring batch files to run in VFM storage policies, see "Running batch files."

For information about the example scripts provided by VFM, see "Batch files."

Configure the incremental phase

You have the option of copying data incrementally and specifying when you want the migration operation to advance to the final phase. This action affects all the migration tasks associated with the policy. Data is copied every time the incremental schedule runs until the conditions you specify for advancing to the final phase are met.

1. Right-click the policy and click **Properties**.
2. Click **Incremental Phase**.
3. Select the **Copy the data** check box to copy the data in increments after a baseline copy of the data is performed.

   Note: When you do not want the incremental phase to run, clear this option or disable the incremental phase schedule.

4. Specify the condition for advancing migration tasks to the final phase.

   Never advance tasks automatically; they will remain in the Incremental Phase until advanced manually - Migration tasks perform incremental copies indefinitely at the intervals specified by the incremental phase schedule. You must advance migration tasks to the final phase manually. For instructions about how to advance migration tasks manually, see "To specify the condition for advancing a migration task to the final phase."

   After each task's current Incremental Phase run completes, advance the task according to the Final Phase schedule - Migration tasks advance to the final phase after each migration task runs the incremental phase one time.

   After each task's current Incremental Phase run completes, advance the task according to the Final Phase schedule - Migration tasks advance to the final phase on the date and time you specify and run the final phase the next time the final phase runs after the date and time you specify.

5. Click **OK**.

Configure the final phase

You have the option of specifying a script to run after each migration task is completed.

1. Right-click the policy and click **Properties**.
2. Click **Final Phase**.
3. (Optional) Select **Run batch file** and type the name of a script file, or browse for a script file to run after each migration task is completed. 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.

Notes:

When an action is suspended or paused after an error occurs, you must resume the migration operation manually. For instructions, see "User action required."

For information about configuring batch files to run in VFM storage policies, see "Running batch files."

For information about the example scripts provided by VFM, see "Batch files."

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, storage locations that contain parent and child directories that are targets of links are ignored.

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 subfolder

`\\server\share\folder1\subfolder`

When scanning for storage locations to migrate, it ignores `LinkA` and `LinkB` are ignored.

Select replication options

Configure replication, file security, and replication differencing options for a storage load balancing policy as well as for other storage policies. See the following migration policy topics in the VFM *Transfer Data* guide:

Select replication options

Select replication filters

Select a replication agent

Select file security replication options

Select differential replication options

Select file attribute replication options

Schedule migration

Schedule how frequently you want to migrate directories referenced by links in your namespace to load balance the storage pool. Before you configure migration schedules, review the information in "Scheduling considerations." For instructions about how to schedule the migration, see the following migration policy topics in the VFM *Transfer Data* guide:

Schedule the initial phase

Schedule the incremental phase

Schedule the final phase

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 from which you can select the 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:

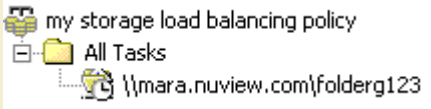
   Right-click a storage load balancing policy and click **Start Scan Now**.

   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 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", migration tasks are added automatically after scanning. To view the migration tasks, double-click the policy to show the **All Tasks** folder.



Run customized commands during replication

Specify batch files to run before and after migration criteria evaluation and before and after a replication operation.

1. Perform one of the following actions:

   Right-click a migration policy and click **Properties**.

   Select a migration policy and click Edit on the **Properties** tab that appears in the right pane.
2. Click **Replication Scripting**.
3. Select the options you want and specify the batch files you want to run. The batch file can be specified either as the UNC path to a file accessible on your network or as a local path to a file residing on the server where VFM monitoring is taking place
4. Click **OK**.

Notes:

(Migration, Archival Migration, and Storage Load Balancing policies only) When you specify scripts to run before and after replication, the files run before and after the following migration actions:

Scan for potential problems copying the data (Initial Phase).

Perform a baseline copy (Initial Phase).

Copy the data (Incremental Phase).

Do a final replication prior to deleting the source data (Final Phase).

Delete the source data (Final Phase).

For information about configuring batch files to run in VFM storage policies, see "Running batch files" in the VFM *Advanced Configuration and Techniques* guide.

For information about the example scripts provided by VFM, see "Batch files" in the VFM *Advanced Configuration and Techniques* guide.

Start migration immediately

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

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

Normally, 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**. The migration task appear in the **All Tasks** folder under the policy.

   To refuse a suggestion, right-click it and click **Exclude**.

Notes:

If you selected the policy option to "Automatically add migration tasks for data move suggestions," migration tasks are added after scanning.

A suggestion that is excluded might appear as a suggestion on subsequent policy scans.

Manage migration tasks

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

VFM Guides

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

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.

C

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 link: Located under the namespace root. Forms a connection to one or more shared folders, links or to another root.

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

DFS path: A UNC path starting at a DFS root.

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

DFS topology: Overall logical hierarchy of a namespace, 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.

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.

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 task: Identifies the source and destination.

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.

Quiesce: Wait for all existing transfers to both volumes and qtrees to complete and then block any further updates.

R

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

Rebase: To change the destination path proposed by the application to the actual path to where the data is to be migrated.

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 during the configuration of storage policies that transfer CIFS and NFS data, or when you run a file differencing report.

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.

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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