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Fujitsu Storage
ETERNUS AF, ETERNUS DX

Configuration Guide -Server Connection-

(Fibre Channel) for Windows®

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Preface

This manual briefly explains the operations that need to be performed by the user in order to connect an ETERNUS AF/DX to a server running Windows® via a Fibre Channel interface.

This manual should be used in conjunction with any other applicable user manuals, such as those for the ETERNUS AF/DX, server, OS, Fibre Channel cards, and drivers.

Use the default values for parameters that are not described in this manual.

Refer to "Configuration Guide -Server Connection- Notations" for the notations used in this manual such as product trademarks and product names. For storage systems that are supported by the OS, refer to the Server Support Matrix of the ETERNUS AF/DX.

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The Contents and Structure of this Manual

This manual is composed of the following 13 chapters.

Table of Contents

Chapter 1 Workflow

This chapter describes how to connect the ETERNUS AF/DX storage systems to a server. The workflow is shown below.

Required Documents

- "Server Support Matrix"
- "Server Support Matrix for FC-SWITCH"
- "Configuration Guide -Server Connection- Storage System Settings" that corresponds to the ETERNUS AF/DX to be connected
- "Configuration Guide -Server Connection- (Fibre Channel) Fibre Channel Switch Settings"
- "Configuration Guide -Server Connection- (Fibre Channel) for Windows® Driver Settings for Fujitsu Fibre Channel Cards"
- "Configuration Guide -Server Connection- (Fibre Channel) for Windows® Driver Settings for Non-Fujitsu Fibre Channel Cards"
- "ETERNUS Web GUI User's Guide"

Workflow

1

Setting Up the ETERNUS AF/DX

Set the various parameters required to operate the ETERNUS AF/DX.

- "Chapter 4 Setting Up the ETERNUS AF/DX" (page 20)
- Checking the setup and maintenance operations
  - "ETERNUS Web GUI User's Guide"
- Setting up the ETERNUS AF/DX
  - "Configuration Guide -Server Connection- Storage System Settings" that corresponds to the ETERNUS AF/DX to be connected

2

Setting Up the Fibre Channel Switches

If a Fibre Channel switch is to be used, set it up now.

- "Chapter 5 Setting Up the Fibre Channel Switches" (page 21)
- Setting up the Fibre Channel switches
  - "Configuration Guide -Server Connection- (Fibre Channel) Fibre Channel Switch Settings"
- Checking the Fibre Channel switch connection requirements
  - "Server Support Matrix for FC-SWITCH"

3

Installing the Driver

Install the appropriate driver for the Fibre Channel card and Multipath Driver to be used.

- "Chapter 7 Installing the Driver" (page 24)
- Installing and setting up the card and driver
  - "Configuration Guide -Server Connection- (Fibre Channel) for Windows® Driver Settings for Fujitsu Fibre Channel Cards"
  - "Configuration Guide -Server Connection- (Fibre Channel) for Windows® Driver Settings for Non-Fujitsu Fibre Channel Cards"
- Checking the Fibre Channel card driver versions
  - "Server Support Matrix"

4

Checking the Connected Devices

Check the ETERNUS AF/DX LUNs and status of the connection to the server.

- "Chapter 9 Checking the Connected Devices" (page 29)

5

Preparing for Operation

Create disk partitions and set up the cluster configuration as necessary.

- "Chapter 10 Creating the Disk Partitions" (page 31)
- "Chapter 11 Setting Up the Cluster Configuration" (page 32)

Chapter 2
Checking the Server Environment

Connection to servers is possible in the following environments.
Check the "Server Support Matrix" for server environment conditions.

2.1 Hardware

Refer to the "Server Support Matrix".

2.2 Operating System (OS)

Refer to the "Server Support Matrix".

2.3 Fibre Channel Cards

Refer to the "Server Support Matrix".

Chapter 3
Notes

Note the following issues when connecting the ETERNUS AF/DX to a server.

3.1 Connection Notes for PRIMERGY and PRIMEQUEST 4000/3000/2000/1000 Series

3.1.1 Connection Notes

- To ensure reliable access to the storage systems, the following methods are recommended:
  - Connection via multiple paths
  - Use of drivers for ETERNUS AF/DX storage systems which support path redundancy control

    Configure a multipath environment and select a driver for ETERNUS AF/DX storage systems that supports path redundancy control to increase redundancy and reliability of the connection between the ETERNUS AF/DX storage systems and the server.
- The following cluster configuration is supported for Windows®:
  - MSCS (Microsoft Cluster Service) configuration
  - WSFC (Windows Server Failover Cluster) configuration

For details on servers which support cluster configuration, consult your Fujitsu sales representative.

3.1.2 When Installing Multiple Fibre Channel Cards

Only the same type of Fibre Channel cards can be installed together. Different types of Fibre Channel cards cannot be mixed.

3.1.3 When Connecting PRIMEQUEST 1000 Series to an ETERNUS AF/DX

When connecting the PRIMEQUEST 1000 series to an ETERNUS AF/DX, the following configurations are recommended:

- For 1-port Fibre Channel cards used in system configurations that emphasize redundancy, use of 8Gbit/s 1-port Fibre Channel cards (MC-0JFC11/MC-0JFC1L) are recommended for use.
- For 2-port Fibre Channel cards (MC-0JFC21/MC-0JFC2L), configurations in which both ports of any given card connect to the same storage system are not recommended.

For other notes, contact a Fujitsu engineer.

3.2 Connection Notes for PRIMEQUEST 500 Series and Other Companies' Industry Standard Servers

- To build a cluster configuration for Windows®, use Microsoft Cluster Service (MSCS), Windows Server Failover Cluster (WSFC), and MSCS- and WSFC-compatible applications. This cluster configuration must also use only one type of Fibre Channel card. Operation cannot be guaranteed if the cluster is configured using multiple types of Fibre Channel cards.
- When the PRIMEQUEST 500 series is connected to an ETERNUS AF/DX, LUN recognition by the Windows® Plug and Play function is not guaranteed.
- To ensure reliable access to the storage systems, the following methods are recommended:
  - Connection via multiple paths
  - Use of drivers for ETERNUS AF/DX storage systems which support path redundancy control

    Configure a multipath environment and select a driver for ETERNUS AF/DX storage systems that supports path redundancy control to increase redundancy and reliability of the connection between the ETERNUS AF/DX storage systems and the server.
- When connecting the PRIMEQUEST 500 series to an ETERNUS AF/DX, the following configurations are recommended:
  - For 1-port Fibre Channel cards used in system configurations that emphasize redundancy, 8Gbit/s 1-port Fibre Channel cards (MC-08FC81) or 4Gbit/s 1-port Fibre Channel cards (MC-08FC31/MC-08FC51) are recommended for use.
  - For 2-port Fibre Channel cards (MC-08FC41/MC-08FC61/MC-08FC91), configurations in which both ports of any given card connect to the same storage system are not recommended.

For other notes, contact a Fujitsu engineer.

3.3 Notes about Driver for ETERNUS AF/DX Storage Systems

When connecting the server to the ETERNUS AF/DX with multipath configuration, using the path redundancy control (path fail-over) function with a driver for ETERNUS AF/DX storage systems, one of the following drivers is required by the server:

OS	Driver
Windows Server® 2025 Windows Server® 2022 Windows Server® 2019 Windows Server® 2016 Windows Server® 2012 R2 Windows Server® 2012	ETERNUS Multipath Driver

For product information, refer to the following URL:

https://www.fujitsu.com/global/products/computing/storage/software/eternus-mpd/

When single-path connection is used between the ETERNUS AF/DX and server, a driver for ETERNUS AF/DX storage systems (ETERNUS Multipath Driver) is not required.

3.4 MSCS and WSFC Notes

- To use MSCS or WSFC configuration, install either the driver for ETERNUS AF/DX storage systems or the standard multipath driver (msdsm) for Windows Server® 2025, Windows Server® 2022, Windows Server® 2019, Windows Server® 2016, Windows Server® 2012 R2, or Windows Server® 2012 on each node (server) and then check the connections before the installation of MSCS or WSFC.
- Check the registry values by following the instructions in "Chapter 8 Checking the Registry Information" (page 28), after installing MSCS or WSFC.
- When setting up the MSCS, a reset group must be set for the ETERNUS AF/DX. A reset group does not need to be set for WSFC.

3.5 Veritas Cluster Server (VCS) Notes

Veritas Cluster Server should be installed according to the directions given in the documentation provided with Veritas Cluster Server.

3.6 Notes about Standard Multipath Driver (msdsm) for Windows Server®

Various settings, such as the load balance policy and retry count, can be adjusted by using the standard multipath drivers (msdsm) for Windows Server® 2025, Windows Server® 2022, Windows Server® 2019, Windows Server® 2016, Windows Server® 2012 R2, or Windows Server® 2012. However the following settings should not be changed from their default values.

Screen name	Parameters that may not be changed
MPIO tab of Multi-Path Disk Device properties	Load balance policy, [Details] button, [Edit] button
Details of DSM	Timer counter (path checking period, enable path checking, number of retires, retry interval, PDO deletion period)
Details of MPIO paths	Path status

3.7 Hyper-V Virtual Fibre Channel (vFC) Function Notes

- The following must be noted depending on the switch that is to be used when the vFC function is used in a cluster configuration via the guest OS.
  - **For Brocade Switch**
    - Enable the NPIV function.
    - Enable the "Enforce FLOGI/FDISC login" function.
  - **For Cisco Switch**
    - Enable the NPIV function.

  - Use version 5.0 (4b) or later for NX-OS.
- For details on the Brocade switch functions, the Cisco switch functions, and their support status, refer to the manual provided with the relevant switch.
- When the vFC function is used, use the host affinity instead of using the LUN mapping.
- When the host WWNs are registered to the host affinity, all virtual WWNs of the vFC that are set for the virtual machine must be registered as host WWNs.
- Configure the switch zone settings using the WWN zoning and avoid a cascade connection between the switches.

3.8 Fibre Channel Switch Notes

- Check the "Server Support Matrix for Windows FCoE connection" and "Server Support Matrix for FC-SWITCH" for which CEE/FCoE switches and Fibre Channel switches are supported by each server OS and ETERNUS AF/DX model. Refer to "Server Support Matrix for FC-SWITCH" to check the available Fibre Channel switches in advance.
- When a Fibre Channel switch is to be used between the server and ETERNUS AF/DX, follow the preparation-in-advance and Fibre Channel switch setup procedures given in the "Configuration Guide -Server Connection- (Fibre Channel) Fibre Channel Switch Settings".

3.9 Server Startup and Power Supply Control Notes

Before turning the server on, check that the ETERNUS AF/DX storage systems and Fibre Channel switches are all "Ready". If the server is turned on and they are not "Ready", the server will not be able to recognize the ETERNUS AF/DX storage systems.

Also, when the ETERNUS AF/DX power supply is being controlled by a connected server, make sure that the ETERNUS AF/DX does not shut down before the connected servers. Similarly, the Fibre Channel switches must also be turned off after the connected servers have been shut down. If turned off, data writes from the running server cannot be saved to the ETERNUS AF/DX storage systems, and already saved data may also be affected.

3.10 Notes on WWN Instance Management Table for the Server

The WWN instance management table for the server is a worksheet that helps make the process of installing an ETERNUS AF/DX easy.

It is important that the system details be recorded after first installing the system and also each time the system is subsequently modified, expanded, or has maintenance work performed on it. Creating an instance management table makes installation and maintenance of the system easy. Use template instance management tables provided in "Appendix Various Management Tables (Template)" of the "Configuration Guide -Server Connection- (Fibre Channel) for Windows Driver Settings" for the Fibre Channel card being used.

3.11 System Design Sheet Notes

The system design sheet is a spreadsheet program work sheet that is used to simplify the process of installing the ETERNUS AF/DX. It is important that the system details be recorded after first installing the system and also each time the system is subsequently modified, expanded, or has maintenance work performed on it. Creating a system design sheet makes installation and maintenance of the system easy.

3.12 Operational Notes

Check the values of the registry information after updating the Fibre Channel card driver. For further details, refer to "Chapter 8 Checking the Registry Information" (page 28).

3.13 Notes on Installing the Storage Cluster Function

To install the Storage Cluster function, rebooting the server is necessary after the TFO group is set up.

3.14 Notes about Connections with a Windows Server®

When Windows Server® is connected to the ETERNUS AF series (excluding the ETERNUS AF S3 series), the ETERNUS DX S4/S3 series (excluding the ETERNUS DX8900 S4), or the ETERNUS DX200F, and Windows Server® is rebooted after a firmware is applied to the storage system, the status of the disks on Windows Server® may become offline.

The status of the disks on Windows Server® can be checked with the following procedure.

Click the [Start] button, select [Computer Management] under [Administrative Tools] and then select [Manage Discs] (or [Disk Management]) in the left pane.

Note that the occurrence condition and the workaround differ depending on the path configuration of Windows Server®.

For single-path configurations, change the SAN Policy setting before a firmware is applied to prevent the disk from becoming offline after the firmware is applied.

For multi-path configurations, there is no workaround. The procedure in "● Measure to take after a problem occurs" (page 17) must be performed to recover from the offline status.

■ Single-path configuration

The offline status can be avoided only when updating the firmware by changing the SAN Policy setting to "Online All".

If operations are possible with the SAN Policy setting set to "Online All", Step 4 in "● Method for proactively preventing occurrences" (page 15) is not required.

- Checking the SAN Policy setting

  The following shows how to check the SAN Policy setting.

  1 Execute the "diskpart" command in the command prompt.
  The prompt changes to DISKPART.

  2 Enter "san" and press the [Enter] key.

```
DISKPART> san
```

  3 One of the following SAN Policies appears.
  - "Offline Shared"
  - "Offline All"
  - "Online All"

  4 Enter "exit" and press the [Enter] key to complete the "diskpart" command.

- Method for proactively preventing occurrences

  Change the SAN Policy setting by performing the following procedure and then update the firmware.

  1 Change the SAN Policy setting.
  (1) Execute the "diskpart" command in the command prompt.
  The prompt changes to DISKPART.

  (2) Enter "san policy=onlineall" and press the [Enter] key.
  Example:

```
DISKPART> san policy=onlineall
```

  (3) To apply the SAN Policy setting, reboot Windows Server®.

  2 Execute the "diskpart" command again in the command prompt and confirm that "Online All" is specified for the SAN Policy setting.
  Example:

```
DISKPART> san
SANPolicy : Online All
```

  3 Update the firmware.
  (1) Update the firmware of the ETERNUS AF/DX.

  (2) To get OS to recognize the new instance ID, reboot Windows Server®.

4 Revert the SAN Policy setting to the previous value.

(1) Execute the following command to revert the SAN Policy setting.

Example:

```
DISKPART> san policy=Offline Shared
```

(2) To apply the SAN Policy setting, reboot Windows Server®.

(3) Execute the "diskpart" command again in the command prompt and confirm that the previous value is specified for the SAN Policy setting.

Example:

```
DISKPART> san
SANPolicy : Offline Shared
```

- Measure to take after a problem occurs

Manually change the offline disks to online with the following procedure.

1 Click the [Start] button, select [Computer Management] under [Administrative Tools] and then select [Manage Discs] (or [Disk Management]) in the left pane.

2 Select each offline disk, then right-click the selected disk to change the status to online.

If a firmware update of the ETERNUS AF/DX is performed in a Hyper-V environment where a pass-through disk is configured for the guest OS, the disk is recognized as a new disk and the pass-through disk is removed from the physical hard disk. Therefore, the pass-through disk must be manually reconfigured to be restored.

The procedure for restoring (or reconfiguring) the disk is as follows:

1 Start "Hyper-V Manager".

2 Select the offline guest OS and click [Settings] in the right pane.

The settings pop-up for the guest OS appears.

3 In the settings pop-up under [SCSI Controller], select the hard drive that has the message "Physical drive not found".

4 Select the appropriate disk for the [Physical hard disk] area in the right side of the window.

5 Click the [OK] button.

- SAN Policy supported OSs

  - Windows Server® 2025
  - Windows Server® 2022
  - Windows Server® 2019
  - Windows Server® 2016
  - Windows Server® 2012 R2
  - Windows Server® 2012

- SAN Policy default value

OS	SAN Policy default value
Windows Server® 2025 (all editions)	Offline Shared
Windows Server® 2022 (all editions)	
Windows Server® 2019 (all editions)	
Windows Server® 2016 (all editions)	
Windows Server® 2012 R2 (all editions)	
Windows Server® 2012 (all editions)	

Multipath configuration

The server starts up with the same disk status (online or offline) as when the multipathing was set up regardless of the SAN Policy setting.

- When the multipathing of an online disk is set up during the configuration of the environment

  The multipath disk starts up in the online status after the firmware is updated.
- When the multipathing of an offline disk is set up during the configuration of the environment

  The multipath disk starts up in the offline status after the firmware is updated.

- Method for proactively preventing occurrences

For multi-path configurations, there are no proactive measures (such as a setting change) to prevent the disk from becoming offline after the environment is configured. In addition, the disk status when multipathing was set up cannot be checked after the environment is configured.

Perform the procedure in "● Measure to take after a problem occurs" (page 17) if the disk becomes offline while the firmware is updated.

- Measure to take after a problem occurs

  - When the OS can be started up

    Manually change the offline disks to online by following the procedure below.

    1 Click the [Start] button, select [Computer Management] under [Administrative Tools] and then select [Manage Discs] (or [Disk Management]) in the left pane.

    2 Select each offline disk, then right-click the selected disk to change the status to online.

  - When the OS cannot be started up

    If the Active Directory database is located in a disk other than the OS area, the OS may not be able to start up because the disk is offline and the OS cannot access the Active Directory database.

    In this case, the disk can be recovered by starting the OS in the Directory Services Restore Mode and changing the disk status to online.

    The procedure for restoring (or reconfiguring) the disk is as follows:

    1 Start the server.

    2 Press the [F8] key on the server start-up screen.

3 The Advanced Boot Options screen appears.

4 Select Directory Services Restore Mode.

5 Log in as Administrator after the OS starts.

6 Select [Computer Management] under [Administrative Tools] and then select [Manage Discs] (or [Disk Management]) in the left pane.

7 Select each offline disk, then right-click the selected disk to change the status to online.

8 Restart the OS.

If a firmware update of the ETERNUS AF/DX is performed in a Hyper-V environment where a pass-through disk is configured for the guest OS, the disk is recognized as a new disk and the pass-through disk is removed from the physical hard disk. Therefore, the pass-through disk must be manually reconfigured to be restored.

The procedure for restoring (or reconfiguring) the disk is as follows:

1 Start "Hyper-V Manager".

2 Select the offline guest OS and click [Settings] in the right pane.

The settings pop-up for the guest OS appears.

3 In the settings pop-up under [SCSI Controller], select the hard drive that has the message "Physical drive not found".

4 Select the appropriate disk for the [Physical hard disk] area in the right side of the window.

5 Click the [OK] button.

3.15 Notes for Formatting a LUN of the ETERNUS AF/DX from a Windows Server®

If a LUN of the ETERNUS AF/DX is formatted from a Windows Server®, the following problems may occur.

- The formatting operation takes longer to complete.
- If the formatting operation is canceled, the canceled operation becomes unresponsive.

These are the problems caused by performance degradation due to the command being issued to release the storage capacity for the entire formatting area.

Performance degradation can be prevented by executing the following command to change the parameter value to stop the command from releasing the storage capacity of all the volumes.

```
# fsutil behavior set disabledeletenotify 1
```

After all formatting operations have been completed, execute the following command to re-enable the command that releases the storage capacity of all the volumes.

```
# fsutil behavior set disabledeletenotify 0
```

Chapter 4
Setting Up the ETERNUS AF/DX

Set up the ETERNUS AF/DX storage systems using ETERNUS Web GUI.

ETERNUS AF/DX setup can be performed independently of server setup. For details on how to perform these settings, refer to the following manuals.

- "Configuration Guide -Server Connection- Storage System Settings" that corresponds to the ETERNUS AF/DX to be connected
- "ETERNUS Web GUI User's Guide"

Chapter 5
Setting Up the Fibre Channel Switches

Perform the settings required to connect the ETERNUS AF/DX storage systems and server via the Fibre Channel switch, according to "Configuration Guide -Server Connection- (Fibre Channel) Fibre Channel Switch Settings".

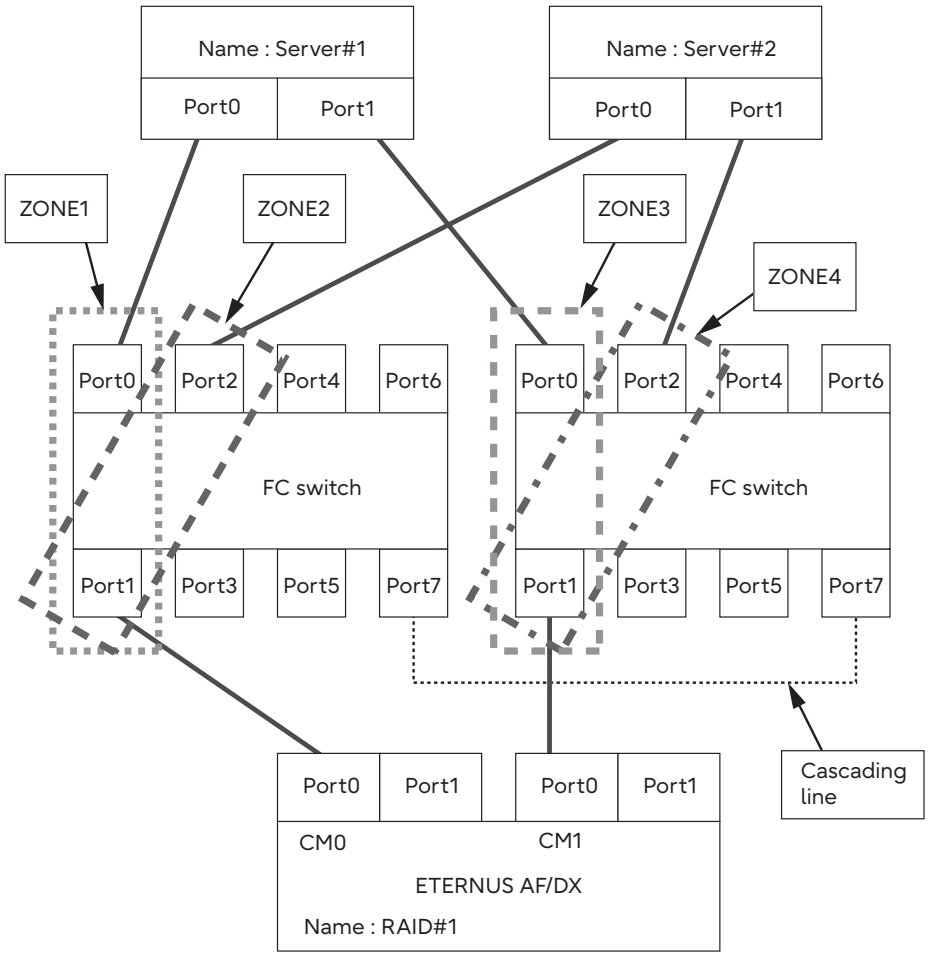
Caution

If the access path is set with ETERNUS SF Storage Cruiser, the Host Response settings are set to the default values.

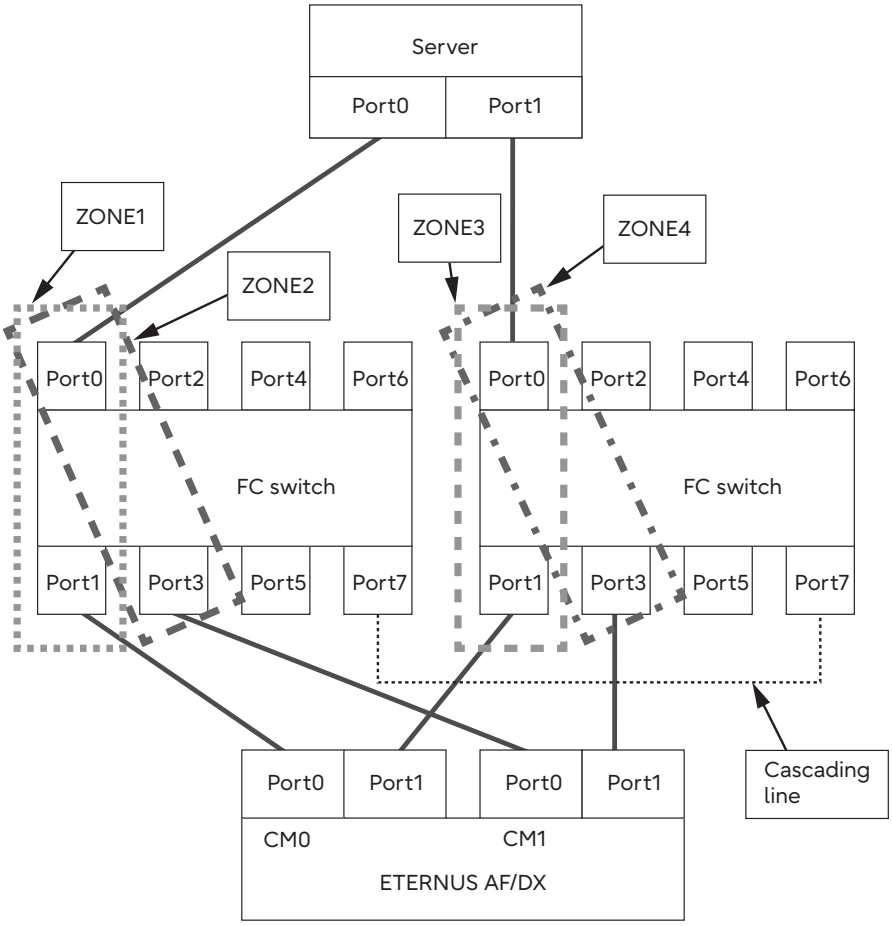
If the Host Response settings are changed from the default values, set the Host Response again.

The following examples show configurations in which a server is connected to a Fibre Channel switch with zoning.

The following example shows a configuration in which multiple servers are connected to multiple CAs.



The following example shows a configuration in which a single server is connected to multiple CAs.



Chapter 6
Installing the OS

Install the OS and Service Pack (SP) to the server if the OS has not yet been installed.

Caution

Check that the power for the ETERNUS AF/DX storage systems are turned off before installing the OS. If the power for the ETERNUS AF/DX storage systems are turned on when installing the OS, the server recognizes the ETERNUS AF/DX storage systems and problems may occur.

Chapter 7
Installing the Driver

Install the Fibre Channel card driver and the driver for ETERNUS AF/DX storage systems or the standard multipath driver (msdsm) for Windows Server® 2025, Windows Server® 2022, Windows Server® 2019, Windows Server® 2016, Windows Server® 2012 R2, or Windows Server® 2012 and then perform a configuration.

7.1 Installing the Fibre Channel Card Driver

Refer to each "Configuration Guide -Server Connection- (Fibre Channel) for Windows®" for detailed setting procedures.

- "Configuration Guide -Server Connection- (Fibre Channel) for Windows® Driver Settings for Fujitsu Fibre Channel Cards"
- "Configuration Guide -Server Connection- (Fibre Channel) for Windows® Driver Settings for Non-Fujitsu Fibre Channel Cards"

7.2 Multipath Environment Configuration

Multipath environment configuration differs depending on the multipath driver that is used.

- When the driver for ETERNUS AF/DX storage systems is used

  Refer to "7.2.1 Configuring ETERNUS Multipath or GR Multipath" (page 24).
- When the standard multipath driver (msdsm) for Windows Server® 2025, Windows Server® 2022, Windows Server® 2019, Windows Server® 2016, Windows Server® 2012 R2, or Windows Server® 2012 is used

  Refer to "7.2.2 Configuring the Standard Multipath Driver (msdsm) Environment for Windows Server®" (page 25).

7.2.1 Configuring ETERNUS Multipath or GR Multipath

Install the driver for ETERNUS AF/DX storage systems as required.

- Refer to "3.3 Notes about Driver for ETERNUS AF/DX Storage Systems" (page 11) for notes about drivers in cases such as when connecting the server to the ETERNUS AF/DX in multipath configuration and using the path redundancy control (path fail-over) function, and for when single-path connection is used between the ETERNUS AF/DX and server.
- For the procedure about how to install (or uninstall), set up, and use the drivers for ETERNUS AF/DX storage systems, refer to the software manuals.

7.2.2 Configuring the Standard Multipath Driver (msdsm) Environment for Windows Server®

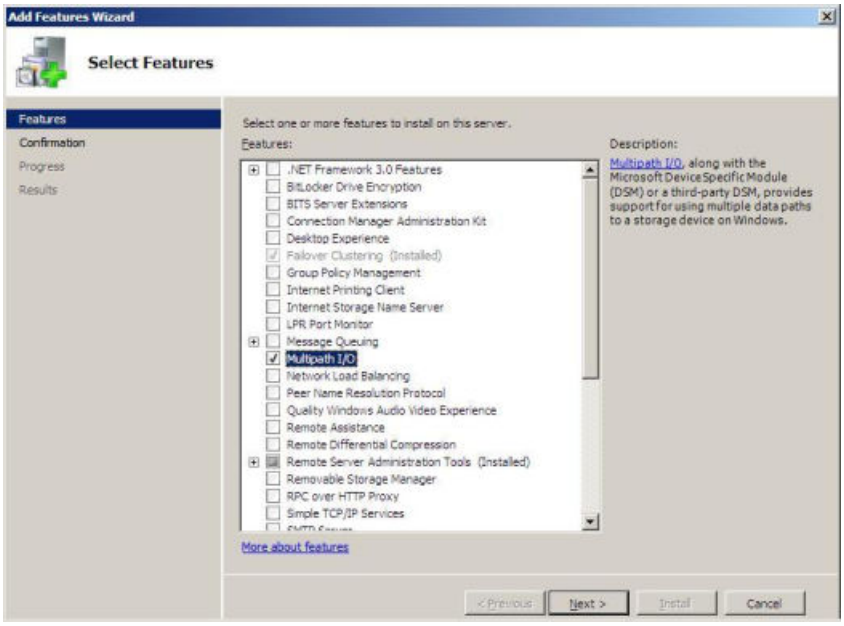
This section describes how to configure the environment to use the standard multipath driver (msdsm) for Windows Server® 2025, Windows Server® 2022, Windows Server® 2019, Windows Server® 2016, Windows Server® 2012 R2, or Windows Server® 2012.

7.2.2.1 Installing Multipath I/O

Procedure

1 Click [Add Features] in the [Server Manager] screen.

Select the "Multipath I/O" checkbox in the "Features" screen of the Add Features Wizard, and install the Multipath I/O function.



2 Reboot the server.

End of procedure

7.2.2.2 Detailed Setup for MPIO

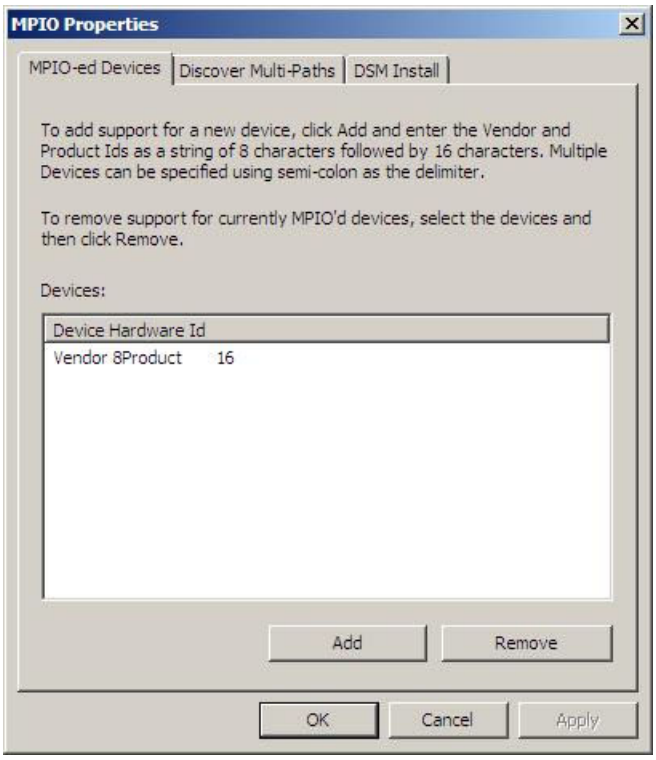
Perform settings to apply the installed Multipath I/O to the ETERNUS AF/DX.

Procedure

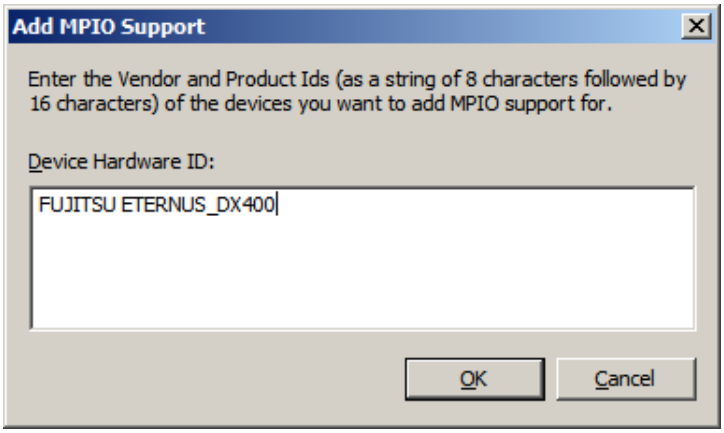
1 Click [Control Panel] — [MPIO].

The MPIO properties window appears.

2 In the MPIO properties window, select the [MIPO-ed Devices] tab, and click the [Add] button.



3 Enter the ID of the ETERNUS AF/DX that is to be connected in the [Device Hardware ID] field.



The device hardware ID that must be entered for the ETERNUS AF/DX can be checked with the following table.

ETERNUS AF/DX to be used	Device Hardware ID
ETERNUS AF150 S3/AF250 S3, ETERNUS AF250 S2, ETERNUS AF250, ETERNUS DX60 S5/DX100 S5/DX200 S5, ETERNUS DX60 S4/DX100 S4/DX200 S4, ETERNUS DX60 S3/DX100 S3/DX200 S3, ETERNUS DX60 S2/DX80 S2/DX90 S2, ETERNUS DX200F	FUJITSU ETERNUS_DXL
ETERNUS AF650 S3, ETERNUS AF650 S2, ETERNUS AF650, ETERNUS DX600 S6, ETERNUS DX500 S5/DX600 S5, ETERNUS DX500 S4/DX600 S4, ETERNUS DX500 S3/DX600 S3	FUJITSU ETERNUS_DXM
ETERNUS DX900 S6, ETERNUS DX900 S5, ETERNUS DX8900 S6, ETERNUS DX8900 S4, ETERNUS DX8100 S3/DX8700 S3/DX8900 S3	FUJITSU ETERNUS_DXH
ETERNUS DX400 S2 series	FUJITSU ETERNUS_DX400
ETERNUS DX8000 S2 series	FUJITSU ETERNUS_DX8000

Caution

A space is required between the "FUJITSU" and the "ETERNUS_...".

4 Connect the ETERNUS AF/DX using multipath configuration with the server turned off, and then turn the server on.

End of procedure

7.3 Single-Path Environment Configuration

In a single-path environment, it is not required to install the ETERNUS Multipath Driver or driver for ETERNUS AF/DX storage systems such as ETERNUS device driver.

Chapter 8
Checking the Registry Information

Check the value of the "TimeOutValue" registry key. If the "TimeOutValue" registry key does not exist, then create it.

The registry file should be backed up before creating or changing any registry values.

Procedure

1 Click the [Start] button, and then click [Run].

2 In the [Run] dialog box, type "regedit", and then click the [OK] button.

Registry Editor starts.

3 Follow the path described below:

```
\HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\Disk
```

4 Check the value of the "TimeOutValue" registry key.

Check that the value of the "TimeOutValue" registry key is "0x3C". If the name or value is not "0x3C", change it to "0x3C".

Caution

- If the "TimeOutValue" key does not exist, add a registry key with the following values:
- The "Name" field is case-sensitive.

Name	TimeOutValue
Type	REG_DWORD
Radix	Hexadecimal
Data	3C

5 If any registry values were added or modified, reboot the server.

The modified settings will be enabled after the reboot.

End of procedure

Chapter 9
Checking the Connected Devices

9.1 Turning On the Devices

To turn on the connected devices, use the following procedure:

Procedure

1 Turn on the Fibre Channel switch power (if used).

2 Check that the Ready LED (or equivalent) is lit on the Fibre Channel switch.

3 Turn on the ETERNUS AF/DX.

4 Check that the Ready LED is lit on the ETERNUS AF/DX.

5 Turn on the server.

End of procedure

9.2 Checking the LUNs

Check the LUNs using the following procedure:

Procedure

1 Open [Device Manager] to show [Disk drives].

2 If the ETERNUS AF/DX storage systems' LUNs are recognized by the server, the ETERNUS AF/DX storage systems' device (LUNs) are displayed under [Disk drives].

Note

For multipath configuration with Windows Server® 2025, Windows Server® 2022, Windows Server® 2019, Windows Server® 2016, Windows Server® 2012 R2, or Windows Server® 2012, each ETERNUS AF/DX LUN shows as a single "Multi-Path Disk Device".

End of procedure

9.3 Checking the ETERNUS AF/DX storage systems' Connection Status

The following items can be set and displayed in the Multipath Manager main window when GR Multipath Driver or ETERNUS Multipath Driver is used.

- ETERNUS AF/DX storage systems' connection status
- Connected LUNs
- Path status
- Path restoration or release

The following is an example use of ETERNUS Multipath Driver. This describes ETERNUS AF/DX storage systems' connection status and the checking of paths.

Procedure

1 Start up ETERNUS AF/DX storage systems (assuming that LUNs are already set up), and check that it is "Ready" before starting up the server.

2 When the server is Ready, start up Multipath Manager.

3 The main window will appear.

The status of the ETERNUS AF/DX storage systems connected to the server (connection status, path status) can be checked.

End of procedure

For details on "Multipath Manager" operations, refer to the manual provided with the GR Multipath Driver or ETERNUS Multipath Driver.

Chapter 10
Creating the Disk Partitions

Create disk partitions as necessary, using the following procedure.

Procedure

1 Open [Disk Management] via [Computer Management].

If unsigned disks exist, a query about whether or not to sign disks for the connected devices is made.

2 Sign disks and create partitions as necessary.

Note

- This setup can also be used to upgrade to dynamic disks.
- 2TB or larger disks must be converted to GPT disks.

End of procedure

Chapter 11
Setting Up the Cluster Configuration

If configuring a cluster (WSFC/MSCS), install the cluster related applications, as necessary. After cluster configuration is finished, recheck the registry information according to the instructions in "Chapter 8 Checking the Registry Information" (page 28). Correct the information, if necessary.

Chapter 12
Storage Migration

This chapter explains how to configure the server for performing Storage Migration.

When Storage Migration is performed, configure the settings so that the dynamic disks can be used from the server (Windows Server®).

Setting Procedure Outline

This procedure is required after performing Storage Migration, and all operations are performed on the server (Windows Server®). This is not dependent on a Multipath Driver.

The following describes the procedure for using the dynamic disks after performing Storage Migration. This procedure is not required when performing Storage Migration for a basic disk.

1 Bring the disk online.

2 Import the disk.

3 Activate the disk.

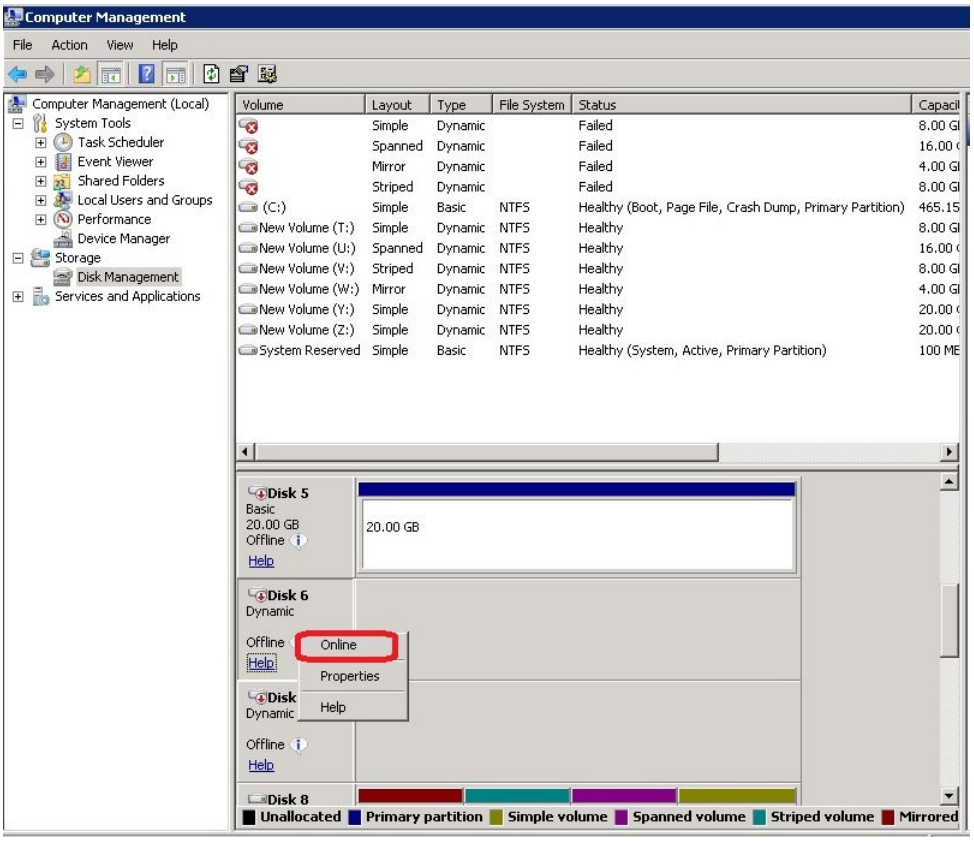
Example Setting Procedure

The following procedure shows an example configuration for using dynamic disks.

Procedure

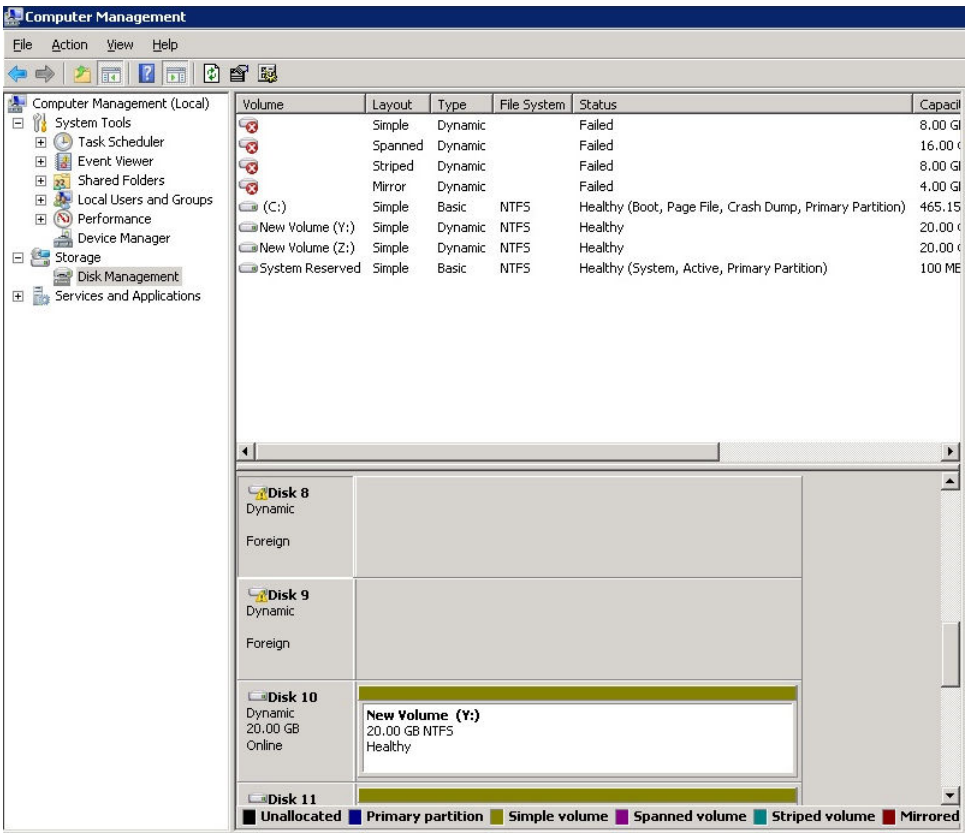
1 Bring the disk online.

After performing Storage Migration, the disk will be offline. Right-click the disk and select [Online].

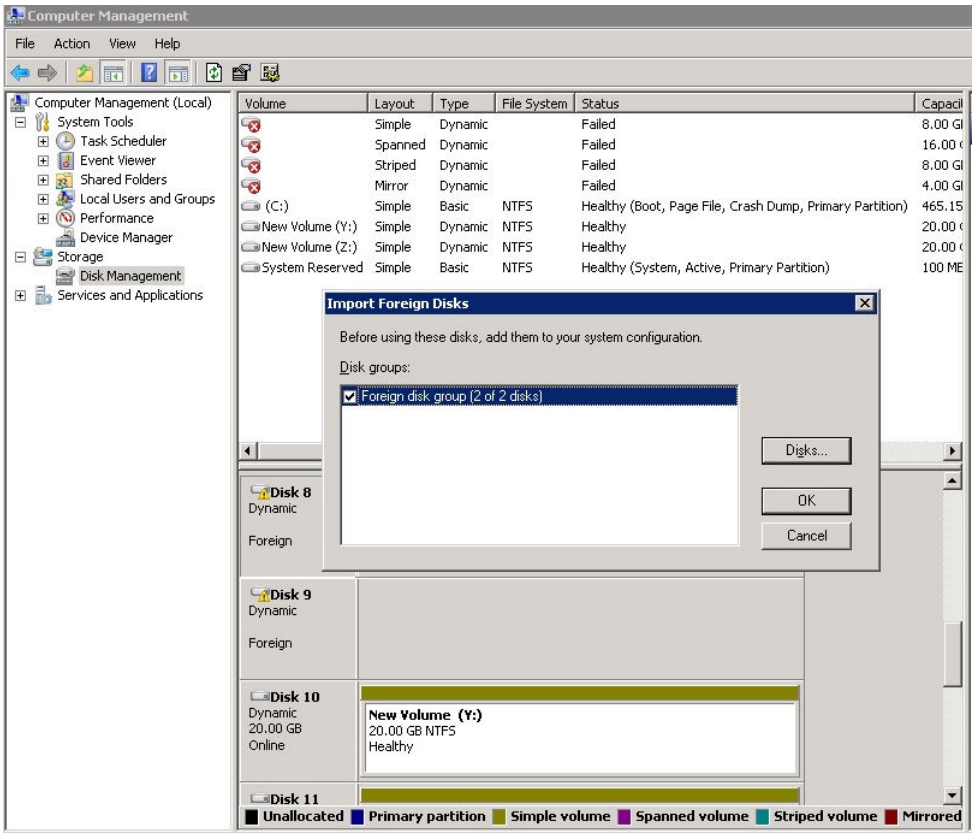


2 Import the disk.

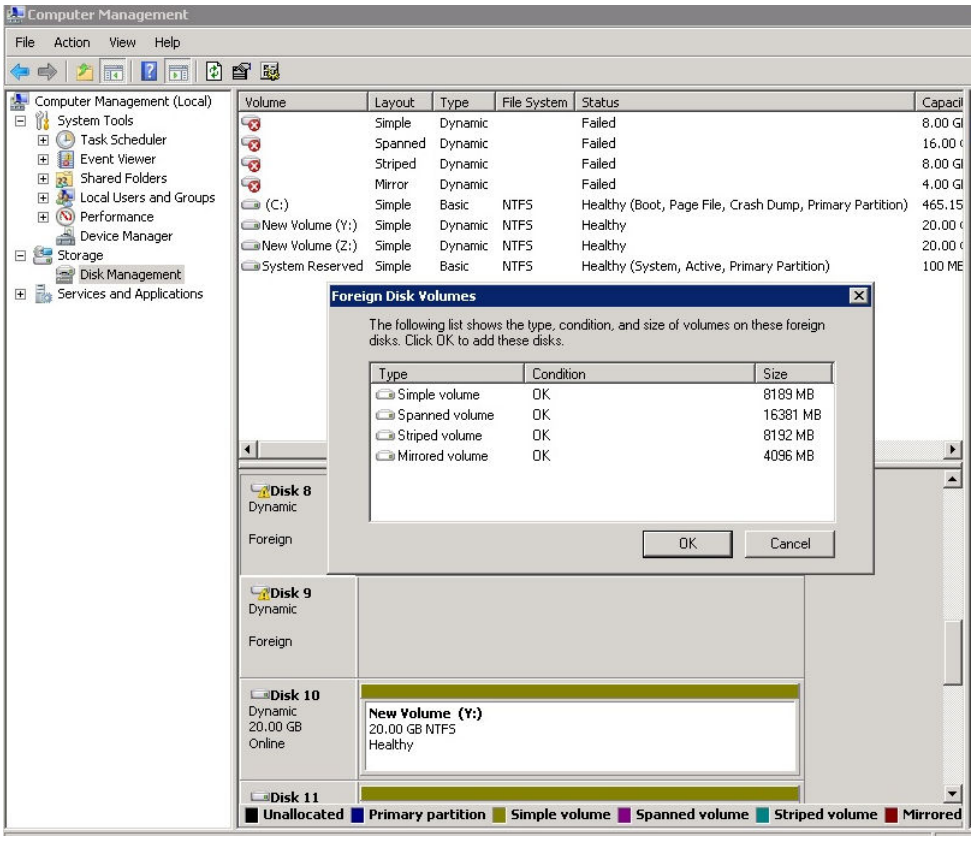
(1) After bringing the disk online, its status will be Foreign. Right-click the disk and select [Import Foreign Disks].



(2) In the [Import Foreign Disks] window, select the checkbox of the disk you want to import and then click the [OK] button.



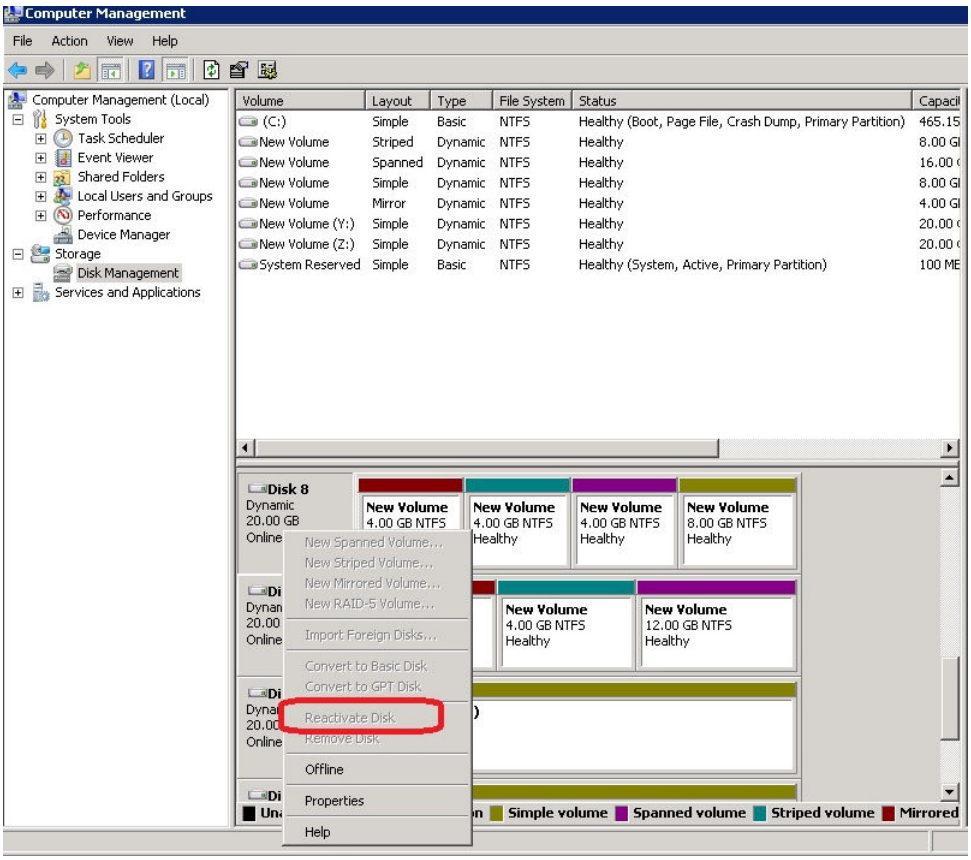
(3) Confirm that the Volume type to be imported is correct, and then click the [OK] button.



3 Activate the disk.

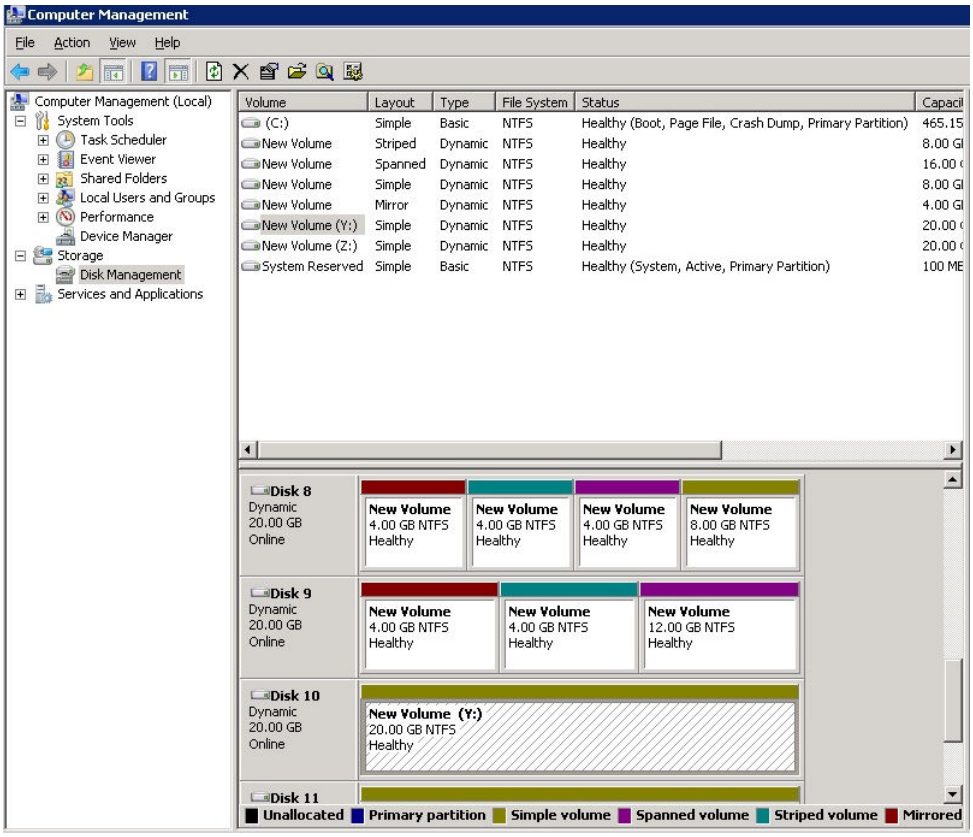
(1) Right-click the disk and select [Reactivate Disk].

If the status is "Online" at "Import Foreign Disks", this procedure is not required.



(2) Confirm that the disk status has returned to "Online".

Each partition is recognized automatically.



End of procedure

After this procedure is completed, the dynamic disks can be used in the migration destination ETERNUS AF/DX the same way as before the migration.

Chapter 13
Non-disruptive Storage Migration

This chapter describes the procedures for connecting and disconnecting paths and provides notes for when the Non-disruptive Storage Migration function is used in the example WSFC environment that uses a multipath driver (msdsm) and runs Windows Server® 2012 R2.

Note that in the WSFC environment, during the time from a path connection until after the path disconnection is completed, the cluster must be stopped. Therefore, data migrations without stopping the operation is not available.

Connecting Paths

The following procedure shows how to add a path to the migration destination storage system from the server (Windows Server® 2012 R2) after the migration destination storage system is connected. Note that Step 1 is not needed in environments other than WSFC.

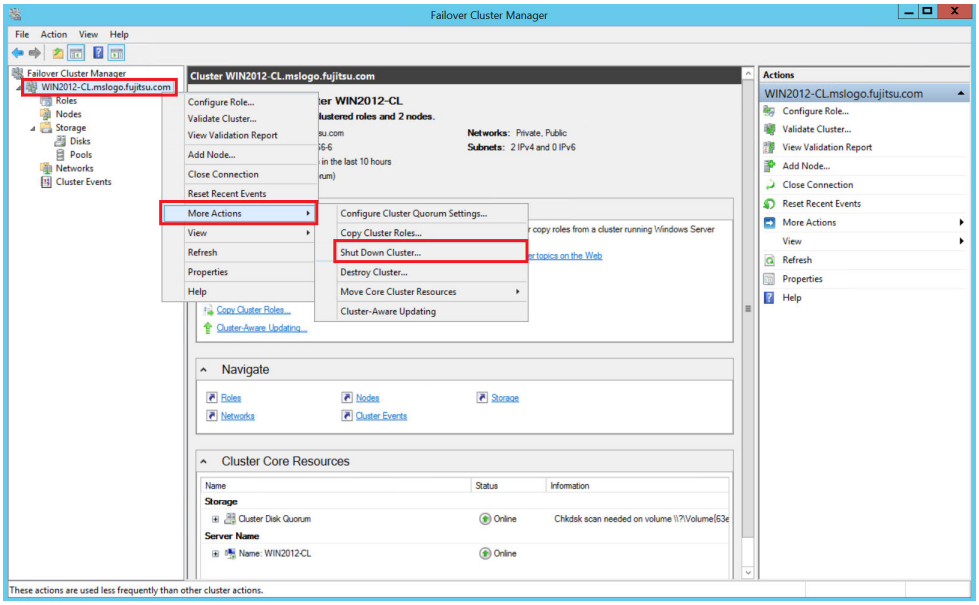
Procedure

1 Stop the cluster.

Note

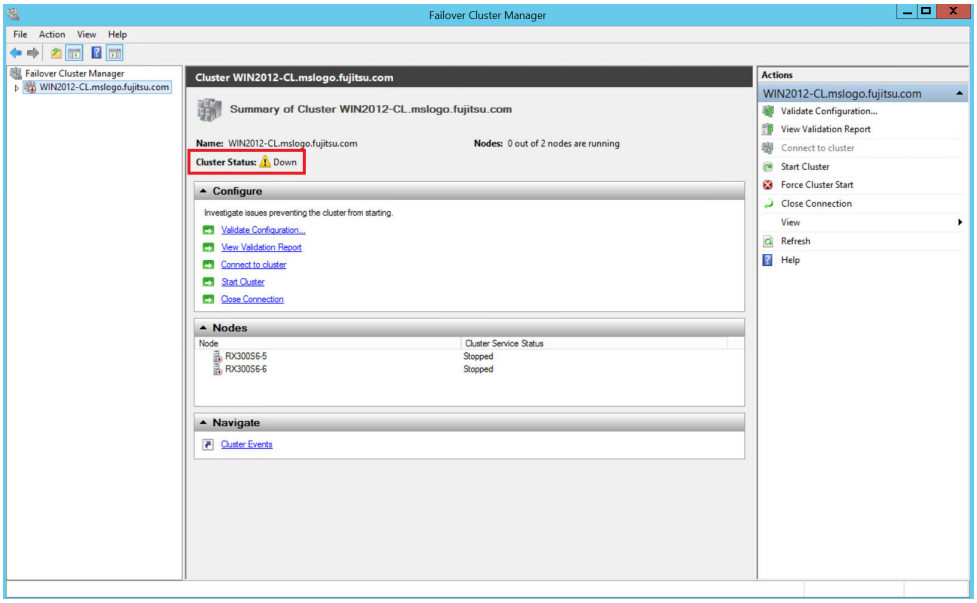
Perform this procedure before configuring the host affinity setting in the migration destination storage system.

(1) In the [Failover Cluster Manager] screen, right-click the cluster name and select [More Actions] - [Shut Down Cluster...] to stop the cluster.



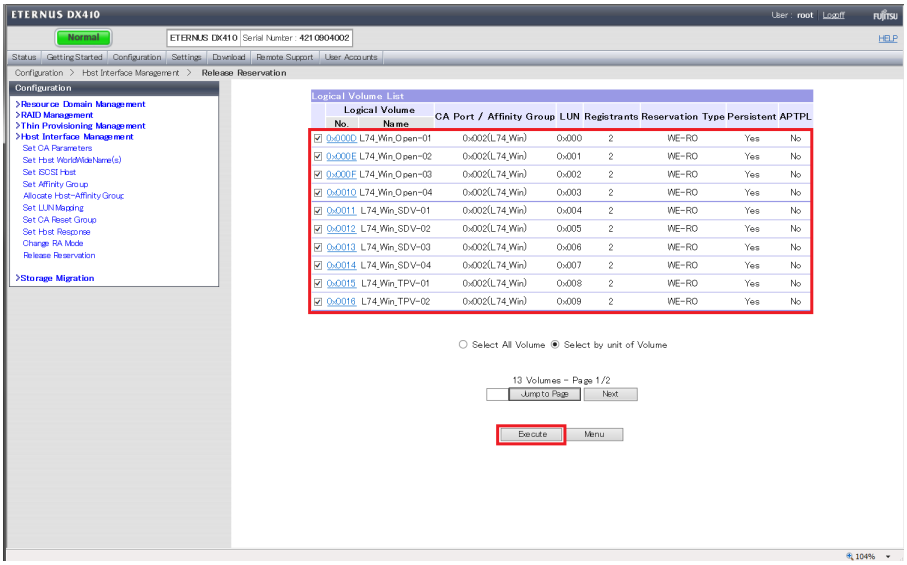
The operation is stopped.

(2) Confirm that the Cluster Status is changed to "Down".

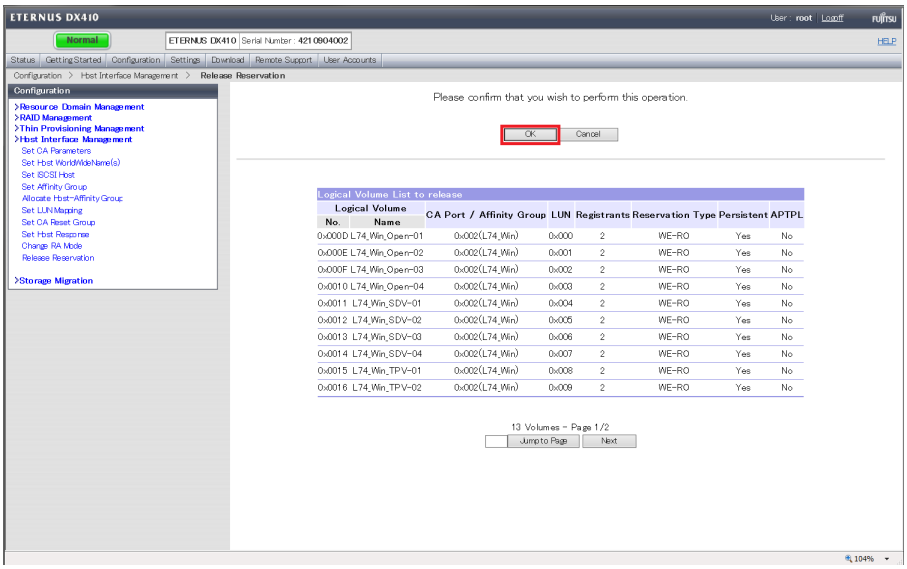


(3) Because the reservation information remains in the migration source storage system, manually release the reservation state from ETERNUS Web GUI.

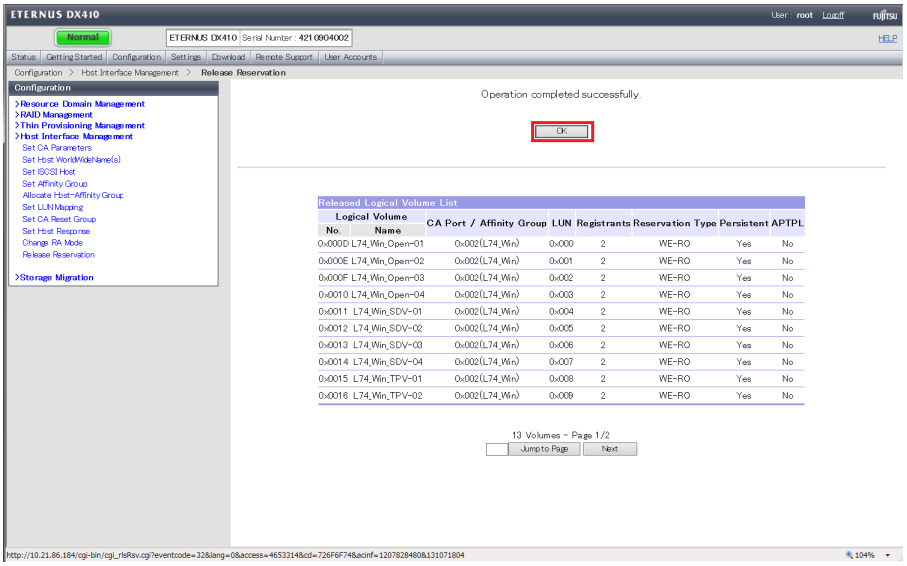
From [Configuration] - [Host Interface Management] -[Release Reservation], select the target volume and then click the [Execute] button.



(4) The "Please confirm that you wish to perform this operation." message is displayed; click the [OK] button.

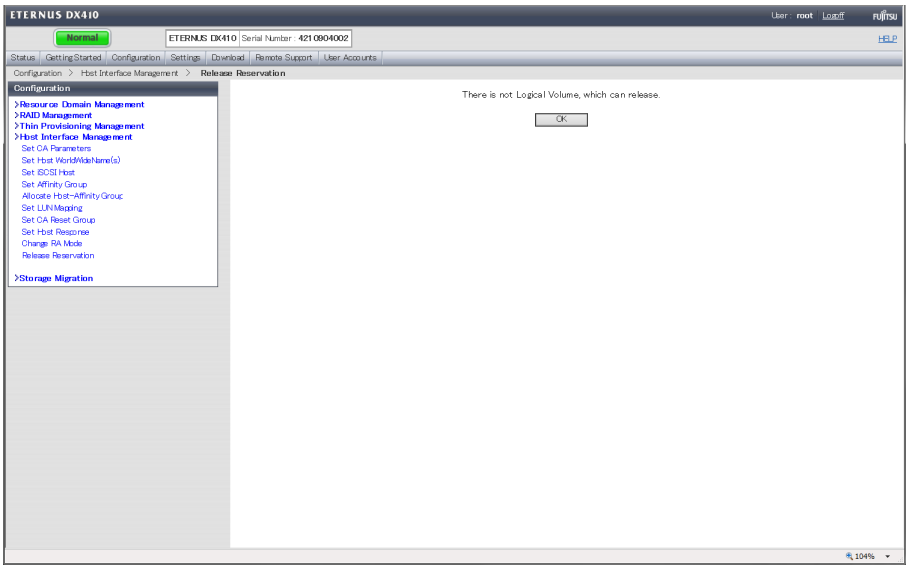


(5) The "Operation completed successfully." message is displayed; click the [OK] button.



(6) Confirm that the reservation state has been released.

If the following message appears, there are no reserved volumes. Click the [OK] button.



2 Check the multipath state using the command prompt or PowerShell.

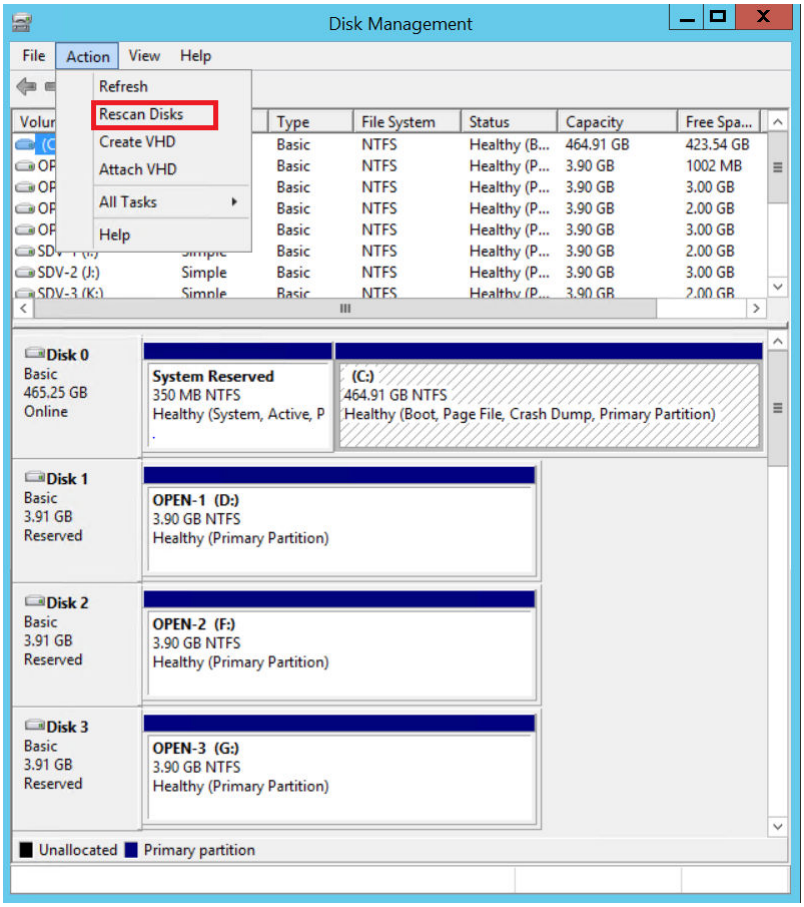
In the following example, each LUN has two paths.

```
C:\Users\administrator.MSLOGO> mpclaim -s -d 0

MPIO Disk0: 02 Paths, Round Robin, Symmetric Access
    Controlling DSM: Microsoft DSM
    SN: 600B5D006A0006ABA00D00
    Supported Load Balance Policies: FOO RR RRWS LQD WP LB

    Path ID          State              SCSI Address      Weight
    -------------------------------------------------------------------------------
    0000000077060001 Active/Optimized   006|000|001|000   0
    * TPG_State : Active/Optimized  , TPG_Id: 17, : 73

    0000000077050002 Active/Optimized   005|000|002|000   0
    * TPG_State : Active/Optimized  , TPG_Id: 16, : 72

PS C:\Users\administrator.MSLOGO> mpclaim -s -d 1

MPIO Disk1: 02 Paths, Round Robin, Symmetric Access
    Controlling DSM: Microsoft DSM
    SN: 600B5D006A0006ABA00E00
    Supported Load Balance Policies: FOO RR RRWS LQD WP LB

    Path ID          State              SCSI Address      Weight
    -------------------------------------------------------------------------------
    0000000077060001 Active/Optimized   006|000|001|001   0
    * TPG_State : Active/Optimized  , TPG_Id: 17, : 73

    0000000077050002 Active/Optimized   005|000|002|001   0
    * TPG_State : Active/Optimized  , TPG_Id: 16, : 72
```

3 Connect the multipath.

Add the host affinity setting to the migration destination storage system.

4 In the [Disk Management] screen, select [Action] - [Rescan Disks] to rescan the disks.



5 Confirm that the path has been connected using the command prompt or PowerShell.

In the following example, two paths are added to each LUN which then becomes a four-path configuration.

```
C:\Users\administrator.MSLOGO> mpclaim -s -d 0

MPIO Disk0: 04 Paths, Round Robin, Symmetric Access
    Controlling DSM: Microsoft DSM
    SN: 600B5D006A0006ABA00D00
    Supported Load Balance Policies: FOO RR RRWS LQD WP LB

    Path ID          State              SCSI Address      Weight
    -------------------------------------------------------------------------
    0000000077060002 Active/Optimized   006|000|002|000   0
    * TPG_State : Active/Optimized  , TPG_Id: 32913, : 16529

    0000000077050001 Active/Optimized   005|000|001|000   0
    * TPG_State : Active/Optimized  , TPG_Id: 32897, : 16513

    0000000077060001 Active/Optimized   006|000|001|000   0
    * TPG_State : Active/Optimized  , TPG_Id: 17, : 73

    0000000077050002 Active/Optimized   005|000|002|000   0
    * TPG_State : Active/Optimized  , TPG_Id: 16, : 72


PS C:\Users\administrator.MSLOGO> mpclaim -s -d 1

MPIO Disk1: 04 Paths, Round Robin, Symmetric Access
    Controlling DSM: Microsoft DSM
    SN: 600B5D006A0006ABA00E00
    Supported Load Balance Policies: FOO RR RRWS LQD WP LB

    Path ID          State              SCSI Address      Weight
    -------------------------------------------------------------------------
    0000000077060002 Active/Optimized   006|000|002|001   0
    * TPG_State : Active/Optimized  , TPG_Id: 32913, : 16529

    0000000077050001 Active/Optimized   005|000|001|001   0
    * TPG_State : Active/Optimized  , TPG_Id: 32897, : 16513

    0000000077060001 Active/Optimized   006|000|001|001   0
    * TPG_State : Active/Optimized  , TPG_Id: 17, : 73

    0000000077050002 Active/Optimized   005|000|002|001   0
    * TPG_State : Active/Optimized  , TPG_Id: 16, : 72
```

End of procedure

Disconnecting the Path

The following procedure shows how to delete a path of the migration destination storage system from the server (Windows Server® 2012 R2) after the migration source storage system is disconnected. Note that Step 5 is not needed in environments other than WSFC.

Procedure

1 Check the multipath state using the command prompt or PowerShell.

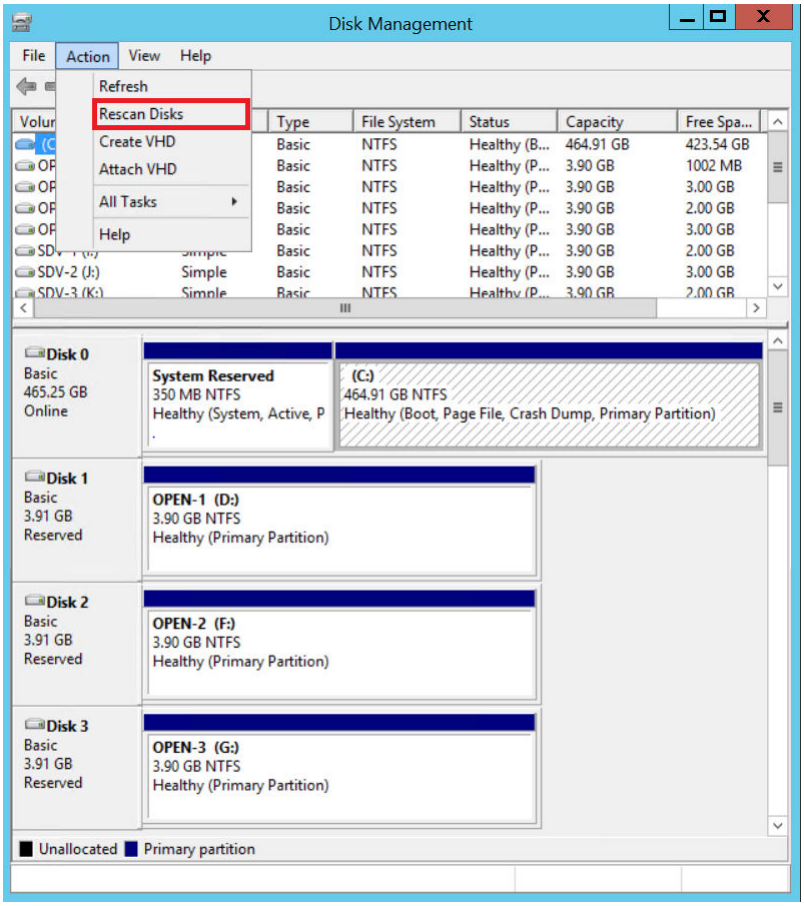
In the following example, each LUN has four paths.

```
C:\Users\administrator.MSLOGO> mpclaim -s -d 0

MPIO Disk0: 04 Paths, Round Robin, Symmetric Access
    Controlling DSM: Microsoft DSM
    SN: 600B5D006A0006ABA00D00
    Supported Load Balance Policies: FOO RR RRWS LQD WP LB

    Path ID          State              SCSI Address      Weight
    -------------------------------------------------------------------------
    0000000077060002 Active/Optimized   006|000|002|000   0
    * TPG_State : Active/Optimized  , TPG_Id: 32913, : 16529

    0000000077050001 Active/Optimized   005|000|001|000   0
    * TPG_State : Active/Optimized  , TPG_Id: 32897, : 16513

    0000000077060001 Active/Optimized   006|000|001|000   0
    * TPG_State : Active/Optimized  , TPG_Id: 17, : 73

    0000000077050002 Active/Optimized   005|000|002|000   0
    * TPG_State : Active/Optimized  , TPG_Id: 16, : 72


PS C:\Users\administrator.MSLOGO> mpclaim -s -d 1

MPIO Disk1: 04 Paths, Round Robin, Symmetric Access
    Controlling DSM: Microsoft DSM
    SN: 600B5D006A0006ABA00E00
    Supported Load Balance Policies: FOO RR RRWS LQD WP LB

    Path ID          State              SCSI Address      Weight
    -------------------------------------------------------------------------
    0000000077060002 Active/Optimized   006|000|002|001   0
    * TPG_State : Active/Optimized  , TPG_Id: 32913, : 16529

    0000000077050001 Active/Optimized   005|000|001|001   0
    * TPG_State : Active/Optimized  , TPG_Id: 32897, : 16513

    0000000077060001 Active/Optimized   006|000|001|001   0
    * TPG_State : Active/Optimized  , TPG_Id: 17, : 73

    0000000077050002 Active/Optimized   005|000|002|001   0
    * TPG_State : Active/Optimized  , TPG_Id: 16, : 72
```

2 Disconnect the multipath.

Disconnect the paths between the migration source storage system and the server.

3 In the [Disk Management] screen, select [Action] - [Rescan Disks] to rescan the disks.



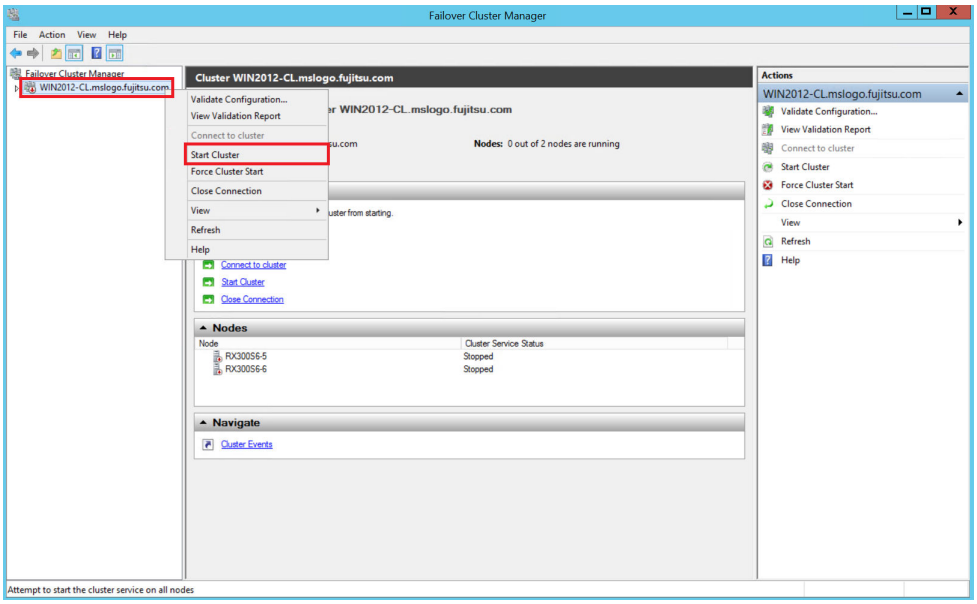
4 Confirm that the path has been disconnected using the command prompt or PowerShell.

In the following example, two paths are deleted from each LUN which then becomes a two-path configuration.

```
C:\Users\administrator.MSLOGO> mpclaim -s -d 0

MPIO Disk0: 02 Paths, Round Robin, Symmetric Access
    Controlling DSM: Microsoft DSM
    SN: 600B5D006A0006ABA00D00
    Supported Load Balance Policies: FOO RR RRWS LQD WP LB

    Path ID          State              SCSI Address      Weight
    -------------------------------------------------------------------------------
    0000000077060002 Active/Optimized   006|000|002|000   0
    * TPG_State : Active/Optimized  , TPG_Id: 32913, : 16529

    0000000077050001 Active/Optimized   005|000|001|000   0
    * TPG_State : Active/Optimized  , TPG_Id: 32897, : 16513


PS C:\Users\administrator.MSLOGO> mpclaim -s -d 1

MPIO Disk1: 02 Paths, Round Robin, Symmetric Access
    Controlling DSM: Microsoft DSM
    SN: 600B5D006A0006ABA00E00
    Supported Load Balance Policies: FOO RR RRWS LQD WP LB

    Path ID          State              SCSI Address      Weight
    -------------------------------------------------------------------------------
    0000000077060002 Active/Optimized   006|000|002|001   0
    * TPG_State : Active/Optimized  , TPG_Id: 32913, : 16529

    0000000077050001 Active/Optimized   005|000|001|001   0
    * TPG_State : Active/Optimized  , TPG_Id: 32897, : 16513
```

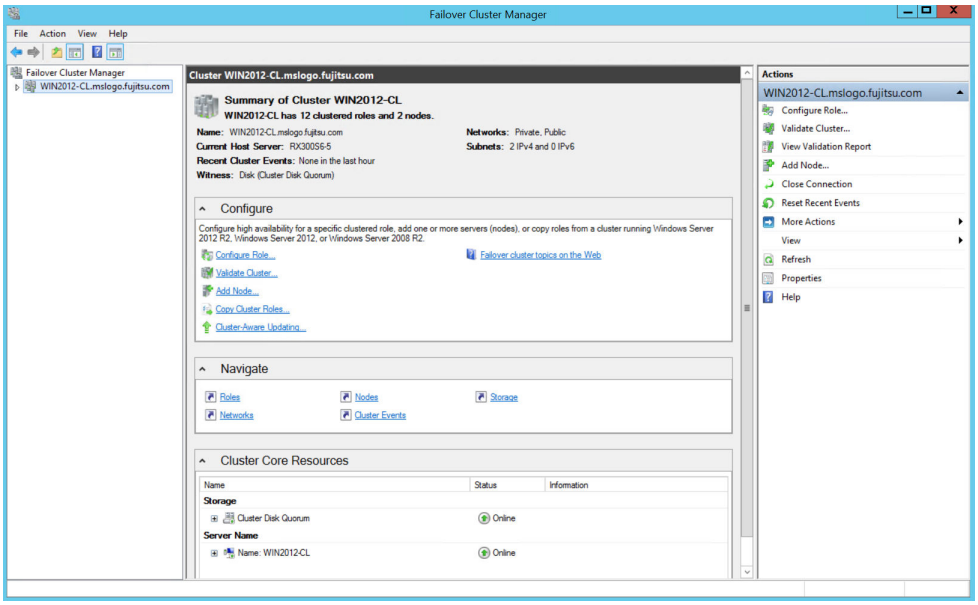
5 Start the cluster.

(1) In the [Failover Cluster Manager] screen, right-click the cluster name and select [Start Cluster] to start the cluster.



The operation can be restarted.

(2) Confirm that the cluster has started.



End of procedure

Notes

- In the WSFC environment, data migrations without stopping the operation is not available. Note that the operation is temporarily stopped during the path connection until after the path disconnection is complete.
- If the ALUA setting differs between the migration source and migration destination storage systems, all the paths in the storage system where the ALUA setting is "ACTIVE / ACTIVE" and the priority paths in the storage system where the ALUA setting is "ACTIVE-ACTIVE / PREFERRED_PATH" are set as the priority path group while the path is connected. After the path is disconnected, the path group specified in the ALUA setting of the migration destination storage system is used.

  The following shows the path state before the migration, while the path is connected, and after the path is disconnected.

- Before the migration

  Because the migration source is "ACTIVE / ACTIVE", both paths become the priority path group.

```
MPIO Disk0: 02 Paths, Round Robin, Symmetric Access
    Controlling DSM: Microsoft DSM
    SN: 600B5D006A0006ABA00D00
    Supported Load Balance Policies: FOO RR RRWS LQD WP LB

    Path ID          State              SCSI Address      Weight
    -------------------------------------------------------------------------
    0000000077060001 Active/Optimized   006|000|001|000   0
    * TPG_State : Active/Optimized  , TPG_Id: 17, : 73

    0000000077050002 Active/Optimized   005|000|002|000   0
    * TPG_State : Active/Optimized  , TPG_Id: 16, : 72
```

- While the path is connected

  Two "ACTIVE / ACTIVE" paths in the migration source storage system and a single priority "ACTIVE-ACTIVE / PREFERRED_PATH" path in the migration destination storage system become the priority path group.

```
MPIO Disk0: 04 Paths, Round Robin with Subset, Implicit Only
    Controlling DSM: Microsoft DSM
    SN: 600B5D006A0006ABA00D00
    Supported Load Balance Policies: FOO RRWS LQD WP LB

    Path ID          State              SCSI Address      Weight
    -------------------------------------------------------------------------
    0000000077060002 Active/Unoptimized 006|000|002|000   0
      TPG_State : Active/Unoptimized, TPG_Id: 32913, : 16529

    0000000077050001 Active/Optimized   005|000|001|000   0
    * TPG_State : Active/Optimized  , TPG_Id: 32897, : 16513

    0000000077060001 Active/Optimized   006|000|001|000   0
    * TPG_State : Active/Optimized  , TPG_Id: 17, : 73

    0000000077050002 Active/Optimized   005|000|002|000   0
    * TPG_State : Active/Optimized  , TPG_Id: 16, : 72
```

- After the path is disconnected

  Because the migration destination is "ACTIVE-ACTIVE / PREFERRED_PATH", only one priority path becomes the priority path group.

```
MPIO Disk0: 02 Paths, Round Robin with Subset, Implicit Only
    Controlling DSM: Microsoft DSM
    SN: 600B5D006A0006ABA00D00
    Supported Load Balance Policies: FOO RRWS LQD WP LB

    Path ID          State              SCSI Address      Weight
    -------------------------------------------------------------------------------
    0000000077060002 Active/Unoptimized 006|000|002|000   0
      TPG_State : Active/Unoptimized, TPG_Id: 32913, : 16529

    0000000077050001 Active/Optimized   005|000|001|000   0
    * TPG_State : Active/Optimized  , TPG_Id: 32897, : 16513
```

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