ftScalable™ Storage: Installation in Multi-Vendor Environments

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Manual Name: *ftScalable Storage: Installation in Multi-Vendor Environments*

Contents

Preface

The *ftScalable Storage: Installation in Multi-Vendor Environments* (R635) manual documents how to configure supported servers that are not manufactured by Stratus to share Stratus ftScalable Storage system resources with Stratus ftServer® systems.

This document is intended for anyone who installs or configures supported servers that are not manufactured by Stratus to share Stratus ftScalable Storage system resources with Stratus ftServer systems.

Stratus provides the following RAID storage-system products:

- The original ftScalable Storage system—This manual refers to this system as *first generation ftScalable Storage*.

- The second generation ftScalable Storage system—This manual refers to this system as *ftScalable Storage G2*.

When providing information that applies to both of these products, this manual uses *ftScalable Storage*.

Revision Information

This document is a revision. This revision incorporates the following changes:

- Information about ftScalable Storage G2 systems

- Information about Red Hat® Enterprise Linux® 6 systems.

Notation Conventions

This document uses the notation conventions described in this section.

Warnings, Cautions, and Notes

Warnings, cautions, and notes provide special information and have the following meanings:

> ⚠️ **W A R N I N G**
>
> **A warning indicates a situation where failure to take or avoid a specified action could cause bodily harm or loss of life.**

⚠ **C A U T I O N** ─────────────

A caution indicates a situation where failure to take or avoid a specified action could damage a hardware device, program, system, or data.

N O T E ─────────────

A note provides important information about the operation of an ftScalable Storage system.

Typographical Conventions

The following typographical conventions are used in this document:

- The bold font emphasizes words in text or indicates text that you type, the name of a screen object, or the name of a programming element. For example:

    Before handling or replacing system components, make sure that you are properly grounded by using a grounded wrist strap.

    In the **System Properties** dialog box, click the **Hardware** tab.

    Call the **RegisterDeviceNotification** function.

- The italic font introduces new terms and indicates programming and command-line arguments that the user supplies. For example:

    Many hardware components are *customer-replaceable units* (CRUs), which can be replaced on-site by system administrators with minimal training or tools.

    copy *filename1 filename2*

    Pass a pointer for the *NotificationFilter* parameter

- The monospace font indicates sample program code and output, including message text. For example:

    ```
    #include <iostream.h>

    The operation completed successfully.
    ```

Getting Help

If you have a technical question about ftServer system hardware or software, try these online resources first:

- **Online documentation at the StrataDOC Web site.** Stratus provides complimentary access to StrataDOC, an online-documentation service that enables you to view, search, download, and print customer documentation. You can access StrataDOC at the following Web site:

  http://stratadoc.stratus.com

  A copy of StrataDOC on supported media for your system is included with this release. To order additional copies of the StrataDOC media or to obtain copies of printed manuals, do one of the following:

  - If you are in North America, call the Stratus Customer Assistance Center (CAC) at (800) 221-6588 or (800) 828-8513, 24 hours a day, 7 days a week.

  - If you are located outside North America, contact your nearest Stratus sales office, CAC office, or distributor; for CAC phone numbers outside the U.S., see http://www.stratus.com/go/support/ftserver/location.

- **Online support from Stratus Customer Service.** You can find the latest technical information about an ftServer system through online product support at the Customer Support Web site:

  http://www.stratus.com/go/support

- **Online product support for Microsoft® products**. Your primary source for support is the computer manufacturer who provided your software, or an authorized Microsoft Support Provider. You can also find the latest technical information about Microsoft Windows® and other Microsoft products through online product support at the Microsoft Help and Support Web site:

  http://support.microsoft.com/

- **Online product support for Red Hat Linux products**. Your primary source for support is the manufacturer who provided your software, or Red Hat Global Support Services. You can also find the latest technical information about Red Hat Enterprise and Standard Linux through online product support at the Red Hat Support Web site:

  http://www.redhat.com/apps/support/

If you are unable to resolve your questions with the help available at these online sites, and the ftServer system is covered by a service agreement, please contact the Stratus Customer Assistance Center (CAC) or your authorized Stratus service representative. For information about how to contact the CAC, see the following Web site:

http://www.stratus.com/go/support/ftserver/location

Commenting on the Documentation

To provide corrections and suggestions on the documentation, send your comments in one of the following ways:

- By clicking the **site feedback** link at the bottom of a Help topic. Information to identify the topic is supplied in the StrataDOC Web Site Feedback form.

- By email to Comments@stratus.com. If it is possible, please include specific information about the documentation on which you are commenting:

  – For a printed document or a document in PDF format, include the title and part number from the Notice page and the page numbers.

  – For online documentation, include the Help subject and topic title.

This information will assist Stratus Information Development in making any needed changes to the ftServer system documentation. Your assistance is most appreciated.

Regulatory Notice

All regulatory notices are provided in the site planning guide for your system.

Chapter 1
Configuring Windows Server 2003-based Systems for Use with First Generation ftScalable Storage

In order to use third-party server systems in a supported first generation ftScalable Storage configuration with Stratus ftServer systems, the third-party server systems must meet the requirements published in the *ftScalable Storage: Multi-Vendor Environment Hardware Compatibility List* (R637).

You must configure the third-party server to work properly in the ftServer first generation ftScalable Storage storage area network (SAN) environment.

To configure third-party server systems running the Windows Server 2003 operating system, install the Stratus Multipath I/O (MPIO) device-specific module (DSM) and configure the host bus adapters as described in this chapter.

> N O T E
>
> To configure third-party server systems running the Windows Server 2008 operating system, see Chapter 2.

Installing the Stratus MPIO DSM configures the Microsoft MPIO feature to operate with the first generation ftScalable Storage DSM, creating a high-performance, high-availability storage solution.

The MPIO feature provides multipath failover protection through redundant physical path components (cables, adapters, and switches) between the server and the storage device. Multipathing also permits the redistribution of the read/write load among multiple paths, reducing bottlenecks and balancing work loads.

The Stratus MPIO DSM includes drivers and utilities for managing multipathing on your array. It supports up to 128 devices and up to 32 paths per storage unit (LUN).

This chapter describes how to obtain, install, and uninstall the Stratus MPIO DSM. Topics covered include:

- "System Requirements" on page 1-2
- "Microsoft MPIO Driver Subsystem Known Issues" on page 1-3
- "Installing the Stratus MPIO Drivers and Utilities" on page 1-4
- "Uninstalling the Stratus MPIO DSM" on page 1-5
- "Related Documentation" on page 1-6

Once the Stratus MPIO DSM is installed, no further configuration is required. However, advanced users can use the MPIO command-line utilities to change existing parameters. See Appendix A, "Windows Server 2003 MPIO Command-Line Utilities" for more information.

System Requirements

The requirements for third-party server systems and first generation ftScalable Storage systems are described in the following sections:

- "Required Server Components" on page 1-2
- "Required First Generation ftScalable Storage Firmware" on page 1-2
- "Storage Area Network Requirements" on page 1-3
- "Host Bus Adapter Configuration Settings" on page 1-3

Required Server Components

Third-party server systems must use a supported:

- Operating system (Windows Server 2003)
- Fibre Channel host bus adapter (HBA)
- HBA driver
- HBA firmware version.

The supported operating systems, HBAs, drivers, and firmware versions are listed in the *ftScalable Storage: Multi-Vendor Environment Hardware Compatibility List* (R637).

Required First Generation ftScalable Storage Firmware

First generation ftScalable Storage systems must have firmware version J200P51 or higher installed.

Storage Area Network Requirements

Third-party server systems must be configured in a SAN configuration.

The SAN must include at least one Stratus ftServer system so that the first generation ftScalable Storage system alarm messages can be can be sent through the ActiveService Network (ASN).

Server systems in the SAN cannot boot from the first generation ftScalable Storage system.

Host Bus Adapter Configuration Settings

Use the HBA manufacturer's management utility to set the parameters described below.

- Set the **LinkSpeed** parameter to **Auto-select**.
- Set the **Topology** parameter as follows:

    – for Emulex HBAs, to the value **1** (Auto topology with loop first)
    – for QLogic HBAs, to the value **2** (Loop preferred, otherwise point-to-point)

Be sure to configure the host driver and each of the HBAs. For supported Emulex HBAs, use the OneCommand or HBAnyware utility. For supported QLogic HBAs, use the SanSurfer utility.

See the *ftScalable Storage: Getting Started Guide* (R601), available at http://stratadoc.stratus.com, for a detailed description of how to obtain and use the configuration utility.

Microsoft MPIO Driver Subsystem Known Issues

The Stratus MPIO DSM installation procedure installs the Microsoft MPIO Driver Subsystem with the ftScalable Storage DSM. The following are known Microsoft issues regarding its MPIO Driver Subsystem:

During MPIO installation, the call to `UpdateDriverForPlugAndPlayDevices` restarts the disk stacks. However, if MPIO is installed on a system with mirrored disks, the disks appear as **failed redundancy**. This happens only if disk management applications (that use the `dmaadmin` service) are running at the time of MPIO installation. To avoid this problem, close all disk management applications (including but not limited to, `diskmgmt.msc` and `diskpart.exe`) prior to installing MPIO. To prevent the mirrored disks from showing up as **failed redundancy** ensure that the `dmaadmin` service is not running at the time of MPIO installation.

Other port filter drivers might interfere with the proper function of MPIO solutions. Microsoft does not recommend the use of these drivers.

Installing the Stratus MPIO Drivers and Utilities

To use the Stratus MPIO DSM, you must first install the drivers and utilities. If you are upgrading the MPIO DSM, uninstall the existing module, reboot the system and then install the new module. See "Uninstalling the Stratus MPIO DSM" on page 1-5 for details.

> N O T E
>
> The MPIO DSM installation, initial scan, and detection of devices can take from 2 to 15 minutes, depending on the system configuration, the number of LUNs, and the number of devices connected to the host.

To install the MPIO drivers and utilities

1. If you are upgrading the MPIO DSM, uninstall the existing module, reboot the system and then install the new module. See "Uninstalling the Stratus MPIO DSM" on page 1-5 for details.

2. Go to http://stratadoc.stratus.com/ftscalable and download the Stratus MPIO DSM installation file for either 64- or 32-bit Windows Server 2003-based systems (depending upon which version of Windows Server 2003 your server is running).

> N O T E
>
> If you experience a problem downloading one of these files, contact the Stratus Customer Assistance Center (CAC) or your authorized Stratus service representative.

3. Run the `.msi` file by performing one of the following actions:

   - In Windows Explorer, navigate to the download directory and double-click the `.msi` file.

   - Click **Start**, click **Run**, then click **Browse**. Navigate to the download directory, click the `.msi` file and click **Open**.

4. From the **Welcome** dialog, click **Next**.

5. Read the license agreement and click **Next** to continue.

N O T E

The install program checks for an existing version of the MPIO DSM. If a previous version of the MPIO DSM is found, you are notified that you must uninstall it before you can install this version.

6. From the **Select Installation Folder** dialog, click **Next** to install to the default folder.

N O T E S

1. Do **not** use **Browse** to select a different installation folder. You must always install the Stratus MPIO DSM in `C:\Program Files\Stratus\AA-D91900`, the default folder.

2. The Microsoft MPIO Driver Subsystem is installed with the DSM. The install program checks for an existing MPIO Driver Subsystem. If it does not find one, the Microsoft MPIO Driver Subsystem is installed. If the install program finds an existing MPIO Driver Subsystem, it prompts you to chose whether to overwrite or keep the existing Microsoft MPIO Driver Subsystem.

7. Click **Install**. The install program installs the MPIO drivers and the DSM.

8. You must restart your system to complete the installation process. A prompt to reboot your computer appears. Click **Yes** to reboot your system. If you click **No**, you must reboot your computer before using the MPIO DSM.

Uninstalling the Stratus MPIO DSM

To uninstall the Stratus MPIO DSM, perform the following steps.

1. In the Windows **Control Panel**, click **Add/Remove Programs**.

2. Click **Stratus AA-D91900 Multi-Path DSM** and click **Change/Remove**.

3. Respond appropriately to the prompts.

N O T E

If no other DSMs are installed on the server, the uninstall procedure removes the Microsoft MPIO drivers as well as the Stratus MPIO DSM. If other DSMs are installed on the server, only the Stratus MPIO DSM is removed.

4. You must restart your system to complete the uninstall process. A prompt to reboot your computer appears. Click **Yes** to reboot your system. If you click **No**, you must reboot your computer to complete the uninstall process.

Related Documentation

Documentation on how to configure and administer first generation ftScalable Storage systems appears in the following manuals, which are available at http://stratadoc.stratus.com.

- *ftScalable Storage: Getting Started Guide* (R601)
- *ftScalable Storage: Operation and Maintenance Guide* (R600)
- *ftScalable Storage: System Administrator's Guide* (R604)
- *ftScalable Storage: Commands Reference Manual* (R599)

Chapter 2
Configuring Windows Server 2008-based Systems for Use with ftScalable Storage

In order to use third-party server systems in a supported ftScalable Storage configuration with Stratus ftServer systems, the third-party server systems must meet the requirements published in the *ftScalable Storage: Multi-Vendor Environment Hardware Compatibility List* (R637).

You must configure the third-party server to work properly in the ftServer ftScalable Storage storage area network (SAN) environment. To configure third-party server systems running the Windows Server 2008 operating system, run the Stratus `w2k8_ftscal_mpio.bat` batch file and configure the host bus adapters as described in this chapter.

> N O T E ———————————————
>
> To configure third-party server systems running the
> Windows Server 2003 operating system, see Chapter 1.

Running the batch file configures the Microsoft MPIO feature and its integrated device-specific module (DSM) to operate with the ftScalable Storage system, creating a high-performance, high-availability storage solution.

The MPIO feature provides multipath failover protection through redundant physical path components (cables, adapters, and switches) between the server and the storage device. Multipathing also permits the redistribution of the read/write load among multiple paths, reducing bottlenecks and balancing work loads.

This chapter describes how to obtain and run the `w2k8_ftscal_mpio.bat` batch file. Topics covered include:

- "System Requirements" on page 2-2
- "Using the w2k8_ftscal_mpio.bat Batch File" on page 2-3
- "Related Documentation" on page 2-4

Once the batch file is run, no further configuration is required.

System Requirements

The requirements for third-party server systems and ftScalable Storage systems are described in the following sections:

- "Required Server Components" on page 2-2
- "Required ftScalable Storage Firmware" on page 2-2
- "Storage Area Network Requirements" on page 2-2
- "Host Bus Adapter Configuration Settings" on page 2-3

Required Server Components

Third-party server systems must use a supported:

- Operating system
- Fibre Channel host bus adapter (HBA)
- HBA driver
- HBA firmware version.

The supported operating systems, HBAs, drivers, and firmware versions are listed in the *ftScalable Storage: Multi-Vendor Environment Hardware Compatibility List* (R637).

Required ftScalable Storage Firmware

First generation ftScalable Storage systems must have firmware version J200P51 or higher installed.

ftScalable Storage G2 systems must have firmware version TS210P008 or higher installed.

Storage Area Network Requirements

Third-party server systems must be configured in a SAN configuration.

The SAN must include at least one Stratus ftServer system so that ftScalable Storage system alarms can be can be sent through the ActiveService Network (ASN).

Server systems in the SAN cannot boot from the ftScalable Storage system.

Host Bus Adapter Configuration Settings

Use the HBA manufacturer's management utility to set the parameters described below.

- Set the **LinkSpeed** parameter to **Auto-select**.

- Set the **Topology** parameter as follows:

  – for Emulex HBAs, to the value **1** (Auto topology with loop first)

  – for QLogic HBAs, to the value **2** (Loop preferred, otherwise point-to-point)

Be sure to configure the host driver and each of the HBAs. For supported Emulex HBAs, use the OneCommand or HBAnyware utility. For supported QLogic HBAs, use the SanSurfer utility.

See the *Stratus ftServer Systems: PCI Adapter Guide* (R461) or the *ftScalable Storage: Getting Started Guide* (R601), available at http://stratadoc.stratus.com, for a detailed description of how to obtain and use the configuration utility.

Using the `w2k8_ftscal_mpio.bat` Batch File

The `w2k8_ftscal_mpio.bat` file consists of the following two lines:

```
Servermanagercmd.exe -install Multipath-IO
Mpclaim.exe -n -i -d "Stratus AA-D91900       "
```

NOTE

If you run the Mpclaim.exe command manually on a command line, you must type the seven trailing spaces after `AA-D91900`.

To obtain and run the `w2k8_ftscal_mpio` batch file

1. Go to http://stratadoc.stratus.com/ftscalable and download the Stratus configuration batch file for Windows Server 2008-based systems to your system.

2. On your system, navigate to the directory that contains the batch file and open a command prompt.

3. Type **`w2k8_ftscal_mpio.bat`** on the command line and press **Enter**.

   The batch file runs `Servermanagercmd.exe` and, depending on the system configuration, it reports that the installation succeeded or that no change was made because the feature was already installed.

   Next, the batch file runs `Mpclaim.exe` and depending on the system configuration it reports that the installation succeeded or that MPIO OC was already installed.

4. Reboot your system to complete the configuration process.

Related Documentation

Documentation on how to configure and administer ftScalable Storage systems appears in the following manuals, which are available at http://stratadoc.stratus.com.

For ftScalable Storage G2 systems:

- *ftScalable Storage G2: Getting Started Guide* (R651)
- *ftScalable Storage G2: Operation and Maintenance Guide* (R650)
- *ftScalable Storage G2: System Administrator's Guide* (R652)
- *ftScalable Storage G2: Commands Reference Manual* (R649)

For first generation ftScalable Storage systems:

- *ftScalable Storage: Getting Started Guide* (R601)
- *ftScalable Storage: Operation and Maintenance Guide* (R600)
- *ftScalable Storage: System Administrator's Guide* (R604)
- *ftScalable Storage: Commands Reference Manual* (R599)

Chapter 3

Configuring Red Hat Enterprise Linux-based Systems for Use with ftScalable Storage

In order to use third-party server systems in a supported ftScalable Storage configuration with Stratus ftServer systems, the third-party server systems must meet the requirements published in the *ftScalable Storage: Multi-Vendor Environment Hardware Compatibility List* (R637).

You must configure the third-party server to work properly in the ftServer ftScalable Storage storage area network (SAN) environment.

To configure third-party server systems running the Red Hat® Enterprise Linux® 6, 5, or 4 operating system, you must configure the multipath.conf file and the host bus adapters as described in this chapter. Topics covered include:

- "System Requirements" on page 3-1
- "Configuring a Red Hat Enterprise Linux Server" on page 3-3
- "Related Documentation" on page 3-5

System Requirements

The requirements for third-party server systems and ftScalable Storage systems are described in the following sections:

- "Required Server Components" on page 3-2
- "Required ftScalable Storage Firmware" on page 3-2
- "Storage Area Network Requirements" on page 3-2
- "Host Bus Adapter Configuration Settings" on page 3-2

Required Server Components

Third-party server systems must use a supported:

- Operating system
- Fibre Channel host bus adapter (HBA)
- HBA driver
- HBA firmware version.

The supported operating systems, HBAs, drivers, and firmware versions are listed in the *ftScalable Storage: Multi-Vendor Environment Hardware Compatibility List* (R637).

Required ftScalable Storage Firmware

First generation ftScalable Storage systems must have firmware version J200P51 or higher installed.

ftScalable Storage G2 systems must have firmware version TS210P008 or higher installed.

Storage Area Network Requirements

Third-party server systems must be configured in a SAN configuration.

The SAN must include at least one Stratus ftServer system so that ftScalable Storage system alarms can be can be sent through the ActiveService Network (ASN).

Server systems in the SAN cannot boot from the ftScalable Storage system.

Host Bus Adapter Configuration Settings

Use the HBA manufacturer's management utility to set the parameters described below.

- Set the **LinkSpeed** parameter to **Auto-select**.
- Set the **Topology** parameter as follows:
    - for Emulex HBAs, to the value **1** (Auto topology with loop first)
    - for QLogic HBAs, to the value **2** (Loop preferred, otherwise point-to-point)

Be sure to configure the host driver and each of the HBAs. For supported Emulex HBAs, use the OneCommand or HBAnyware utility. For supported QLogic HBAs, use the SanSurfer utility.

See the *Stratus ftServer Systems: PCI Adapter Guide* (R461) or the *ftScalable Storage: Getting Started Guide* (R601), available at

http://stratadoc.stratus.com, for a detailed description of how to obtain and use the configuration utility.

Configuring a Red Hat Enterprise Linux Server

You must configure your third-party server systems to recognize and work with the ftScalable storage system. The exact configuration procedure depends upon whether your third-party server is running Red Hat Enterprise Linux 6, 5, or 4, as described in the following sections.

- "Configuring Red Hat Enterprise Linux 6- or 5-based Systems" on page 3-3
- "Configuring Red Hat Enterprise Linux 4-based Systems" on page 3-4

Configuring Red Hat Enterprise Linux 6- or 5-based Systems

To configure third-party servers running the Red Hat Enterprise Linux 6 or 5 operating system with multipath packages, install the sample `multipath.conf.ftscalable` file and start the `multipathd` daemon, as described in the following procedure.

To configure a Red Hat Enterprise Linux 6- or 5-based system

1. Go to http://stratadoc.stratus.com/ftscalable and download the sample `multipath.conf` file for Red Hat Enterprise Linux 6-based systems or for Red Hat Enterprise Linux 5-based systems.

2. Name the downloaded file `multipath.conf.ftscalable`.

3. Type the following commands to back up the existing multipath configuration file and install the ftScalable Storage system's multipath configuration file:

```
# cp /etc/multipath.conf /etc/multipath.conf.bk
# cp /your-download directory/multipath.conf.ftscalable
      /etc/multipath.conf
```

4. Type the following commands to start the `multipathd` daemon:

```
# chkconfig --add multipathd
# chkconfig multipathd on
# multipath
# /etc/init.d/multipathd start
```

Configuring Red Hat Enterprise Linux 4-based Systems

To configure third-party servers running the Red Hat Enterprise Linux 4 operating system, install the sample `multipath.conf.ftscalable` file, modify the `/etc/scsi_id.config` file, and start the `multipathd` daemon, as described in the following procedure.

To configure a Red Hat Enterprise Linux 4-based system

1. Go to http://stratadoc.stratus.com/ftscalable and download the sample `multipath.conf` file for Red Hat Enterprise Linux 4-based systems.

2. Name the downloaded file `multipath.conf.ftscalable`.

3. Type the following commands to back up the existing multipath configuration file and install the ftScalable Storage system's multipath configuration file:

```
# cp /etc/multipath.conf /etc/multipath.conf.bk
# cp /your-download directory/multipath.conf.ftscalable
    /etc/multipath.conf
```

4. Add the line starting with `vendor=Stratu`s to the `/etc/scsi_id.config` file, as shown in the example below:

```
# If you normally don't need scsi id's, or might be
# attaching devices of an unknown functionality, black
# list everyone. This is the default
# behaviour (if no -b or -g is specified).
#
options=-b

# Then white list devices on your system that have correct and
useful id's:

vendor=Stratus, model="AA-D91900", options=-g
```

5. Type the following commands to start the multipathd daemon:

```
# multipath -v2 -d
# chkconfig --add multipathd
# chkconfig multipathd on
# multipath
# /etc/init.d/multipathd start
```

Related Documentation

Documentation on how to configure ftServer systems running Linux and how to administer ftScalable Storage systems appears in the following manuals, which are available at http://stratadoc.stratus.com.

For ftScalable Storage G2 systems:

- *Stratus ftServer System Administrator's Guide for the Linux Operating System* (R003L)
- *ftScalable Storage G2: Getting Started Guide* (R651)
- *ftScalable Storage G2: Operation and Maintenance Guide* (R650)
- *ftScalable Storage G2: System Administrator's Guide* (R652)
- *ftScalable Storage G2: Commands Reference Manual* (R649)

For first generation ftScalable Storage systems:

- *Stratus ftServer System Administrator's Guide for the Linux Operating System* (R003L)
- *ftScalable Storage: Getting Started Guide* (R601)
- *ftScalable Storage: Operation and Maintenance Guide* (R600)
- *ftScalable Storage: System Administrator's Guide* (R604)
- *ftScalable Storage: Commands Reference Manual* (R599)

Appendix A
Windows Server 2003 MPIO Command-Line Utilities

After configuring the third-party server (running the Windows Server 2003 operating system) as described in Chapter 1, you can use the following MPIO command-line utilities to administer the system:

The **dsmcli** Command-line Interface

The DSM command-line interface enables you to display or change devices, paths, and load balance policies.

To run dsmcli from the command-line prompt, navigate to the directory in which the MPIO DSM was installed (C:\Program Files\Stratus\AA-D91900 by default), open a command prompt window, and enter the following command:

    dsmcli

The dsmcli> command-line prompt is displayed. From the dsmcli> prompt, the following commands are available:

- **clear** – The clear command clears the performance counters. You can view performance counter information by executing the pathinfo command.

- **devinfo** – The devinfo command enables you to display device information or change the load-balance policy for the specified device.

  dsmcli> devinfo [*SerialNumber* | all] [policy | {failback-on | failbackoff}] where:

  SerialNumber is the serial number of the device and policy is the load-balance policy to use for the specified device. Choosing all policy sets the load-balance policy of all devices.

  SerialNumber {failback-on | failbackoff} sets the failback status of the specified device.

all {`failback-on` | `failbackoff`} sets the failback status of all devices. The failback feature is only valid when the load-balance mode is `FailOver`. You can enable or disable the failback feature for a device. By default, failback is enabled when the device is in FailOver mode.

- **`help`** – The `help` command displays a help file with available `dsmcli` command options.

- **`pathinfo`** – The `pathinfo` command displays path information or changes the status of the path. The path can be specified by the serial number or by the worldwide port name (WWPN) of the HBA.

  dsmcli> pathinfo [SN *serial_number* | HBA *HBA_wwpn*] where *serial_number* is the serial number of the path and *HBA_wwpn* is the worldwide port name of the HBA.

  The status of the path can be set to `online`, `standby`, or `failed`.

  dsmcli> pathinfo HBA_wwpn [`online` | `standby` | `failed`] where *HBA_wwpn* is the worldwide port name of the HBA.

- **`policies`** – The `policies` command displays the currently supported load-balance policies. Each LUN can have its own load-balance policy. Possible values include the following:

  `FailOver` – No load balancing is performed. There is a single active path and the rest of the paths are standby paths. The active path is used for sending all I/O. If the active path fails then one of the standby paths is used.

  `RoundRobin` (default) – All paths are active paths. They are used for sending I/O in a round-robin fashion.

  `Dynlqd` – Uses the path with the least number of active requests.

  `Weighted` – Each path is assigned a weight and I/O is sent on the path with the lowest weight. If the path with the lowest weight fails, then the path with the next lowest weight is used.

  `LeastBlocks` – Uses the path with the fewest pending I/O blocks.

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  >
  > In a cluster environment, no load balancing is performed and the policy is set to `FailOver`. If you are not using cluster software, you can enable a load-balance policy to distribute I/O to all paths.

- **`primary`** – The `primary` command sets the primary path to the specified path ID. The syntax is as follows:

  dsmcli> primary *pathID* where *pathID* is the new primary path ID.

- **`weight`** – The `weight` command sets the weight of the specified path. I/O is sent to the path with the lowest weight. If that path fails, I/O is sent to the path with the next lowest weight, and so on.

  dsmcli> weight *pathID weight* where *pathID* is the specified path ID and *weight* is the assigned weight. The recommended weight range is 0-100.

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  > The `weight` command is valid only when the weighted load-balance policy is available.

The `mpiolist` Utility

The `mpiolist` utility displays detailed information for WMI objects. To run the `mpiolist` utility, open a command-line window, navigate to the directory in which the MPIO DSM was installed (`C:\Program Files\Stratus\AA-D91900` by default), and enter the commands as described below.

The syntax for this utility is:

    mpiolist *WMI_object* [*machine_name* [*admin_user password*]]

where:

- *WMI_object* is an option digit or the corresponding name of the WMI object as follows:

Option Digit	WMI Object Name
0	MSDisk_Driver_Performance
1	MPIO_DISK_INFO
2	MPIO_PATH_INFORMATION
3	MPIO_CONTROLLER_CONFIGURATION
4	MPIO_TIMERS_COUNTERS
5	MPIO_GET_DESCRIPTOR

- *machine_name* is an optional parameter specifying the computer to be queried.

- *admin_user* is an optional parameter specifying the domain and user for the *machine_name* computer.

  password is the password for *admin_user*. If *admin_user* is specified, then *password* is required.

The following example shows the output for the command line entry mpiolist 1.

```
<ROOT\wmi>
MPIO_DISK_INFO
  InstanceName* = "Root\MPIO\0000_0"
  NumberDrives = 0x4
  DriveInfo =
    instance of MPIO_DRIVE_INFO {
      NumberPaths = 0x2
      Name = "MPIO Disk0"
      SerialNumber = "60CFF00A772145EB0471000"
      DsmName = "Stratus AA-D91900 Multi-Path Device Specific
                 Module"
    }
    instance of MPIO_DRIVE_INFO {
      NumberPaths = 0x2
      Name = "MPIO Disk1"
      SerialNumber = "60CFF00A77215DAF6481000"
      DsmName = "Stratus AA-D91900 Multi-Path Device Specific
                 Module"
    }
    instance of MPIO_DRIVE_INFO {
      NumberPaths = 0x2
      Name = "MPIO Disk2"
      SerialNumber = "60CFF00A77A6DBF6481000"
      DsmName = "Stratus AA-D91900 Multi-Path Device Specific
                 Module"
    }
    instance of MPIO_DRIVE_INFO {
      NumberPaths = 0x2
      Name = "MPIO Disk3"
      SerialNumber = "60CFF00A7ED3BD5DB0471000"
      DsmName = "Stratus AA-D91900 Multi-Path Device Specific
                 Module"
    }
```

Index

W

`w2k8_ftscal_mpio.bat` file, running, 2-3
Windows Server 2003-based systems
    configuring, 1-1
    utilities
        `dsmcli`, A-1
        `mpiolist`, A-3
Windows Server 2008-based systems,
        configuring, 2-1