FUJITSU

Multipath Diagnostic Program User's Guide

Preface

This manual provides an overview of Multipath Diagnostic Program 2.0. Procedures for installation and uninstallation of Multipath Diagnostic Program 2.0 are also provided in this manual.

Product Names

In this manual, a storage system that is supported by the Multipath Diagnostic Program is referred to as an "ETERNUS Disk storage system".

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High Safety

The Multipath Diagnostic Program is designed, developed and manufactured as contemplated for general use, including without limitation, general office use, personal use, household use, and ordinary industrial use, but is not designed, developed and manufactured for use in situations with accompanying fatal risks or dangers that, unless extremely high safety is secured, could lead directly to death, personal injury, severe physical damage or other loss (hereinafter "High Safety Required Use"), including without limitation, nuclear reaction control in nuclear facility, aircraft flight control, air traffic control, mass transport control, medical life support system, and missile launch control in weapon systems. Do not use the Multipath Diagnostic Program for High Safety Required Use without securing the sufficient safety level required. If you wish to use the Multipath Diagnostic Program for High Safety Required Use, please consult with our sales representative before such use.

Intended Audience

This manual is intended for system administrators of Oracle Solaris. It is expected that the readers of this manual have basic knowledge of functions and terms for Oracle Solaris, MPxIO, and ETERNUS Disk storage system.

Release Information

Date	Version	Modification details
2013/04/26	1.0.0	First edition
2013/08/08	1.1.0	- Added Multipath Diagnostic Program to Enhanced Support Facility - Modified the startup method - Added support for a SAN boot environment

Revision History

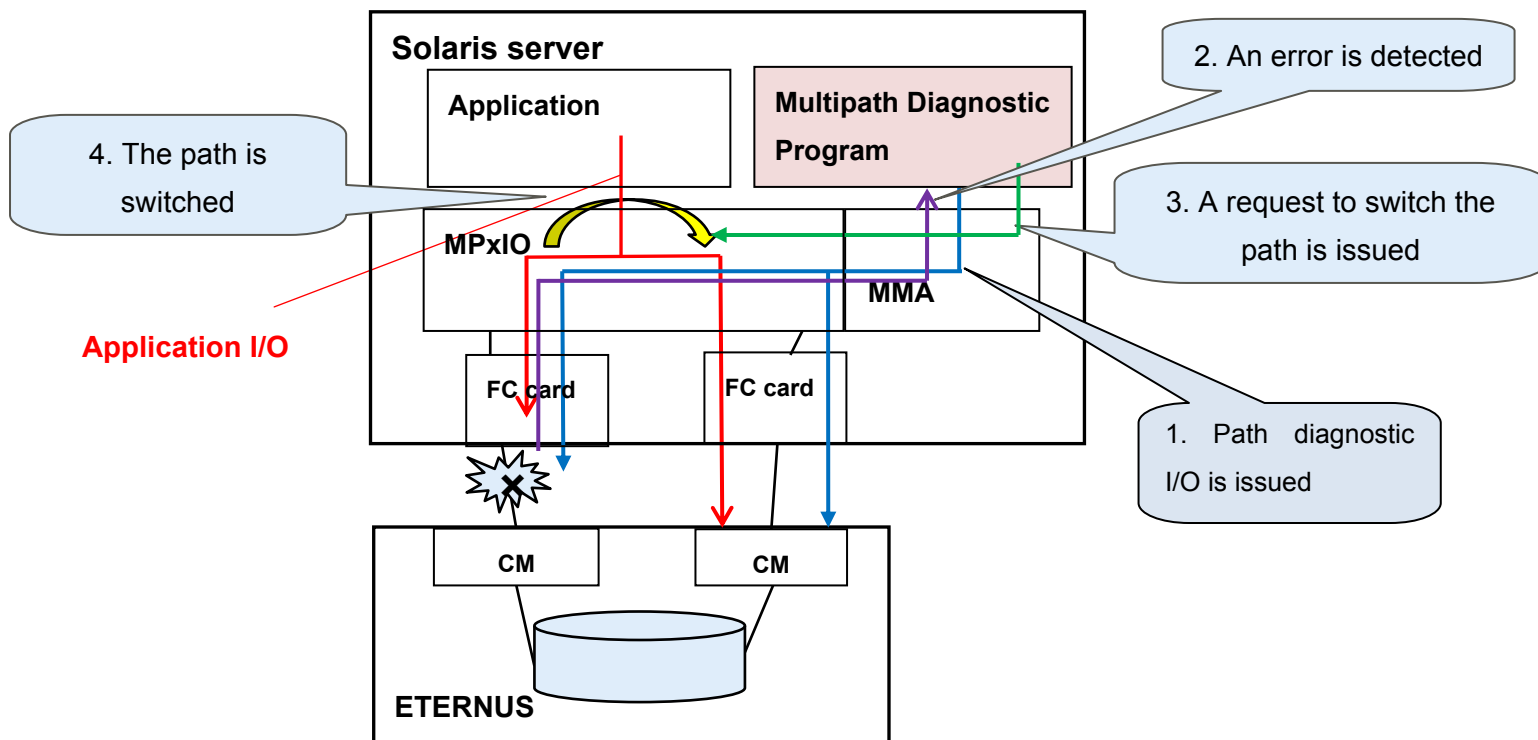| Date	Version	Modification details
2013/04/26	1.0	Newly created
2013/08/08	1.1	Added support for 1.1.0

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1 Multipath Diagnostic Program Overview

1-1 Operation Overview

The Multipath Diagnostic Program requests "MPxIO", which is the standard Solaris Multipath driver, to switch a path when a timeout error is detected after a regular diagnosis is performed on the connection paths between the ETERNUS Disk storage systems that are controlled with "MPxIO".

The Multipath Diagnostic Program can be set to automatically start when the system is started by executing the setting command. An overview of how a multipath configuration is diagnosed is provided below.

1. Diagnostic I/O is issued for each path by MMA (Multipath Management API).

2. If an error is detected by diagnostic I/O, the error details are analyzed.

3. MMA is used to send MPxIO a request to switch a path when it is determined that the path needs to be switched.

4. When the path switch request is received, MPxIO switches the path to which the application I/O is issued.

- A path that is removed from the target destination of an application IO is returned to the target after a certain period of time or when an error occurs in another target path.
- All paths are diagnosed regardless of whether they are operation paths or standby paths.

1-2 Error Handling

The Multipath Diagnostic Program requests MPxIO to switch a path when the following errors are detected.

➢ Timeout errors
The Multipath Diagnostic Program requests MPxIO to switch a path when the following timeout errors are detected.

● When the Solaris server issues an I/O request and no response is made within a certain period of time.
● When the Solaris server sends data to an ETERNUS Disk storage system and the data is not delivered within a certain period of time.
● When an ETERNUS storage system receives an I/O request and cannot reply within a certain period of time.

➢ BUSY/QFULL
The Multipath Diagnostic Program requests MPxIO to switch a path when an I/O request cannot be issued due to excessive workload.

2　Operating Environment

2-1　OS

The Multipath Diagnostic Program can be used with the following OSes.

　Oracle Solaris 10 08/07 or later + PTF R12021 or later (143643-05 or later)

　Oracle Solaris 11 or later

2-2　Target ETERNUS Disk Storage Systems

The Multipath Diagnostic Program supports the ETERNUS Disk storage systems that are listed in the table below.

Model	Firmware version
ETERNUS DX60/DX80/DX90	V10L72 or later
ETERNSU DX60 S2	V20L16 or later
ETERNUS DX80 S2/DX90 S2 ETERNUS DX400 S2/DX8000 S2 series	V10L40 or later
ETERNUS DX400 series/DX8000 series	V20L86-8000 or later
ETERNUS4000 models 400 and 600 ETERNUS8000 models 800, 1200, and 2200	V20L86-8000 or later
ETERNUS4000 models 300 and 500 ETERNUS8000 models 700, 900, 1100, and 2100	V11L96-8000 or later

• Performing sense data conversion setup is required. Refer to the Appendix for more details.

2-3　Resource Requirements

Disk capacity

In order to install the Multipath Diagnostic Program, the directories listed in the table below require the corresponding disk capacity.

No.	Directory	Disk capacity
1	/opt	1MB
2	/etc	1MB
3	/var	3MB

3 Multipath Diagnostic Program Installation and Uninstallation

3-1 Installation

Use the "root" user account to install the Multipath Diagnostic Program in global zone. The previous version does not need to be removed in order to install the latest version.

(1) Copy "FJSVpdiag_110.tar.Z" to a server in which the Multipath Diagnostic Program is to be installed. The commands in the following procedure are examples when "FJSVpdiag_100.tar.Z" is copied to "/tmp".

(2) Extract "FJSVpdiag_110.tar.Z".

```
# cd /tmp
# zcat FJSVpdiag_110.tar.Z | tar xf -
```

(3) Perform the following commands to install the Multipath Diagnostic Program.

```
# ./pdiagpkgadd

Processing package instance <FJSVpdiag> from </tmp/FJSVpdiag.str>

Multipath diagnostic package(sparc) 1.1.0,REV=2013.07.2200
All Rights Reserved, Copyright (c) FUJITSU LIMITED 2013.


This package's default installation information is following:
        Program install directory:     /opt

Do you want to change the install directory? n [y,n,?,q] n
Using </> as the package base directory.
## Processing package information.
## Processing system information.
    4 package pathnames are already properly installed.
## Verifying disk space requirements.
## Checking for conflicts with packages already installed.
## Checking for setuid/setgid programs.

This package contains scripts which will be executed with super-user
permission during the process of installing this package.

Do you want to continue with the installation of <FJSVpdiag> [y,n,?] y

Installing Multipath diagnostic package as <FJSVpdiag>

## Installing part 1 of 1.
/opt/FJSVpdiag/bin/fjsvpdiag
/opt/FJSVpdiag/bin/fjsvpdiagbootset.sh
/opt/FJSVpdiag/bin/fjsvpdiagsnap.sh
/opt/FJSVpdiag/etc/K99pdiag
/opt/FJSVpdiag/etc/S99pdiag
[ verifying class <none> ]
/var/opt/FJSVpdiag/fjsvpdiag.conf
/var/opt/FJSVpdiag/fjsvpdiag1.log
/var/opt/FJSVpdiag/fjsvpdiag2.log
/var/opt/FJSVpdiag/fjsvpdiag3.log
[ verifying class <init> ]
## Executing postinstall script.

Installation of <FJSVpdiag> was successful.
```

3-2 Uninstallation

Use the "root" user account to uninstall the Multipath Diagnostic Program.

Perform the following commands to uninstall the Multipath Diagnostic Program.

```
# pkgrm FJSVpdiag

The following package is currently installed:
   FJSVpdiag   Multipath diagnostic package
                (sparc) 1.1.0,REV=2013.07.2200

Do you want to remove this package? [y,n,?,q] y

## Removing installed package instance <FJSVpdiag>

This package contains scripts which will be executed with super-user
permission during the process of removing this package.

Do you want to continue with the removal of this package [y,n,?,q] y
## Verifying package <FJSVpdiag> dependencies in global zone
## Processing package information.
## Removing pathnames in class <init>
/var/opt/FJSVpdiag/fjsvpdiag3.log
/var/opt/FJSVpdiag/fjsvpdiag2.log
/var/opt/FJSVpdiag/fjsvpdiag1.log
/var/opt/FJSVpdiag/fjsvpdiag.conf
## Removing pathnames in class <none>
/var/opt/FJSVpdiag <non-empty directory not removed>
/var/opt <shared pathname not removed>
/var <mount point not removed>
/opt/FJSVpdiag/etc/S99pdiag
/opt/FJSVpdiag/etc/K99pdiag
/opt/FJSVpdiag/etc
/opt/FJSVpdiag/bin/fjsvpdiagsnap.sh
/opt/FJSVpdiag/bin/fjsvpdiagbootset.sh
/opt/FJSVpdiag/bin/fjsvpdiag
/opt/FJSVpdiag/bin
/opt/FJSVpdiag
/opt <shared pathname not removed>
## Executing postremove script.
## Updating system information.

Removal of <FJSVpdiag> was successful.
```

4　Starting and Stopping the Multipath Diagnostic Program

The Multipath Diagnostic Program can be set to automatically start when the system is started by executing the setting command. The Multipath Diagnostic Program can be started or stopped manually.

4-1　Starting and Stopping the Multipath Diagnostic Program Manually

To start the Multipath Diagnostic Program immediately, execute the following command with the "root" user account.

```
# /opt/FJSVpdiag/etc/S99pdiag
```

To stop the Multipath Diagnostic Program, execute the following command with the "root" user account.

```
# /opt/FJSVpdiag/etc/S99pdiag stop
```

4-2　Starting the Multipath Diagnostic Program Automatically When a Server is Started

To start the Multipath Diagnostic Program automatically when a server is started, execute the following command with the "root" user account.

```
# /opt/FJSVpdiag/bin/ fjsvpdiagbootset.sh
```

To cancel the setting for starting the Multipath Diagnostic Program automatically when a server is started, execute the following command with the "root" user account.

```
# /opt/FJSVpdiag/bin/ fjsvpdiagbootset.sh unset
```

4-3　Resident Process

The resident process of the Multipath Diagnostic Program is provided below.

No.	Process name	No. of processes
1	/opt/FJSVpdiag /bin/fjsvpdiag	2

5　Procedure to Obtain Maintenance Information

To examine the Multipath Diagnostic Program, execute the information acquisition command by using the "root" user account. Obtain information by following the procedure below.

```
# /opt/FJSVpdiag/bin/fjsvpdiagsnap.sh
```

"fjsvpdiagsnap.tar.Z" is created in the current directory.

6 Message List

A list of the messages for the Multipath Diagnostic Program is provided below.

Message	fjsvpdiag path disabled [Logical Unit] path=[Initiator Port Name],[Target Port Name]
Cause	A path was blocked because an error was detected.
Solution	Check if an error occurred in the ETERNUS Disk storage system.
Output example	Mar 12 10:14:18 m3000 fjpdiag[1192]: [ID 447159 user.error] fjsvpdiag path disabled /dev/rdsk/c3t600000E00D00000000000AD700130000d0s2 path=10000000c95ad70e,500000e0d00ad706

Message	fjsvpdiag path enabled [Logical Unit] path=[Initiator Port Name],[Target Port Name]
Cause	A blocked path became online.
Solution	None
Output example	Mar 12 10:19:18 m3000 fjpdiag[1192]: [ID 437143 user.error] fjsvpdiag path enabled /dev/rdsk/c3t600000E00D00000000000AD700130000d0s2 path=10000000c95ad70e,500000e0d00ad706

7 Notes

If timeout errors continue to occur, a message is displayed for every diagnosis that is performed due to switching back or switching. When this occurs, contact Fujitsu support immediately.

Appendix: Host Response Setup for the ETERNUS Disk Storage System

The following procedure is required for the ETERNUS Disk storage system when using the Multipath Diagnostic Program.

Perform the relevant procedure from the procedures listed below for each storage system that is used.

If upgrading firmware for the ETERNUS Disk storage system is required, contact your maintenance engineer.

- ETERNUS DX80 S2, DX90 S2, DX400 S2 Series, DX8000 S2 Series
  - ➢ Supported firmware version: V10L40 or later
  - ➢ Host response: Use one of the following methods to set the host response.
    1. When using Solaris MPxIO (recommended host response pattern for an Oracle Solaris server with MPxIO)

       Create a unique host response for the following parameter settings by performing "Add Host Response", and then add the host response to a host group.

Parameter			Setting value
Name			Any name that is not already being used
Sense Data Conversion			Customize
	From	SK/ASC/ASCQ	4/*/*
	To	SK/ASC/ASCQ	6/*/*
	From	SK/ASC/ASCQ	B/*/*
	To	SK/ASC/ASCQ	6/*/*
Other			Same as the preset value* for Solaris MPxIO

       * Existing host response settings cannot be used to create a unique host response.
       Make sure to take a note of the preset value for Solaris MPxIO.

       For more setting details, refer to "9.2.5.1 Add Host Response" and "9.2.2.5 Modify Host Group" in "ETERNUS Web GUI User's Guide ETERNUS DX80 S2/DX90 S2, ETERNUS DX410 S2/DX440 S2, ETERNUS DX8100 S2/DX8700 S2".

    2. When using a unique host response
       Change the parameter value of the host response that is being used as shown in the table below.

Parameter			Setting value
Sense Data Conversion			Customize
	From	SK/ASC/ASCQ	4/*/*
	To	SK/ASC/ASCQ	6/*/*
	From	SK/ASC/ASCQ	B/*/*
	To	SK/ASC/ASCQ	6/*/*
Other			Do not change the value

       For more setting details, refer to "9.2.5.3 Modify Host Response" in "ETERNUS Web GUI User's Guide ETERNUS DX80 S2/DX90 S2, ETERNUS DX410 S2/DX440 S2, ETERNUS DX8100 S2/DX8700 S2".

■ ETERNUS DX60 S2

  ➢ Supported firmware version: V20L16 or later

  ➢ Host response:
    Change the parameter value of the host response that is being used as shown in the table below.

Parameter	Setting value
Sense Data Conversion	Solaris MPxIO Recommended
Other	Do not change the value

    For more setting details, refer to "6.5.3 Setup Host Response" in "ETERNUS Web GUI User's Guide -ETERNUS DX60 S2-".

■ ETERNUS DX60, DX80, DX90

  ➢ Supported firmware version: V10L72 or later

  ➢ Host response
    Change the parameter value of the host response that is being used as shown in the table below.

Parameter	Setting value
Sense Data Conversion	Solaris MPxIO Recommended
Other	Do not change the value

    For more setting details, refer to "6.5.3 Setup Host Response" in "ETERNUS DX60/DX80/DX90 Web GUI User Guide".

■ ETERNUS DX400 series, ETERNUS DX8000 series

  ➢ Supported firmware version: V20L86-8000 or later

  ➢ Host response
    Change the parameter value of the host response that is being used as shown in the table below.

Parameter	Setting value
Sense Code Conversion Pattern	Solaris MPxIO Recommended
Other	Do not change the value

    For more setting details, refer to "5.4.8 Set Host Response" in "ETERNUS DX400/DX8000 series ETERNUSmgr User Guide -Settings/Maintenance- ".

■ ETERNUS4000 model 400 and 600, ETERNUS8000 model 800, 1200, and 2200

  ➢ Supported firmware version: V20L86-8000 or later

  ➢ Host response
    Change the parameter value of the host response that is being used as shown in the table below.

Parameter	Setting value
Sense Code Conversion Pattern	Solaris MPxIO Recommended
Other	Do not change the value

    For more setting details, refer to "5.4.8 Set Host Response" in "ETERNUS8000, ETERNUS4000 ETERNUSmgr User Guide -Settings/Maintenance- ETERNUS8000 models 800, 1200, and 2200 ETERNUS4000 models 400 and 600".

- ETERNUS4000 model 300 and 500, ETERNUS8000 model 700, 900, 1100, and 2100

  - Supported firmware version: V11L96-8000 or later

  - Host response
    Change the parameter value of the host response that is being used as shown in the table below.

Parameter	Setting value
Sense Code Conversion Pattern	Solaris MPxIO Recommended
Other	Do not change the value

    For more setting details, refer to "5.2.8 Set Host Response" in "ETERNUS8000, ETERNUS4000 ETERNUSmgr User Guide -Settings/Maintenance- ETERNUS8000 models 700, 900, 1100, and 2100 ETERNUS4000 models 300 and 500".