```
*******************************************************************************
**                                                                           **
**                          Software Information                             **
**                                                                           **
**              FUJITSU Storage ETERNUS Multipath Driver 3.1                  **
**                           for Oracle Solaris                              **
**                                                                           **
**                        Jul 2015 FUJITSU LIMITED                           **
*******************************************************************************
```

   This guide explains installation/uninstallation procedures and notes of
FUJITSU Storage ETERNUS Multipath Driver 3.1.

[High Safety Required]
   This Product 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 this Product for High
Safety Required Use without securing the sufficient safety level required. If you
wish to use this Product for High Safety Required Use, please consult with our
sales representative before such use.

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   UNIX is a trademark of X/Open Company limited and licensed exclusively by the
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   Oracle and Java are registered trademarks of Oracle and/or its affiliates. Other
names may be trademarks of their respective owners.
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respective owners.

[About the abbreviation]
   When all the following products are indicated, it is written, "Solaris OS".
    Oracle Solaris(TM) 10 Operating System
    Oracle Solaris(TM) 11 Operating System

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[Correction history]
  <The first edition>
    1) New making

  <The second edition>
    1) ETERNUS Multipath Driver 3.1.1
    2) Migration of the SAN Boot environment is supported.

  <The third edition>
    1) ETERNUS Multipath Driver 3.1.2

1 About ETERNUS Multipath Driver

   "ETERNUS Multipath Driver" (hereafter referred to as "Multipath Driver") is
software designed to make a multipath configuration between Solaris server and
ETERNUS Disk storage system.

   Please visit the following product's web site for the latest information
 (supported models and operating systems, important notes, etc.).
Refer to the installation information on the web site.

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

   Please confirm a number of versions used and latest patch information
 (Multipath Driver and use OS) before it is installed.
When the latest patch exists, apply together with the product.

2 Software Packages

   The individual modules that configure this software program are called packages.
   Multipath Driver software consists of the following packages:

Package Name	Version/Level	Function
FJSViomp	2.3	IOMP command/library
FJSVmplb	31.0.0	Multipath Driver

3 Application manual

   There is the online manual in the CD-ROM.

      File: P2SO-0063-03ENZO.pdf

4 Software Environment

4.1 Operating System

   Following basic software product must to be installed in order to use this
   product:
      Oracle Solaris 10 (119042-02)
      Oracle Solaris 11

4.2 Restriction matter

   In the Oracle VM environment, please apply following SRU or patch.
      Oracle Solaris 10   150400-20 or lator
      Oracle Solaris 11   SRU14121 or lator

4.3 Exclusive software

   This product cannot be used together with the following software.

      ETERNUS Multipath Driver 2.0.X

ETERNUS Multipath Driver 3.0.X

5 Hardware Environment

The following I/O devices are required to use this product:

```
Device Name           Model
Disk Storage Systems  FUJITSU Storage ETERNUS Disk storage system
Fibre Channel card    SE0X7F31F, SE0X7F32F, SP1X7FBR2F, SE0X7F21F, SE0X7F22F
                      SP1X7FBA2F, SP1X7FAA2F
FCoE card             SP1X7FAR2F, SP1X7FAS2F, SP1X7FBR2F, SP1X7FBS2F
PCIe ExpressModule    SP1X5FAR2F, SP1X5FAS2F, SP1X5FBR2F, SP1X5FBS2F,
                      SP1X5FAA2F, SP1X5FBA2F
```

Please check the latest information at the following website.

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

6 Resources

The following resources are required to use this product:

1) Disk Resources
   10MB or more

2) Memory
   20MB or more

7 Restrictions matter

- Please let me execute the following command when you increase the storage
  system, LUN, and path and recognize LUN to OS.
   cfgadm -al
   devfsadm

- Please execute iompadm restart after executing "cfgadm -al" or "devfsadm"
  command when it is not possible to restore by the diagnosis or iompadm restart
  command.

- Upgrade Install from ETERNUS Multipath Driver 2.0.x/3.0.x

   The SAN Boot environment cannot be migration.

- Migration from MPxIO

   Do not let other devices be connected to HBA with which the ETERNUS Disk
   storage system is connected.

8 Notes of upgrade/migration

8.1 Upgrade Install from ETERNUS Multipath Driver 2.0.x/3.0.x

- The overwrite install cannot be done.
  Please uninstall the package of the old edition.

- When PRIMECLUSTER and PRIMECLUSTER GDS are used, it is necessary to release
  the resource. Please refer to each manual for details.

- This product does not support a Solaris standard disk access special file
  "/dev/[r]dsk/c*t*d*s*".

- The method of matching the mplb instance number is as follows.
  1. It takes notes of the mplb instance number, LUN, the device name, and the
     serial number from the output result of mplbconfig -nv before upgrade.
     Example)
     Path   : Action : Element path   : LUN : Storage
     mplb0   : exist : c14t16d0s2 ...   : 0 : ETERNUS_DX400- 10017C :

  2. After upgrade, the mplb instance number is changed by the mplbconfig -o/-f
     command. Please refer to the user's guide for the use of the mplbconfig
     command.
     Example)
     Path   : Action : Element path   : LUN : Storage
     mplb0   : exist : c11t2140000B5D6A0299d0s2 ... : 0 : ETERNUS_DX400-
     10017C

8.2 Migration from MPxIO

There is the following conditions.

- Do not access IO at the single user mode.
  IO makes an error because MPxIO is released.

- Server can be rebooted.

Please answer the following inquiry when it installs it "n".
    Do you want to make a multipath configuration now ? [y,n,?]

Please refer to "11 Migration procedure from MPxIO" for other detailed
procedures.

9 Note

- This product cannot be overwrite install from ETERNUS Multipath Driver
  2.0.x/3.0.x

- When this product is installed, the following message might be output.
  There is no problem and disregard it.

    WARNING: setting mode of </usr/lib/locale/ja> to default mode (755)
    WARNING: setting mode of </usr/lib/locale/ja/LC_MESSAGES> to default mode

```
         (755)
    WARNING: setting mode of </usr/lib/locale/ja_JP.PCK> to default mode
         (755)
    WARNING: setting mode of </usr/lib/locale/ja_JP.PCK/LC_MESSAGES> to defau
    lt mode (755)
         26 package pathnames are already properly installed.
```

- Notes of stmsboot command
  - Please answer the inquiry of "Reboot the system now ? [y/n] (default: y)" by
    "n" when you execute stmsboot -e.
    Please set mpxio-disable to /kernel/drv/fp.conf for path of ETERNUS.
     Example)
     name="fp" parent=" path name " port=0 mpxio-disable="yes";

    Refer to man of fp and stmsboot for details.

  - When stmsboot -d is executed, the above setting of /kernel/drv/fp.conf might
    be deleted.

  - When stmsboot -d is executed, the above setting of /kernel/drv/fp.conf might
    be deleted.

  - The disk allocation to the guest domain of Oracle VM supports only block
    device (/dev/FJSVmplb/dsk/mplb*s2).

  - In the Oracle VM environment, the I/O domain cannot be started when the guest
    domain is binding.

    [Environment]
     I/O domain's OS version is:
      Solaris11.1 + SRU14051(SRU11.1.19.6.0) or later
      Solaris11.2 ~ Solaris11.2 SRU14111
      Solaris10 + 150840-04 or later is applied and 150400-20 is not applied.

    [Recommended Action]
    In the IO domain, add the following definitions to/etc/system.

      forceload: drv/px

  - In the Oracle VM environment, when the I/O domain is rebooted, path of the
    guest domain becomes offline. And, path cannot be restarted.

    [Environment]
     I/O domain's OS version is:
      Solaris11.1 + SRU14051(SRU11.1.19.6.0) or later
      Solaris11.2 ~ Solaris11.2 SRU14111
      Solaris10 + 150840-04 or later is applied and 150400-20 is not applied.

    [Recommended Action]
      Deal with either as follows when the phenomenon is generated.
      Corrective action 1:
        1. Delete path of the rebooted IO domain from the guest domain.
           - The grmpdautoconf -d command is not choked.
           - Execute it with the IO domain starts.
           Example)
            (Guest domain) # /usr/opt/FJSViomp/bin/iompadm del
              /dev/FJSVmplb/fiomp/admXX /dev/rdsk/cXdXs2
        2. The allocated vdisk is released.

                               5
```

Example)
   (Control domain) # ldm rm-vdisk vdisk2-0 gdom2
3. The released vdisk is allocated again.
Example)
   (Control domain) # ldm add-vdisk vdisk2-0 vol2-2@iodom1-vds0 gdom2
4. Path is added by the grmpdautoconf command.
Example)
   (Guest domain) # grmpdautoconf

Corrective action 2:
1. Stop the guest domain.
2. Unbin the guest domain.
Example)
   # ldm unbind-domain gdom2
3. Bind the guest domain.
Example)
   # ldm bind-domain gdom2
4. Start the guest domain.
Example)
   # ldm start-domain gdom2

- In the Oracle VM environment, when the I/O domain is rebooted, the virtual disk allocated in the guest domain might not be correctly allocated.

[Environment]
 I/O domain's OS version is:
  Solaris11.1 + SRU14051(SRU11.1.19.6.0) or later
  Solaris11.2 ~ Solaris11.2 SRU14111
  Solaris10 + 150840-04 or later is applied and 150400-20 is not applied.

[Recommended Action]
1. Please start I/O domain
2. The state of the guest domain is made bound or inactive.
3. Please execute the following to each virtual disk.
   # ldm rm-vdisk <vdisk> <guest domain>
   # ldm add-vdisk <vdisk> <vol>@<vds> <guest domain name>
4. Please start guest domain.

- Don't send the break request to OS at I/O domain while I/O is issued.
Data breaks, and the I/O becomes no reply.

- In the Oracle VM environment, when the I/O domain does hang, the guest domain becomes no I/O response. Please make I/O domain panic

- It is not possible to open the slice of size0 from 3.1.2.


10 Installation of the Multipath Driver


All commands must be run as root user in this section.
(# represents the root user prompt.)


10.1 New Installation


1) Mount CDROM

2) Execute the mpdpkgadd command.
   # /cdrom/cdrom0/mpdpkgadd <RETURN>

3) Respond to the questions in the installation script, as appropriate for your
   installation. A sample installation follows.

   *** Installation of ETERNUS Multipath Driver is started. ***

   Processing package instance <FJSViomp> from </cdrom/cdrom0/ETERNUSMPD>

   IOMP Common Framework Level 2 package(sparc) 2.3,REV=2002.04.1000
   Copyright (c) FUJITSU LIMITED 1999-2002
   All Rights Reserved.
   Using </> as the package base directory.
   ## Processing package information.
   ## Processing system information.
      1 package pathname is already properly installed.
   ## Verifying disk space requirements.
   ## Checking for conflicts with packages already installed.
   ## Checking for setuid/setgid programs.

   Installing IOMP Common Framework Level 2 package as <FJSViomp>

   ## Installing part 1 of 1.
   [ verifying class <none> ]

   Installation of <FJSViomp> was successful.

   Processing package instance <FJSVmplb> from </cdrom/cdrom0/ETERNUSMPD>

   FUJITSU Storage ETERNUS Multipath Driver Package(sparc) 31.0.0

   FJSVmplb 31.0.0
       FUJITSU Storage ETERNUS Multipath Driver 3.1.2

   COPYRIGHT (c) FUJITSU 2014 - 2015


   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.

   ## Verifying package dependencies.
   ## 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 <FJSVmplb> [y,n,?] y

   Installing FUJITSU Storage ETERNUS Multipath Driver Package as <FJSVmplb>

   ## Executing preinstall script.

```
## Installing part 1 of 1.

   ...

## Executing postinstall script.
Loading smf(5) service descriptions: 1/1


*** IMPORTANT NOTICE ***
        This machine must now be rebooted in order to ensure
        sane operation.   Execute
                shutdown -y -i6 -g0
        and wait for the "Console Login:" prompt.

Installation of <FJSVmplb> was successful.

Do you want to make a multipath configuration now ?  [y,n,?]
```

- When ETERNUS Disk storage system is recognized with ssd, the multipath can be made by inputting "y".
  The multipath can be made by the grmpdautoconf command even when answering by "n".
  Please refer to the user's guide for grmpdautoconf command.

- Please answer by "n" when the ETERNUS Disk storage system is used with MPxIO

10.2 Update Installation

The update install is possible in ETERNUS Multipath Driver 3.1.0.
Please usually refer to the installation for the procedure.
The following inquiries are not done at the update installation.

```
Do you want to change the install directory? n [y,n,?,q]
Do you want to make a multipath configuration now ?  [y,n,?]
```

Please reboot the server after the installation.

10.3 Silent Installation

The installation is done without the inquiry in the silent installation.
The multipath are not constructed in silent installation.

1) Mount CDROM

2) Execute the mpdpkgadd command with -q.

   - It installs it in default directory (/opt).
     # /cdrom/cdrom0/mpdpkgadd -q<RETURN>

   - It installs it in/opt2 directory.
     # /cdrom/cdrom0/mpdpkgadd -q -o /opt2<RETURN>

10.4 Uninstallation

1)) Stop applications.
   Stop all applications that might access the multipath.
   If the LUN has been mounted, unmount it.

2) Execute the pkgrm command.
   # pkgrm FJSVmplb

   The following package is currently installed:
      FJSVmplb FUJITSU Storage ETERNUS Multipath Driver Package
             (sparc) 31.0.0

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

   ## Removing installed package instance <FJSVmplb>

   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 <FJSVmplb> dependencies in global zone
   ## Processing package information.
   ## Executing preremove script.

      ...

   *** IMPORTANT NOTICE ***
         This machine must now be rebooted in order to ensure
                  sane operation. Execute
                        shutdown -y -i6 -g0
            and wait for the "Console Login:" prompt.

   ## Updating system information.

   Removal of <FJSVmplb> was successful.

   # pkgrm FJSViomp

   The following package is currently installed:
      FJSViomp IOMP Common Framework Level 2 package
             (sparc) 2.3,REV=2002.04.1000

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

   ## Removing installed package instance <FJSViomp>
   ## Verifying package <FJSViomp> dependencies in global zone
   ## Processing package information.
   ## Removing pathnames in class <none>

      ...

   ## Updating system information.

   Removal of <FJSViomp> was successful.

11 Migration procedure from MPxIO

　Data in storage can be continuously used.
　The backup and restoring are unnecessary.
　All commands must be run as root user in this section.

11.1 PRIMECLUSTER Environment

1. This product is installed. All nodes.

2. Record all MPxIO names (ex. /dev/rdsk/c1t6000B5D0006A0000006A029902D10000d0)
   and ssd names (ex. /dev/rdsk/c12t500000E0D00AD706d7). All nodes.
   Example)
   　# stmsboot -L
   　/dev/rdsk/c12t500000E0D00AD706d7 /dev/rdsk/c1t6000B5D0006A0000006A029902D1
   　0000d0
   　　　...

3. Stop RMS and it does not start automatically.
   　　Please refer to the manual of PRIMECLUSTER for details.

4. Backup the GDS composition. All nodes.
   　　Please refer to the manual of PRIMECLUSTER GDS for details.

5. Delete the GDS composition.
   　　Please refer to the manual of PRIMECLUSTER GDS for details.

6. Delete the disk resource.
   　　Please refer to the manual of PRIMECLUSTER for details.

7. Execute the command that releases MPxIO and reactivate. All nodes.
   　- When MPxIO is controlled only ETERNUS
   　　# stmsboot -d

   　　It answers the following inquiry by "y".
   　　Reboot the system now ? [y/n] (default: y) y

   　- When MPxIO is controlled ETERNUS and other devices
   　　The following definition is described in /kernel/drv/fp.conf, and only
   　　ETERNUS makes MPxIO disable.
   　　　name="fp" parent="path name" port=0 mpxio-disable="yes";

   　　Example)
   　　　name="fp" parent="/pci@13,700000/emlx@0" port=0 mpxio-disable="yes";
   　　　name="fp" parent="/pci@12,600000/emlx@0" port=0 mpxio-disable="yes";

   　　Reboot the server.

   　　Please refer to man of fp and stmsboot for details.

8. Make the disk resource.
   　　Please refer to the manual of PRIMECLUSTER for details.

9. Convert a physical device of the configuration file of GDS.
   　Look for mplb with the same ssd route recorded by "2".
   　And, rewrite the configuration file "4" by the sdxconfig Convert command.

   　Example)

```
# /usr/opt/FJSViomp/bin/iompadm info
IOMP: /dev/FJSVmplb/fiomp/adm2049
Element:
        /dev/rdsk/c11t500000E0D00AD787d7s2        online  ~
        /dev/rdsk/c12t500000E0D00AD706d7s2        online  ~
 ...

# sdxconfig Convert -e replace -c Class1 -p c1t6000B5D0006A0000006A029902D1
0000d0=mplb2049 -i /var/tmp/Class1.conf -o /var/tmp/Class1.conf -e update
```

Please refer to the manual of PRIMECLUSTER GDS for details.

10. The composition of GDS is restored. one node.
    Please refer to the manual of PRIMECLUSTER GDS for details.

11. Reboot the server. All nodes.

12. Enhance scope from a local class to a common class.
    Please refer to the manual of PRIMECLUSTER GDS for details.

13. Set to use the GDS class with RMS.
    Please refer to the manual of PRIMECLUSTER for details.

14. Set to start RMS automatically and start.
    Please refer to the manual of PRIMECLUSTER for details.

11.2 PRIMECLUSTER GDS Environment

1. This product is installed.

2. Record all MPxIO names (ex /dev/rdsk/c1t6000B5D0006A0000006A029902D10000d0)
   and ssd names (ex /dev/rdsk/c12t500000E0D00AD706d7).
   Example)
   ```
   # stmsboot -L
   /dev/rdsk/c12t500000E0D00AD706d7 /dev/rdsk/c1t6000B5D0006A0000006A029902D
   10000d0
        ...
   ```

3. Backup the GDS composition.
   Please refer to the manual of PRIMECLUSTER GDS for details.

4. Delete the GDS composition.
   Please refer to the manual of PRIMECLUSTER GDS for details.

5. Execute the command that releases MPxIO and reactivate. All nodes.
   - When MPxIO is controlled only ETERNUS
     ```
     # stmsboot -d
     ```

     It answers the following inquiry by "n".
     Reboot the system now ? [y/n] (default: y) n

   - When MPxIO is controlled ETERNUS and other devices
     The following definition is described in /kernel/drv/fp.conf, and only
     ETERNUS makes MPxIO disable.
       name="fp" parent="path name" port=0 mpxio-disable="yes";

     Example)

```

```
            name="fp" parent="/pci@13,700000/emlx@0" port=0 mpxio-disable="yes";
            name="fp" parent="/pci@12,600000/emlx@0" port=0 mpxio-disable="yes";

        Please refer to man of fp and stmsboot for details.
```

6. Start in the single user mode.
```
        # shutdown -i0 -y -g0
        ok boot -s
```

7. Mount if necessary it as for/opt and/var, etc.

8. The multipath is constructed.
```
        # grmpdautoconf
```

9. Convert a physical device of the configuration file of GDS.
   Look for mplb with the same ssd route recorded by "2".
   And, rewrite the configuration file of "4" by the sdxconfig Convert command.

   Example)
```
        # /usr/opt/FJSViomp/bin/iompadm info
        IOMP: /dev/FJSVmplb/fiomp/adm0
        Element:
                /dev/rdsk/c11t500000E0D00AD787d7s2        online  ～
                /dev/rdsk/c12t500000E0D00AD706d7s2        online  ～
         ...

        # sdxconfig Convert -e replace -c Class1 -p c1t6000B5D0006A0000006A029902
        D10000d0=mplb0 -i /var/tmp/Class1.conf -o /var/tmp/Class1.conf -e update
```

        Please refer to the manual of PRIMECLUSTER GDS for details.

10. The composition of GDS is restored.
```
        Please refer to the manual of PRIMECLUSTER GDS for details.
```

11. Reboot the server.
```
        # shutdown -i6 -y -g0
```


11.3 UFS Environment

1. This product is installed.

2. Record the controller number of MPxIO.

   Example)
```
        /dev/rdsk/c2t6000B5D0006A0000006A029902D00000d0s2
        A controller number is "2".
```

3. Execute the command that releases MPxIO.
   - When MPxIO is controlled only ETERNUS
```
        # stmsboot -d
```

```
        It answers the following inquiry by "n".
        Reboot the system now ? [y/n] (default: y) n
```

   - When MPxIO is controlled ETERNUS and other devices
     The following definition is described in /kernel/drv/fp.conf, and only
     ETERNUS makes MPxIO disable.

```
            name="fp" parent="patn name" port=0 mpxio-disable="yes";

        Example)
            name="fp" parent="/pci@13,700000/emlx@0" port=0 mpxio-disable="yes";
            name="fp" parent="/pci@12,600000/emlx@0" port=0 mpxio-disable="yes";

        Please refer to man of fp and stmsboot for details.
```

4. Start in the single user mode.
```
    # shutdown -i0 -y -g0
    ok boot -s
```

5. Mount if necessary it as for/opt and/var, etc.

6. The multipath is constructed.
```
    # grmpdautoconf
```

7. Make the symbolic link by the grmpdautoconf command.
```
    grmpdautoconf -l Controller number of which it takes notes by "2"
```

   Example)
```
    # grmpdautoconf -l 2
```

8. Boot multiuser mode.
```
    # exit
```


11.4 ZFS Environment

1. This product is installed.

2. Export zfs on ETERNUS.
```
     Example)
       # zpool export mpdpool
```

3. Execute the command that releases MPxIO.
   - When MPxIO is controlled only ETERNUS
```
       # stmsboot -d
```

```
       It answers the following inquiry by "n".
       Reboot the system now ? [y/n] (default: y) n
```

   - When MPxIO is controlled ETERNUS and other devices
     The following definition is described in /kernel/drv/fp.conf, and only
     ETERNUS makes MPxIO disable.
```
           name="fp" parent="patn name" port=0 mpxio-disable="yes";
```

```
       Example)
           name="fp" parent="/pci@13,700000/emlx@0" port=0 mpxio-disable="yes";
           name="fp" parent="/pci@12,600000/emlx@0" port=0 mpxio-disable="yes";
```

       Please refer to man of fp and stmsboot for details.

4. Start in the single user mode.
```
    # shutdown -i0 -y -g0
    ok boot -s
```

5. Mount if necessary it as for/opt and/var, etc.

6. The multipath is constructed.
      # grmpdautoconf

7. Import zpool exported by "2".
    Example)
      # zpool import -d /dev/FJSVmplb/dsk mpdpool

8. Boot multiuser mode.
      # exit

11.5 PRIMECLUSTER Environment (SAN Boot)

When system volume is ZFS, it is necessary to make the disk of the same capacity
as the boot disk.

1. This product is installed. All nodes.

2. Record all MPxIO names (ex. /dev/rdsk/c1t6000B5D0006A0000006A029902D10000d0)
    and ssd names (ex. /dev/rdsk/c12t500000E0D00AD706d7). All nodes.
    Example)
     # stmsboot -L
     /dev/rdsk/c12t500000E0D00AD706d7 /dev/rdsk/c1t6000B5D0006A0000006A029902D1
     0000d0
        ...

3. Stop RMS and it does not start automatically.
      Please refer to the manual of PRIMECLUSTER for details.

4. Backup the GDS composition other than system volume. All nodes.
      Please refer to the manual of PRIMECLUSTER GDS for details.

5. Delete the GDS composition. The route class in system volume is deleted.
      Please refer to the manual of PRIMECLUSTER GDS for details.

6. Delete the disk resource.
      Please refer to the manual of PRIMECLUSTER for details.

7. Execute the command that releases MPxIO and reactivate. All nodes.
    - When MPxIO is controlled only ETERNUS
      # stmsboot -d

      It answers the following inquiry by "y".
      Reboot the system now ? [y/n] (default: y) y

    - When MPxIO is controlled ETERNUS and other devices
      The following definition is described in /kernel/drv/fp.conf, and only
      ETERNUS makes MPxIO disable.
        name="fp" parent="path name" port=0 mpxio-disable="yes";

      Example)
        name="fp" parent="/pci@13,700000/emlx@0" port=0 mpxio-disable="yes";
        name="fp" parent="/pci@12,600000/emlx@0" port=0 mpxio-disable="yes";

      Reboot the server.

      Please refer to man of fp and stmsboot for details.

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8. The SAN Boot environment is constructed.
    Please refer to SAN Boot Environment Build Guide.

9. GDS is constructed in system volume.
    Please refer to the manual of PRIMECLUSTER GDS for details.

10. Convert a physical device other than system volume of the configuration file
    of GDS.
    Look for mplb with the same ssd route recorded by "2".
    And, rewrite the configuration file "4" by the sdxconfig Convert command.

    Example)
        # /usr/opt/FJSViomp/bin/iompadm info
        IOMP: /dev/FJSVmplb/fiomp/adm2049
        Element:
                /dev/rdsk/c11t500000E0D00AD787d7s2   online ～
                /dev/rdsk/c12t500000E0D00AD706d7s2   online ～
         ...

        # sdxconfig Convert -e replace -c Class1 -p c1t6000B5D0006A0000006A029902
        D10000d0=mplb2049 -i /var/tmp/Class1.conf -o /var/tmp/Class1.conf -e update

        Please refer to the manual of PRIMECLUSTER GDS for details.

11. The composition of GDS is restored other than system volume. one node.
    Please refer to the manual of PRIMECLUSTER GDS for details.

12. Reboot the server. All nodes.
    # shutdown -i6 -y -g0

13. Enhance scope from a local class to a common class.
    Please refer to the manual of PRIMECLUSTER GDS for details.

14. Set to use the GDS class with RMS.
    Please refer to the manual of PRIMECLUSTER for details.

15. Set to start RMS automatically and start.
    Please refer to the manual of PRIMECLUSTER for details.

11.6 PRIMECLUSTER GDS Environment (SAN Boot)

When system volume is ZFS, it is necessary to make the disk of the same capacity
as the boot disk.

1. This product is installed.

2. Record all MPxIO names (ex. /dev/rdsk/c1t6000B5D0006A0000006A029902D10000d0)
   and ssd names (ex. /dev/rdsk/c12t500000E0D00AD706d7).
   Example)
    # stmsboot -L
    /dev/rdsk/c12t500000E0D00AD706d7 /dev/rdsk/c1t6000B5D0006A0000006A029902D10
    000d0
        ...

3. Backup the GDS composition other than system volume.
    Please refer to the manual of PRIMECLUSTER GDS for details.

4. Delete the GDS composition. The route class in system volume is deleted.
   Please refer to the manual of PRIMECLUSTER GDS for details.

5. Execute the command that releases MPxIO and reactivate.
   - When MPxIO is controlled only ETERNUS
     # stmsboot -d

     It answers the following inquiry by "y".
     Reboot the system now ? [y/n] (default: y) y

   - When MPxIO is controlled ETERNUS and other devices
     The following definition is described in /kernel/drv/fp.conf, and only
     ETERNUS makes MPxIO disable.
       name="fp" parent="path name" port=0 mpxio-disable="yes";

     Example)
       name="fp" parent="/pci@13,700000/emlx@0" port=0 mpxio-disable="yes";
       name="fp" parent="/pci@12,600000/emlx@0" port=0 mpxio-disable="yes";

     Reboot the server.

     Please refer to man of fp and stmsboot for details.

6. Start in the single user mode.
   # shutdown -i0 -y -g0
   ok boot -s

7. Mount if necessary it as for/opt and/var, etc.

8. The multipath is constructed.
   # grmpdautoconf

   There is no problem though one path becomes offline.

9. Boot multiuser mode.
   # exit

10. The SAN Boot environment is constructed.
    Please refer to SAN Boot Environment Build Guide.

11. System volume is restructured with GDS.
    Please refer to the manual of PRIMECLUSTER GDS for details.

12. Convert a physical device other than system volume of the configuration file
    of GDS.
    Look for mplb with the same ssd route recorded by "2".
    And, rewrite the configuration file "4" by the sdxconfig Convert command.

    Example)
       # /usr/opt/FJSViomp/bin/iompadm info
      IOMP: /dev/FJSVmplb/fiomp/adm2049
      Element:
            /dev/rdsk/c11t500000E0D00AD787d7s2   online ~
            /dev/rdsk/c12t500000E0D00AD706d7s2   online ~
       ...

       # sdxconfig Convert -e replace -c Class1 -p c1t6000B5D0006A0000006A029902
       D10000d0=mplb2049 -i /var/tmp/Class1.conf -o /var/tmp/Class1.conf -e update

       Please refer to the manual of PRIMECLUSTER GDS for details.

13. The composition of GDS is restored other than system volume.
    Please refer to the manual of PRIMECLUSTER GDS for details.

14. Reboot the server.
    # shutdown -i6 -y -g0

11.7 UFS Environment (SAN Boot)

1. This product is installed.

2. Record the controller number of MPxIO.

   Example)
       /dev/rdsk/c2t6000B5D0006A0000006A029902D00000d0s2
       A controller number is "2".

3. Execute the command that releases MPxIO.
   - When MPxIO is controlled only ETERNUS
       # stmsboot -d

       It answers the following inquiry by "n".
       Reboot the system now ? [y/n] (default: y) n

   - When MPxIO is controlled ETERNUS and other devices
       The following definition is described in /kernel/drv/fp.conf, and only
       ETERNUS makes MPxIO disable.
           name="fp" parent="patn name" port=0 mpxio-disable="yes";

       Example)
           name="fp" parent="/pci@13,700000/emlx@0" port=0 mpxio-disable="yes";
           name="fp" parent="/pci@12,600000/emlx@0" port=0 mpxio-disable="yes";

       Please refer to man of fp and stmsboot for details.

4. Start in the single user mode.
       # shutdown -i0 -y -g0
       ok boot -s

5. Mount if necessary it as for/opt and/var, etc.

6. The multipath is constructed.
       # grmpdautoconf

       There is no problem though one path becomes offline.

7. Make the symbolic link by the grmpdautoconf command.
   grmpdautoconf -l Controller number of which it takes notes by "2"

   Example)
       # grmpdautoconf -l 2

8. Boot multiuser mode.
       # exit

9. The boot device is changed to the ssd path.
   Example)

```
# eeprom boot-device="/pci@1,700000/pci@0/pci@0/QLGC,qlc@0/fp@0,0/disk@w50
0000e0d00ad706,0:a
```

10. The SAN Boot environment is constructed.
    Please refer to SAN Boot Environment Build Guide.

11.8 ZFS Environment (SAN Boot)

It is necessary to make the disk of the same capacity as the boot disk.

1. This product is installed.

2. ZFS on ETERNUS other than system volume is exported. Stop the application
   program that uses the pool where export is done if necessary.
   Example)
   # zpool export mpdpool

3. Execute the command that releases MPxIO.
   - When MPxIO is controlled only ETERNUS
     # stmsboot -d

     It answers the following inquiry by "n".
     Reboot the system now ? [y/n] (default: y) n

   - When MPxIO is controlled ETERNUS and other devices
     The following definition is described in /kernel/drv/fp.conf, and only
     ETERNUS makes MPxIO disable.
         name="fp" parent="patn name" port=0 mpxio-disable="yes";

     Example)
         name="fp" parent="/pci@13,700000/emlx@0" port=0 mpxio-disable="yes";
         name="fp" parent="/pci@12,600000/emlx@0" port=0 mpxio-disable="yes";

     Please refer to man of fp and stmsboot for details.

4. Start in the single user mode.
   # shutdown -i0 -y -g0
   ok boot -s

5. Mount if necessary it as for/opt and/var, etc.

6. The multipath is constructed.
   # grmpdautoconf

   There is no problem though one path becomes offline.

7. Do zpool that does export in import.
   Example)
   # zpool import -d /dev/FJSVmplb/dsk mpdpool

8. Boot multiuser mode.
   # exit

9. The SAN Boot environment is constructed.
   Please refer to SAN Boot Environment Build Guide.