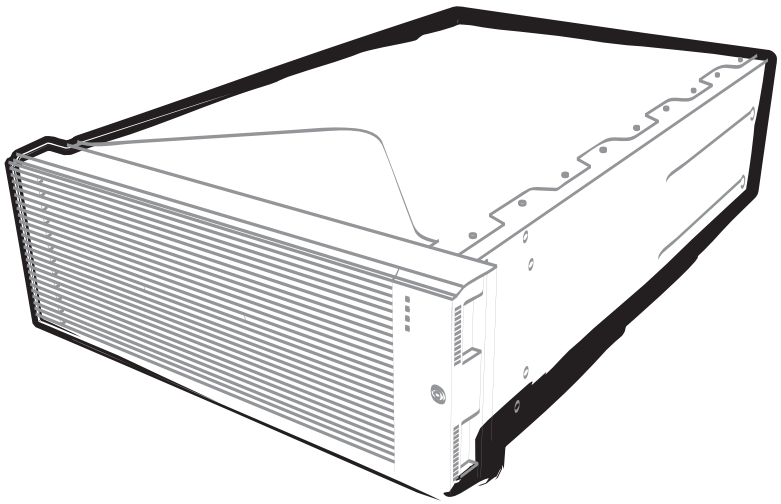
Express5800

NEC



NEC Express Server
Express5800 Series

Express5800/R320c-E4

Model Number: N8800-173F, EXP320P

Express5800/R320c-M4

Model Number: N8800-174F, EXP320Q

Installation Guide (Linux)

30.104.01-103.01
September 2014, First Edition

Documents for This Product

Documents for this product are provided as booklets (📖) and as electronic manuals (📄) in the EXPRESSBUILDER DVD (💿).

User's Guide

Chapter 1: General Description	Overviews, names, and functions of the server components
Chapter 2: Preparations	Installation of additional options, connection of peripheral devices, and suitable location for this server
Chapter 3: Setup	System BIOS configurations and summary of EXPRESSBUILDER
Chapter 4: Appendix	Specifications

Installation Guide (Linux)

Chapter 1: Installing Operating System	Installation of OS and drivers, and important information for installation
Chapter 2: Installing Bundled Software	Installation of bundled software, such as NEC ESMPRO

Maintenance Guide (Linux)

Chapter 1: Maintenance	Server maintenance and troubleshooting
Chapter 2 Configuring and Upgrading the System	Configure hardware and setup management tool associated with hardware
Chapter 3: Useful Features	Useful features and the detail of system BIOS settings, SAS Configuration Utility, and EXPRESSBUILDER

Other documents

Provides the detail of NEC ESMPRO and the other features.

Contents

Notations Used in This Document

Notations used in the text

In addition to safety-related symbols urging caution, three other types of notations are used in this document. These notations have the following meanings.

Important	Indicates critical items that must be followed when handling the hardware or operating software. If the procedures described are not followed, **hardware failure, data loss, and other serious malfunctions could occur**.
Note	Indicates items that must be confirmed when handling the hardware or operating software.
Tips	Indicates information that is helpful to keep in mind when using this server.

Optical disk drive

This server is equipped with one of the following drives. These drives are referred to as *optical disk drive* in this document.

- DVD-ROM drive
- DVD Super MULTI drive

Abbreviations of Operating Systems (Linux)

Linux Operating Systems are referred to as follows.

See *Chapter 1* (*1.1 Supported Linux OS)* for detailed information.

Notations in this document	Official names of Linux
Red Hat Enterprise Linux 6 Server	Red Hat Enterprise Linux 6 Server (x86_64)

POST

POST described in this document refers to the following.

- Power On Self-Test

BMC

BMC described in this document refers to the following.

- Baseboard Management Controller

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	Manufacturer : NEC CORPORATION

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NEC Express5800 Series
Express5800/R320c-E4, R320c-M4

1

Installing Operating System

This chapter describes how to install an operating system. Read through this chapter to set up the system correctly.

1. **Before Starting Setup**
   Describes overview of setup and precautions on installing an OS.

2. **Setting up Red Hat Enterprise Linux 6 Server**
   Describes how to set up Red Hat Enterprise Linux 6 Server.

1. Before Starting Setup

This section describes overview of setup and precautions on installing an OS.

1.1 Supported Linux OS

The server supports the following Linux OS.

Name of Linux OS		Supported
Red Hat Enterprise Linux 6 *1	Red Hat Enterprise Linux 6 (x86)	–
	Red Hat Enterprise Linux 6 (x86_64)	✓

✓ : Supported – : Not Supported

*1 Use Red Hat Enterprise Linux 6.5 Install Media for installation.

1.2 Overview of Setup

To use Linux system, install (or re-install) Linux in your computer.

The server provides the following method including installation of Linux.

- Setup with OS standard installer (Linux manual setup)

1.3 Precautions on Setup

This section describes precautions on installing Linux.

(1) Available install media

The install media available for installing Linux on the server is Red Hat Enterprise Linux 6.5. If you update Red Hat Enterprise Linux 6.5 to Red Hat Enterprise Linux 6.x, ft Server Control Software must also be updated.

2. Setting up Red Hat Enterprise Linux 6 Server

This section describes how to install Red Hat Enterprise Linux 6 Server.

2.1 Before starting setup with OS standard installer

2.1.1 Preparation for hardware

The following steps are required to prepare for re-installing an OS (setup with OS standard installer):

1. If the POWER LED on CPU/IO module is on, shutdown the OS.
2. Unplug the power cord from outlet while the POWER LED is blinking.
3. Perform the preparation process for the server as shown below.

- Install CPU/IO modules 0 and 1.
- Install hard disk drives in slot 0 of CPU/IO modules 0 and 1, respectively.
- Disconnect all LAN cables.
- Disconnect the cable for tape device from the connector on SAS board.
- Disconnect the cable for device from the connector on Fibre Channel board.

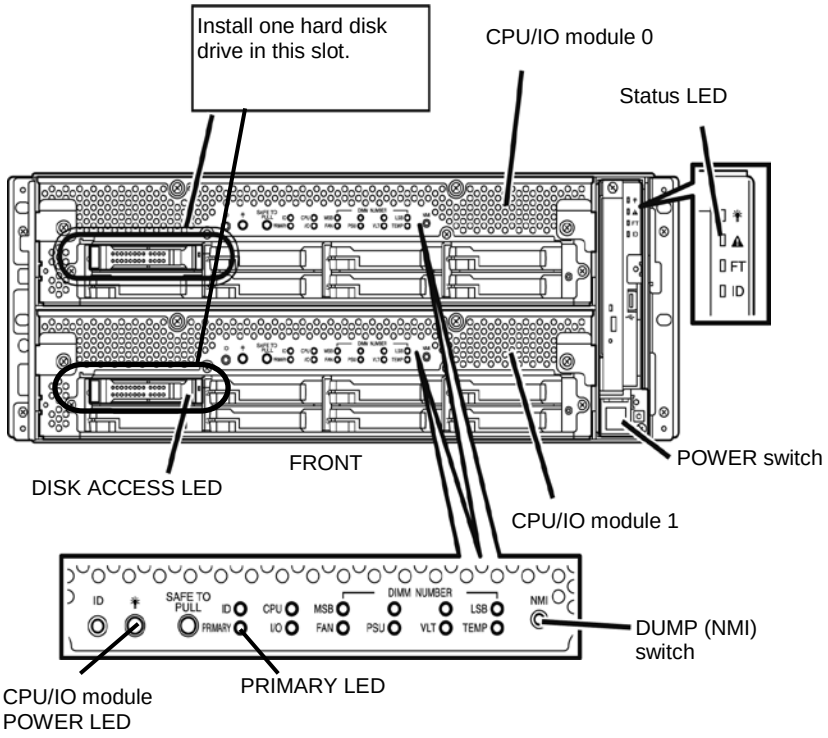
Important

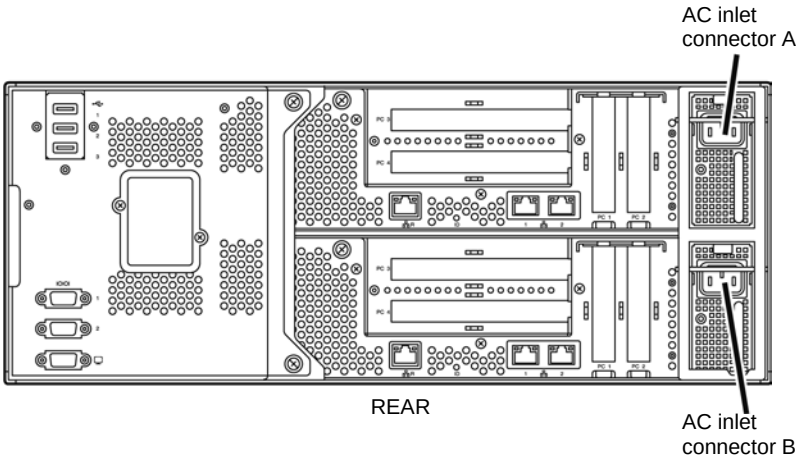
- **Install only one hard disk drive in the slot specified here.**
- **If the hard disk drive is not a new one, physically format it. See *Chapter 3 (3. SAS Configuration Utility)* in *Maintenance Guide* for physical formatting.**

4. Prepare for setup on CPU/IO modules 0 and 1.

The location of components that are required for setup or confirmation is as shown in the figure below.

Install one hard disk drive in CPU/IO module 0 and another one in CPU/IO module 1.
Do not install any hard disk drive in any other slots than specified.





5. Connect power cords to the server in the following order.

(1) Connect a power cord to AC inlet connector A.

(2) Connect a power cord to AC inlet connector B.

(3) Make sure the PRIMARY LED on CPU/IO module 0 is lit.

Note If you disconnect the power cord, wait at least 30 seconds before connect it again.

2.1.2 Disabling OS Boot Monitoring Feature

Before starting setup process, the OS boot monitoring feature needs to be disabled.

Important **Be sure to disable OS boot monitoring feature before setting up the system for successful setup. This function is enabled by shipping default.**

Tips For details of operations for BIOS Setup Utility and parameters for boot monitoring feature, see *Chapter 3 (1. System BIOS)* in *Maintenance Guide*.

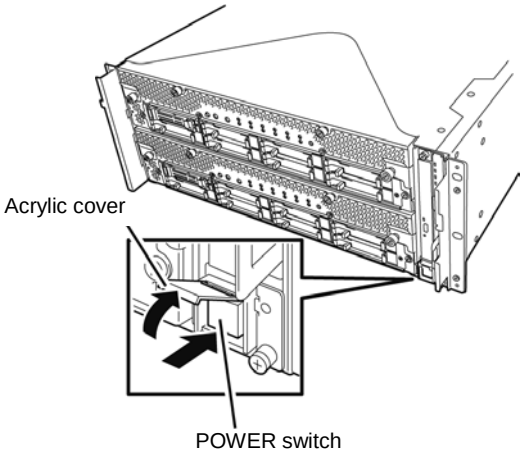
1. Turn on the display and the peripheral equipment connected to the server.

Note If the power cords are connected to a power controller like a UPS, make sure that it is powered on.

2. Remove the front bezel.
3. Press the POWER switch located on the front side of the server.

Lift the acrylic cover, and press the POWER switch.

Important **Do not turn off the power before the "NEC" logo appears.**



After a while, the "NEC" logo will appear on the screen.

Tips While the "NEC" logo is displayed on the screen, the server performs a power-on self test (POST) to check itself. OS starts upon completion of POST.

For details, see *Chapter 3 (1.1 POST Check)* in *User's Guide*.

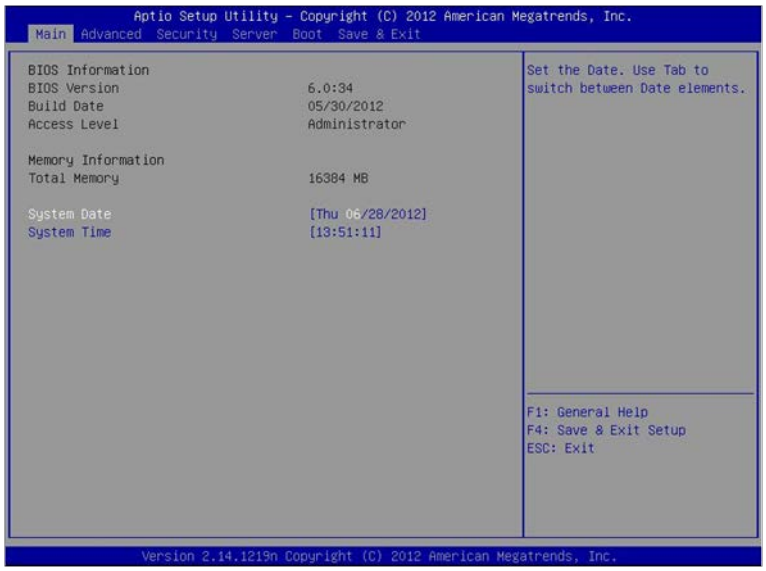
Note If the server finds errors during POST, it will interrupt POST and display the error message. See *Chapter 1 (6.2 POST Error Message)* in *Maintenance Guide*.

4. When POST proceeds, the following message appears at lower left of the screen.

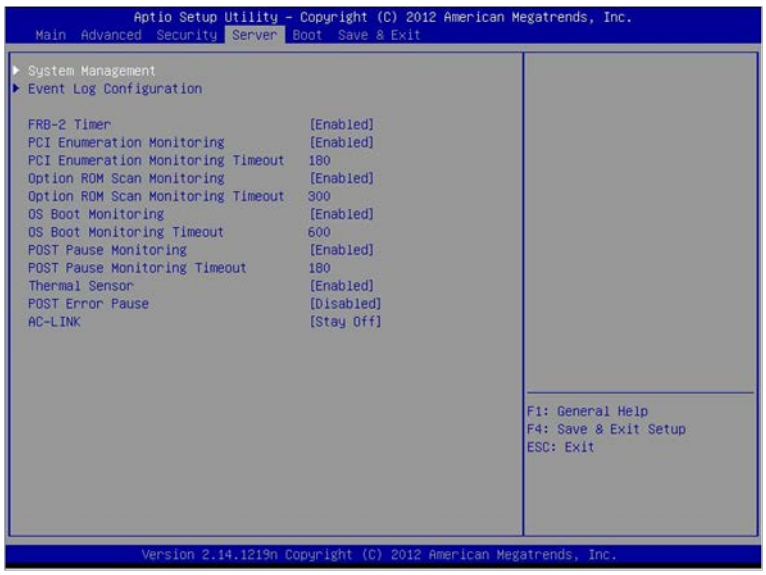
   `Press <F2> SETUP, ...` (The on-screen message depends on your system environment.)

If you press <**F2**>, SETUP will start after POST, and the Main menu appears. (You can also start SETUP by pressing <**F2**> key while expanding option ROM.)

Example:

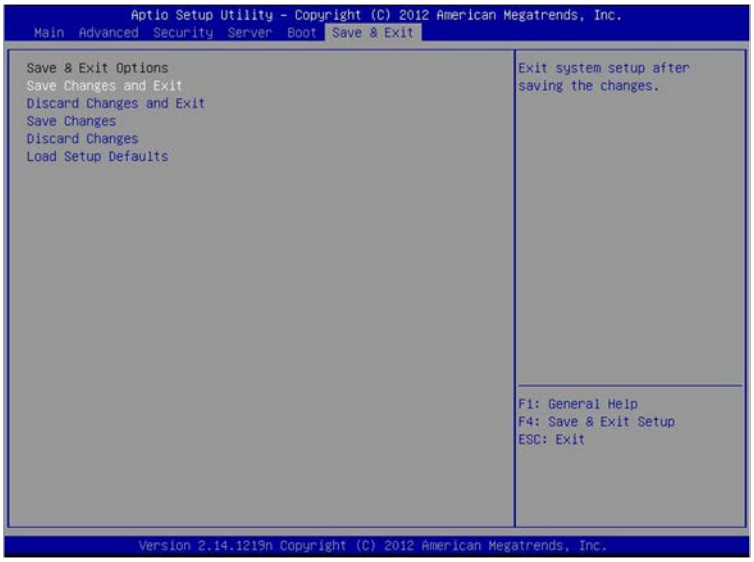


5. When you move the cursor onto **Server**, the **Server** menu appears.



6. Move the cursor onto **OS Boot Monitoring** and press **Enter**.
7. Among the parameters, choose **Disabled** and press **Enter**.

8. Move the cursor onto **Save & Exit**, the **Save & Exit** menu appears.



9. Select **Save changes and Exit**.

On the confirmation window shown below, select **Yes** to save parameters and exit SETUP.

System reboots when SETUP completes.

Save configuration and exit?
[Yes] No

Now **OS Boot Monitoring** feature is disabled.

2.1.3 Preparation for software

Prepare the following items before starting setup with OS standard installer.

(1) Requirements for Setup

- **To be obtained from Red Hat, Inc.**
  - ISO image file of Red Hat Enterprise Linux 6.5 Install DVD

Tips Download the ISO image file of Red Hat Enterprise Linux 6.5 (x86_64) from Red Hat Network (https://rhn.redhat.com/), and create an install media.

  - Update packages

    kernel-2.6.32-431.17.1.el6.x86_64.rpm

    kernel-devel-2.6.32-431.17.1.el6.x86_64.rpm

    kernel-doc-2.6.32-431.17.1.el6.noarch.rpm

    kernel-firmware-2.6.32-431.17.1.el6.noarch.rpm

    openssl-1.0.1e-16.el6_5.14.x86_64.rpm

    openssl-devel-1.0.1e-16.el6_5.14.x86_64.rpm

Important **A serious vulnerability (e.g., leakage of information on secret key) is found on OpenSSL package that is bundled in RHEL6.5. Update the package to openssl-1.0.1e-16.el6_5.14 or later.**

Note Download the package from Red Hat Network (https://rhn.redhat.com/).

If registration number (RHN-ID) is not registered, register it according to Chapter 1 (2.1.3 (2) Registration to Red Hat Network).

When downloading the update package, write down the MD5 checksum described in Red Hat Network.

- Accessories of the server
  - Express5800/R320c-E4, R320c-M4 Installation Guide (Linux) (This manual)
  - ft Server Control Software 9.0.5 for Red Hat Enterprise Linux 6.5 Install CD
- Prepare the following as needed:
  - Environment that allows writing to DVD (for creating install media)
  - A blank DVD (for creating install media)

(2) Registration to Red Hat Network

To use Red Hat Enterprise Linux, you must have RHN-ID (registration number for Red Hat Network). If you do not have RHN-ID or it has expired, the software channel corresponding to subscription is not displayed.

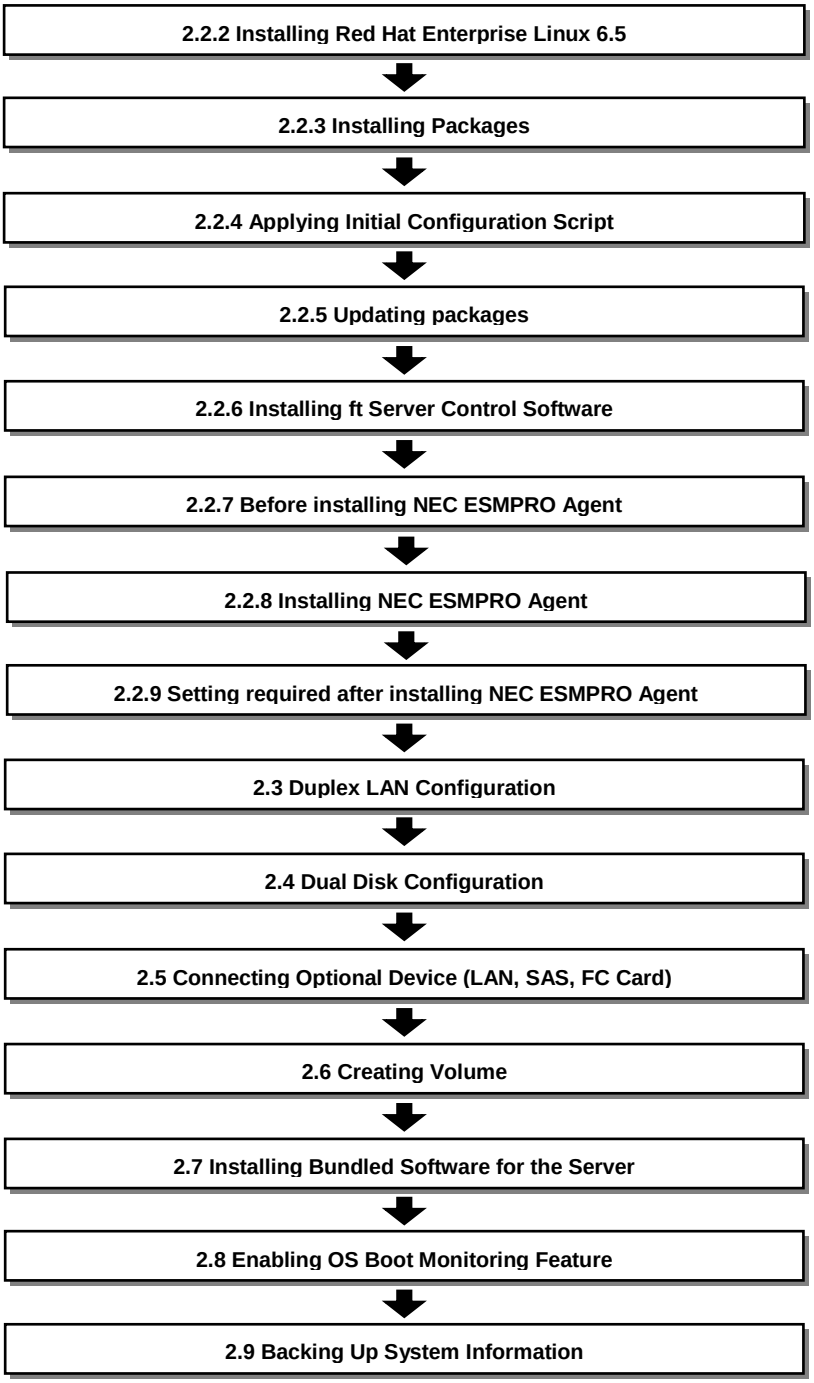
2.2 Setup with OS Standard Installed (Linux Manual Setup)

This section describes how to install an OS using OS standard installer.

Important **It is recommended to make a backup copy of user data as needed.**

2.2.1 Setup flow

Setup according to the flowchart below.



2.2.2 Installing Red Hat Enterprise Linux 6.5

In this server, all the internal hard disk drives must be configured as RAID1 by software. RAID1 is composed of pairs of hard disk drives installed in the same slot number of CPU/IO modules 0 and 1.

Follow the steps below to install Red Hat Enterprise Linux 6.5.

1. Make sure that PRIMARY LED on CPU/IO module 0 is lit according to Chapter 1 (*2.1.1 Preparation for hardware*).
2. Be sure to disable OS Boot Monitoring feature according to *Chapter 1 (2.1.2 Disabling OS Boot Monitoring Feature)*.

Important **OS Boot Monitoring feature is enabled by the shipping default. Setup process will fail if this feature is enabled.**

3. Power on the server.
4. Insert Red Hat Enterprise Linux 6.5 Install Media into the optical disk drive of the server.
5. Reset (i.e. press <Ctrl>+<Alt>+<Delete>) or power off/on to restart the server.
6. Boot menu as shown below appears. Select "Install or upgrade an existing system" and press the <Enter> key.

Tips If no access is made within the certain time of period, installer starts automatically and proceed to the screen to confirm the install media.

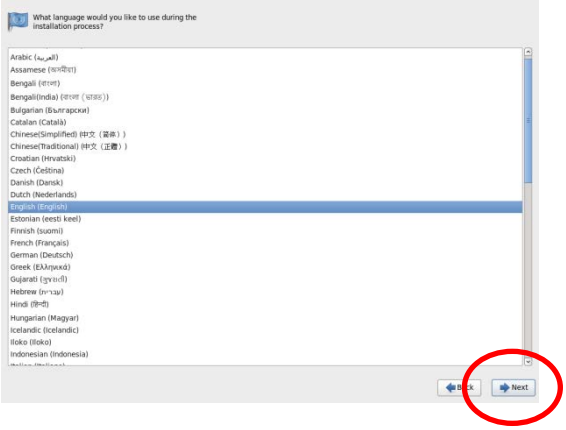
7. The Disc Found screen appears. Click [OK] if you need to check the install media, or [Skip] if not.

Tips

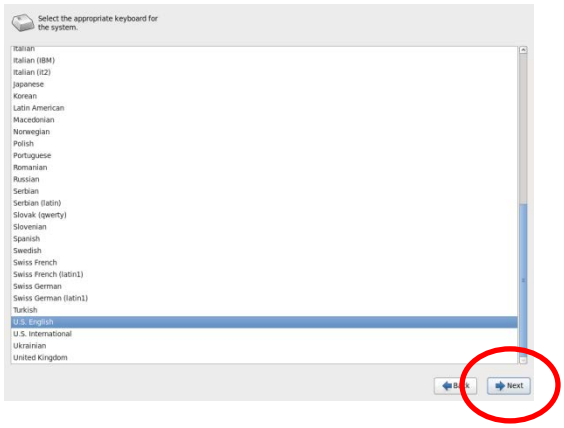
It is recommended to let the media checked to ensure that the install media is health. It takes several minutes to several tens of minutes to check the media.

8. Red Hat Enterprise Linux 6 screen appears. Click [Next].

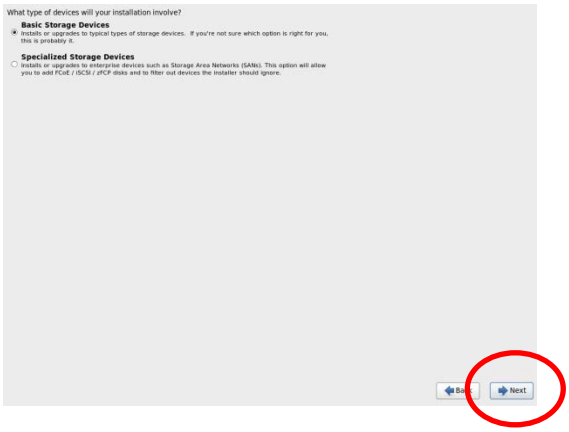
9. Language selection screen appears. Select [English (English)], and click [Next].



10. Keyboard selection screen appears. Select the appropriate keyboard and click [Next].

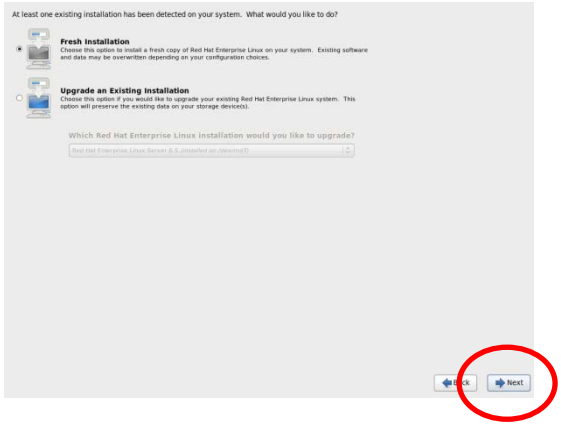


11. The screen to select a storage device for installing an OS. Select [Basic Storage Devices], and click [Next].



Note If the device needs to be re-initialized, a warning message is displayed. Confirm the status of hard disk drive.

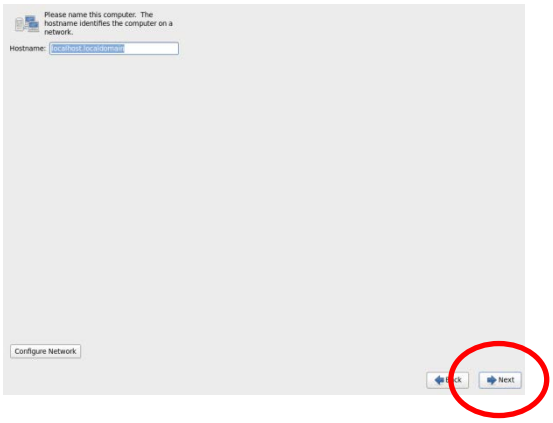
12. The screen to select installation type appears. Select [Fresh Installation], and click [Next].



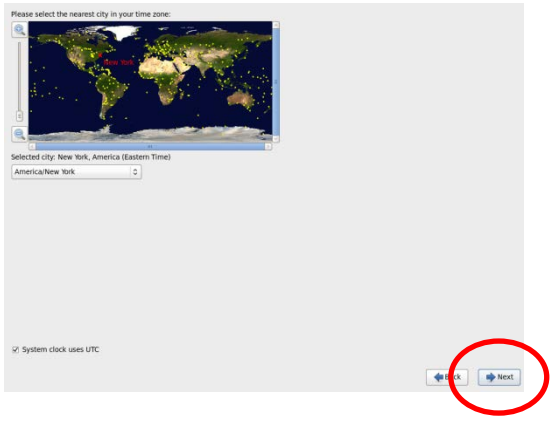
Important **[Upgrade an Existing Installation] is not supported. Be sure to select [Fresh Installation].**

Tips This screen does not appear according to the system configuration.

13. Enter the desired host name, and click [Next].

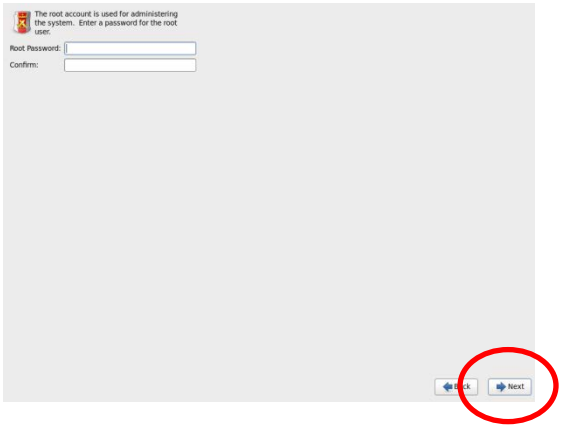


14. The screen to select time zone appears. Select the appropriate time zone and click [Next].

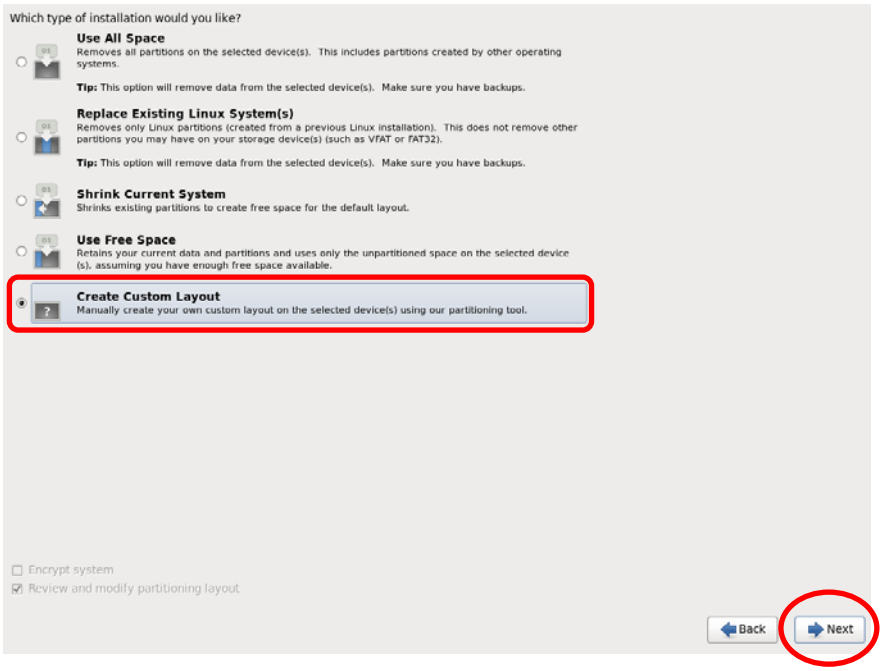


Note Ensure to keep [System clock uses UTC] checked. Do not change this setting even after installation as well. (By default, system clock is set to UTC.)

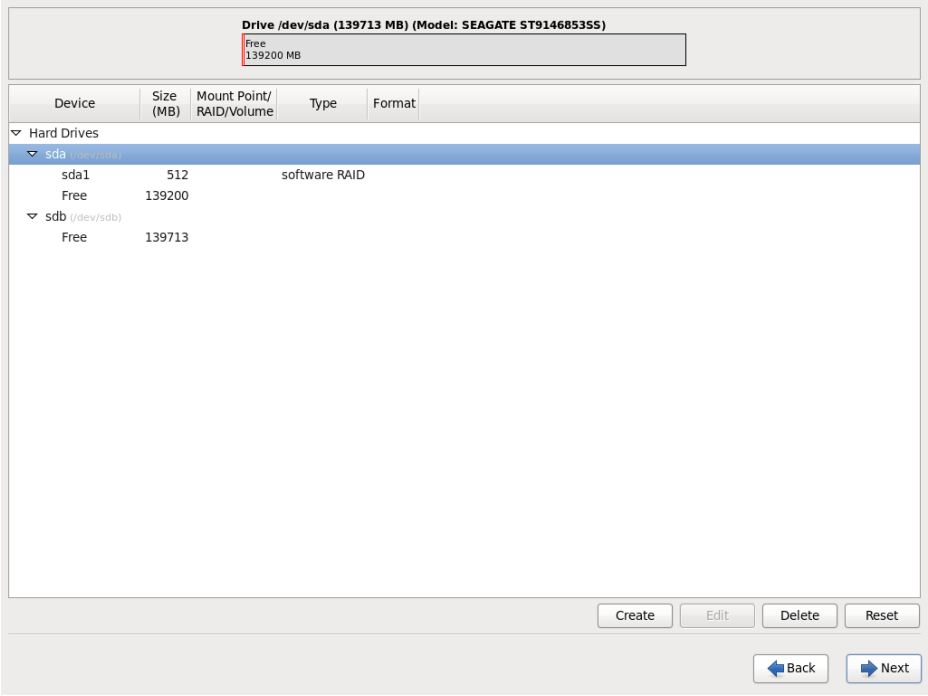
15. The screen to set root password appears. Enter the root password, and click [Next].



16. The screen to select partition layout type. Select [Create Custom Layout], and click [Next].



17. The screen to configure partition is displayed. If any partition information remains, delete all the information. If no partition information exists (new formatted hard disk drive), go to Step 18.

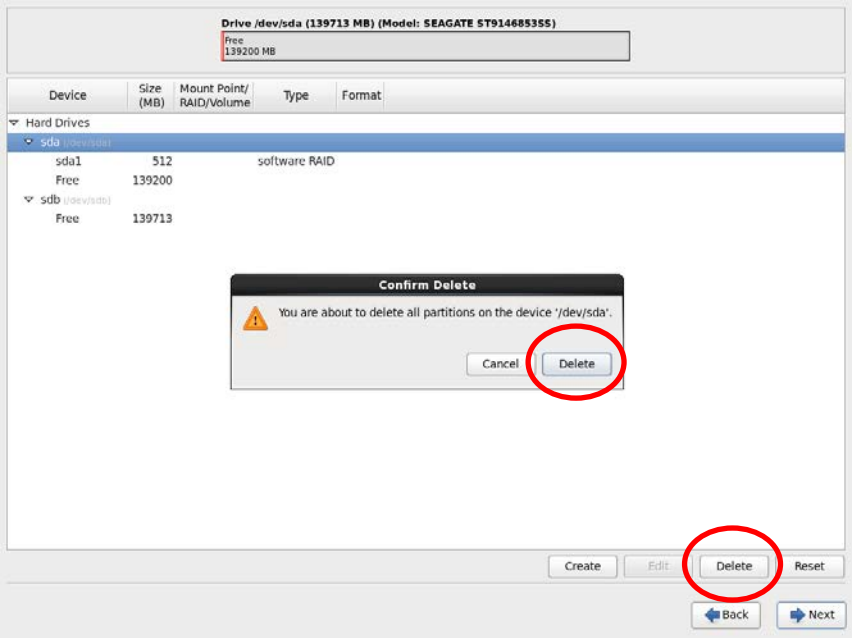


Deleting the partition information

Select the device to delete and click [Delete].

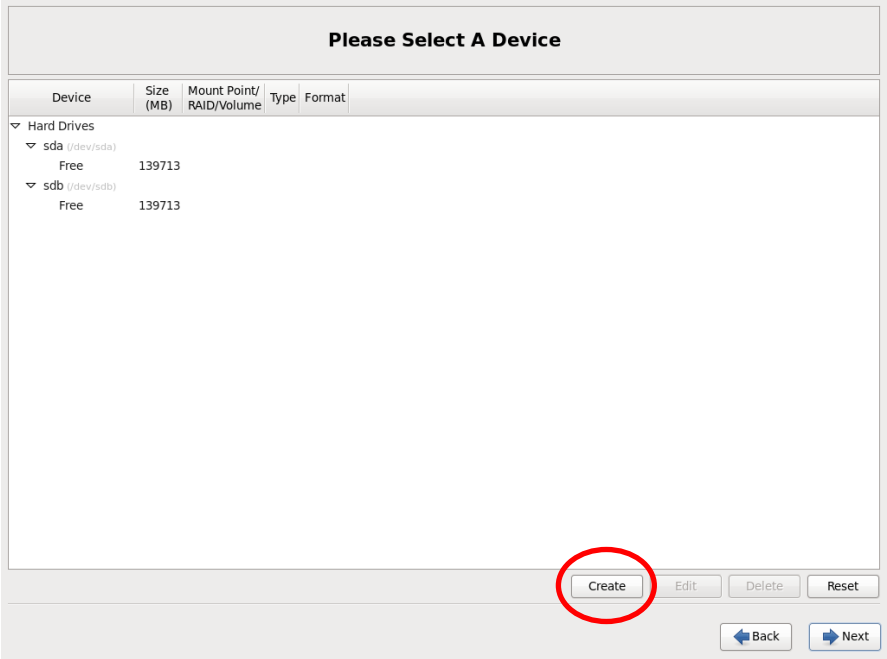
The message appears and prompts to confirm the deletion of the selected device. Click [Delete] to delete.

If there is any remaining partition information on other devices, follow the same step to delete.



18. Create RAID device (md device).

Click [Create].



Note

Device names changes depending on the number of hard disk drives to be mounted. Check the device name of each hard disk drive.

Slot number \ Number of hard disk drives	Device name							
	2	4	6	8	10	12	14	16
CPU module 0 Slot 0	sda	sda	sda	sda	sda	sda	sda	sda
CPU module 0 Slot 1	-	sdb	sdb	sdb	sdb	sdb	sdb	sdb
CPU module 0 Slot 2	-	-	sdc	sdc	sdc	sdc	sdc	sdc
CPU module 0 Slot 3	-	-	-	sdd	sdd	sdd	sdd	sdd
CPU module 0 Slot 4	-	-	-	-	sde	sde	sde	sde
CPU module 0 Slot 5	-	-	-	-	-	sdf	sdf	sdf
CPU module 0 Slot 6	-	-	-	-	-	-	sdg	sdg
CPU module 0 Slot 7	-	-	-	-	-	-	-	sdh
CPU module 1 Slot 0	sdb	sdc	sdd	sde	sdf	sdg	sdh	sdi
CPU module 1 Slot 1	-	sdd	sde	sdf	sdg	sdh	sdi	sdj
CPU module 1 Slot 2	-	-	sdf	sdg	sdh	sdi	sdj	sdk
CPU module 1 Slot 3	-	-	-	sdh	sdi	sdj	sdk	sdl
CPU module 1 Slot 4	-	-	-	-	sdj	sdk	sdl	sdm
CPU module 1 Slot 5	-	-	-	-	-	sdl	sdm	sdn
CPU module 1 Slot 6	-	-	-	-	-	-	sdn	sdo
CPU module 1 Slot 7	-	-	-	-	-	-	-	sdp

Important

- **Available partition layout is as shown below:**

Mount point	File System	Device	Size *1
Pattern 1			
/boot	**ext4**	**md0 (RAID Level=1 Device=sda1,sdb1)**	**512MB *2**
/var/crash	**ext4**	**md1 (RAID Level=1 Device=sda2,sdb2)**	**24GB *3**
swap	**swap**	**md2 (RAID Level=1 Device=sda3,sdb3)**	**2GB or more *4**
/	**ext4**	**md3 (RAID Level=1 Device=sda5,sdb5)**	**16GB**
Free area *5	**—**	**—**	**All rests**
Pattern 2			
/boot	**ext4**	**md0 (RAID Level=1 Device=sda1,sdb1)**	**512MB *2**
/var/crash	**ext4**	**md1 (RAID Level=1 Device=sda2,sdb2)**	**24GB *3**
swap	**swap**	**md2 (RAID Level=1 Device=sda3,sdb3)**	**2GB or more *4**
/	**ext4**	**md3 (RAID Level=1 Device=sda5,sdb5)**	**16GB**
/home	**ext4**	**md4 (RAID Level=1 Device=sda6,sdb6)**	**All rests**
Pattern 3			
/boot	**ext4**	**md0 (RAID Level=1 Device=sda1,sdb1)**	**512MB *2**
/var/crash	**ext4**	**md1 (RAID Level=1 Device=sda2,sdb2)**	**24GB *3**
swap	**swap**	**md2 (RAID Level=1 Device=sda3,sdb3)**	**2GB or more *4**
/	**ext4**	**md3 (RAID Level=1 Device=sda5,sdb5)**	**All rests**

***1 The partition size actually reserved slightly differs from that shown in the table.**

***2 We recommend you to save 300 to 500 MB size partition as described above because the latest kernel security and bug fixed should be additionally installed on the /boot partition when using the system continuously.**

***3 Keep the partition size of 24GB regardless of the amount of memory installed on this server. If its partition size is smaller than the amount of installed memory, the following warning message may be displayed while the system starts. But it is not problem in the system**

Warning: There might not be enough space to save a vmcore.

The size of UUID=<UUID> should be much greater than <file size> kilo bytes.

When the partition size is less than 24GB and the amount of installed memory, the installation of ft Sever Control Software fails.

***4 The swap partition size depends on the amount of installed memory. Calculate swap partition size according to the table below.**

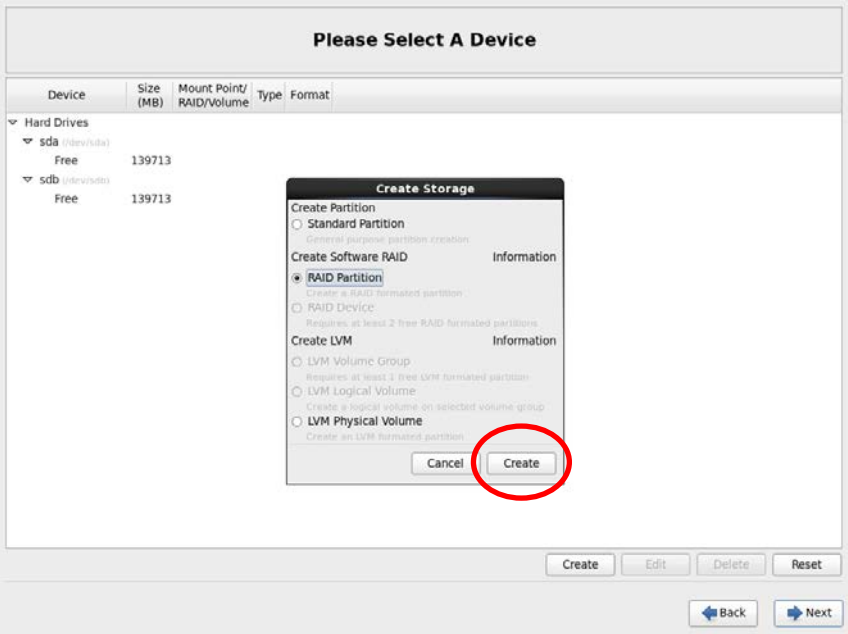
Amount of installed memory	swap partition size
4GB or less	2GB
Larger than 4GB 16GB or less	4GB
Larger than 16GB 64GB or less	8GB
Larger than 64GB 256GB or less	16GB

***5 Free area can be used to create a partition. To add a partition, see the following section:**

- **Chapter 1 (*2.6 Creating Volume*)**

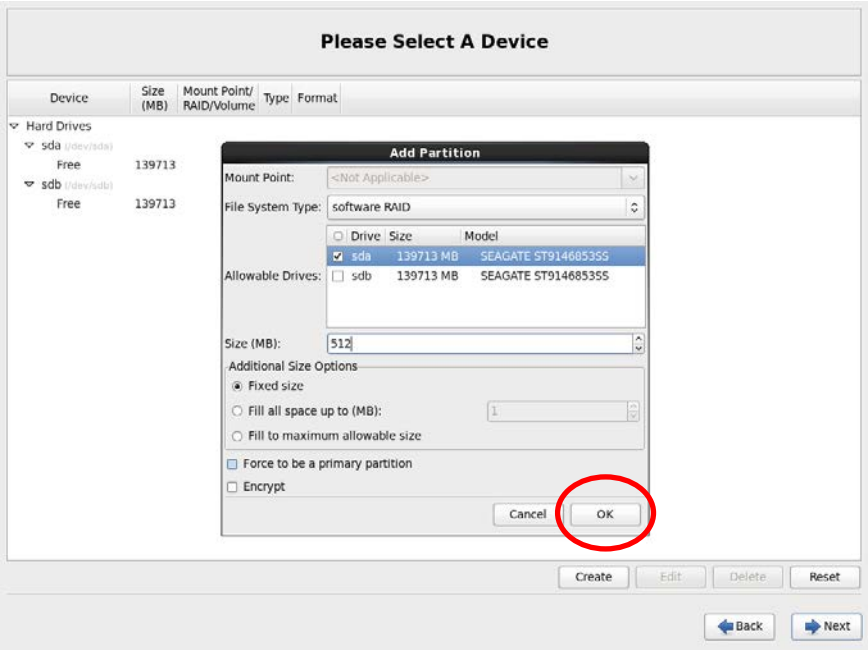
- **The disk pair of software RAID must be configured in combination of corresponding slot numbers. The corresponding slot numbers are as follows. See the above "Note" column for each device name.**
  - **Slot 0 of CPU/IO module 0 and Slot 0 of CPU/IO module 1**
  - **Slot 1 of CPU/IO module 0 and Slot 1 of CPU/IO module 1**
  - **Slot 2 of CPU/IO module 0 and Slot 2 of CPU/IO module 1**
  - **Slot 3 of CPU/IO module 0 and Slot 3 of CPU/IO module 1**
  - **Slot 4 of CPU/IO module 0 and Slot 4 of CPU/IO module 1**
  - **Slot 5 of CPU/IO module 0 and Slot 5 of CPU/IO module 1**
  - **Slot 6 of CPU/IO module 0 and Slot 6 of CPU/IO module 1**
  - **Slot 7 of CPU/IO module 0 and Slot 7 of CPU/IO module 1**
- **Configure all partitions (including a swap partition) with software RAID (LEVEL=1, number of hard disk drives=2, number of spare hard disk drives=0).**
- **Ensure to create /var/crash partition, as ft Server Control Software requires exclusive one for the dump.**
- **Use fdisk or df command to view the partition information or free space of hard disk drive.**
- **Do not place /usr on a separate partition from the rest of the root volume.**
- **LVM feature of hard disk drive including system partition is not supported.**

Select [RAID Partition] and click [Create].



Select one drive available and enter the size of it.

Click [OK] to add a partition.

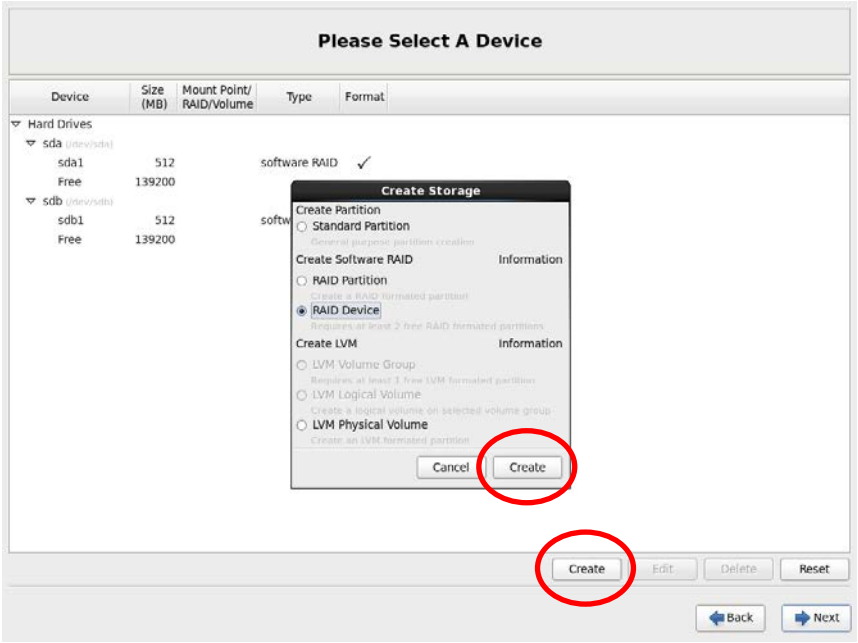


Add a partition for the other drive by following the same steps.

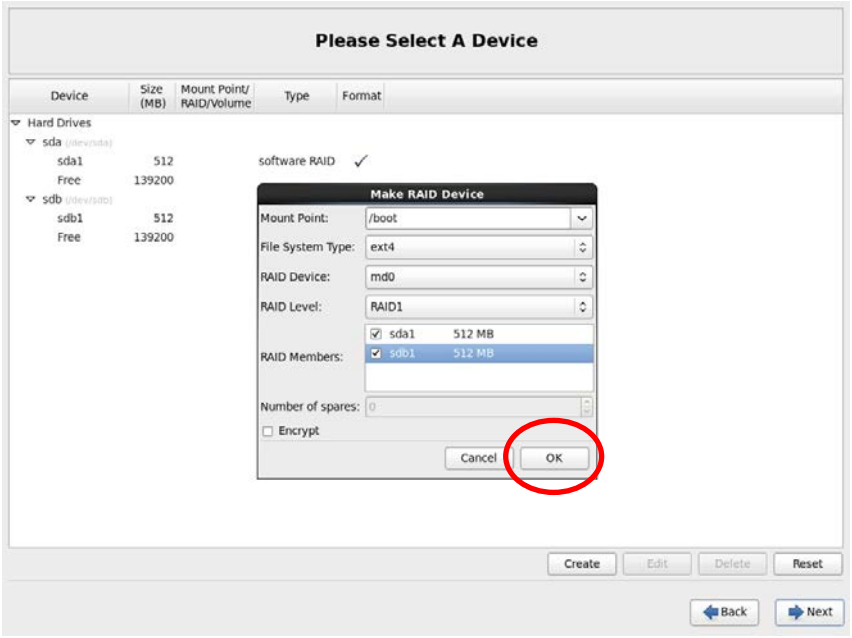
Specify the same size as that of the previously added partition.

Verify that two RAID partitions are now created. Click [Create].

Select [RAID Device] and click [Create].

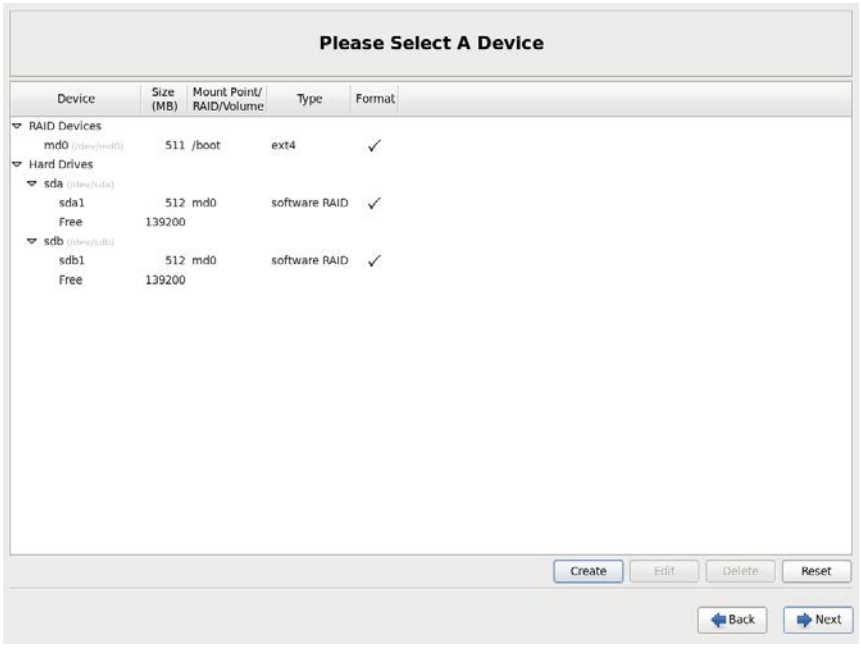


Configure mount point and file system type (select "swap" if it is a swap partition). Set the [RAID Level] as "RAID1". Specify [RAID Members]. Click [OK].



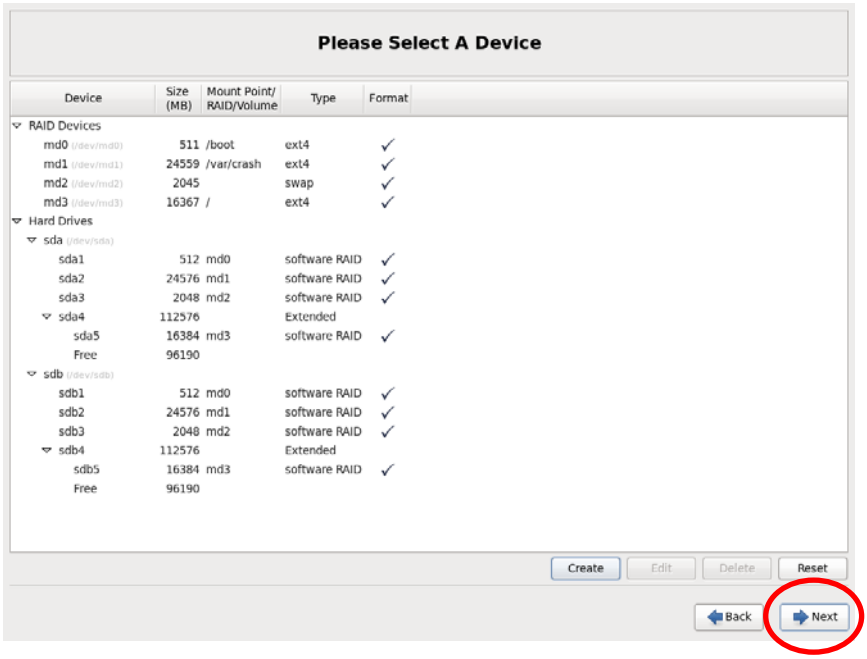
Verify that RAID device is created.

Create the necessary RAID devices with the same steps.

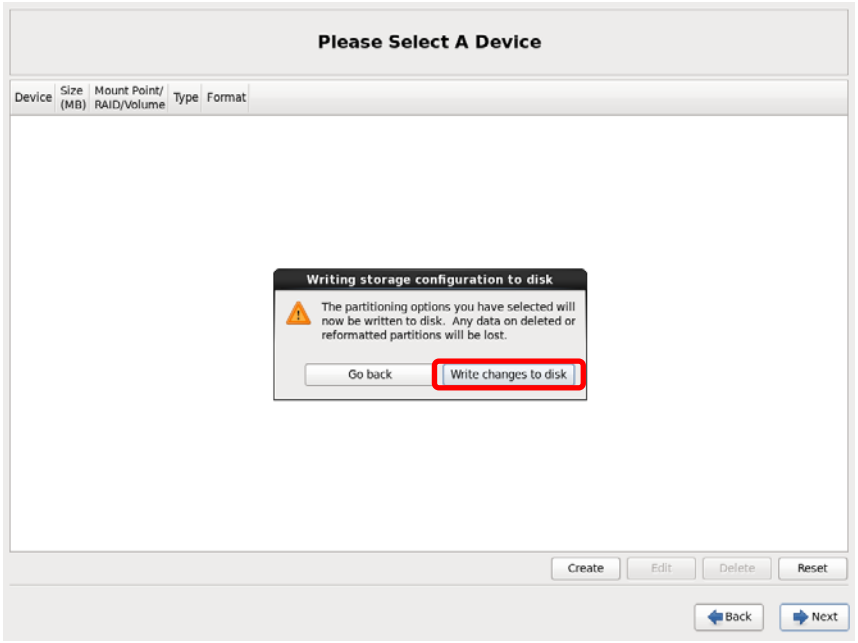


Verify that all necessary partitions are created.

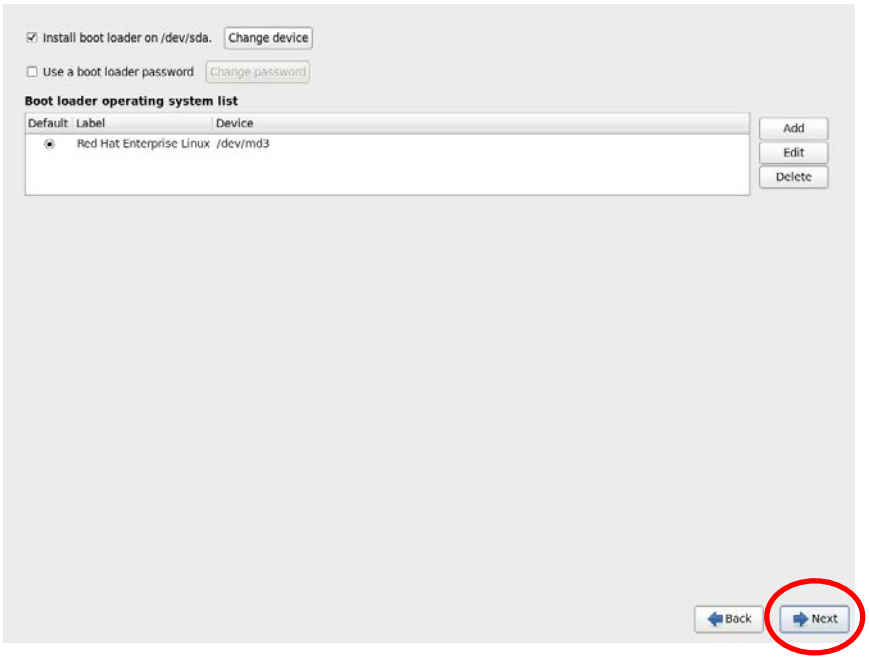
Click [Next] to proceed if there is no problem.



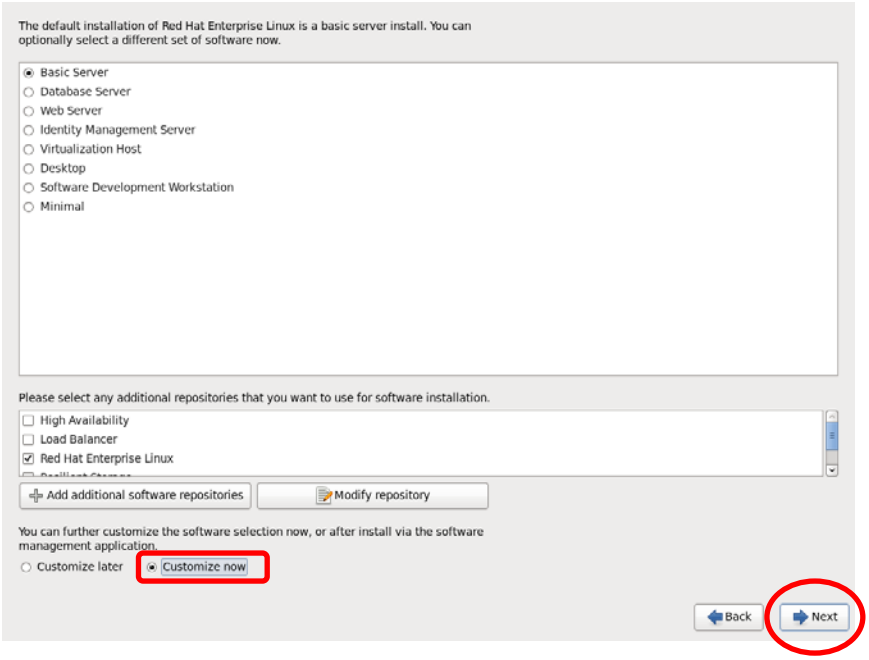
Click [Write changes to disk].



19. The screen to configure boot loader appears. Click [Next].



20. The screen to select package set appears. Select [Customize now], and click [Next] to proceed.



Note

The ft Server Control Software does not support the package set "Virtualization Host".

The following add-ins are not supported.

- High Availability
- Load Balancer
- Resilient Storage
- Scalable Filesystem Support

21. The detailed package group screen appears.

Select a package group marked with ✓ in the table below.

Base System	
Backup Client	
Base	✓※1
Compatibility libraries	✓
Console internet tools	✓
Debugging Tools	✓
Dial-up Networking Support	
Directory Client	✓
FCoE Storage Client	
Hardware monitoring utilities	✓
Infiniband Support	
Java Platform	✓
Large Systems Performance	✓
Legacy UNIX compatibility	✓※2
Mainframe Access	
Network file system client	✓
Networking Tools	✓※3
Performance Tools	✓
Perl Support	✓
Printing client	
Ruby Support	
Scientific support	
Security Tools	
Smart card support	
Storage Availability Tools	✓
iSCSI Storage Client	

∗1 "tboot-"Version Information" - Performs a verified launch using Intel TXT" is not supported.
Click "Optional packages" and select the following package.
"logwatch-"Version Information" - A log file analysis program」

∗2 Click "Optional packages" and select the following package.
"dump-"Version Information" - Programs for backing up and restoring ext2/ext3 filesystems」

∗3 Click "Optional packages" and select the following package.
"wireshark-"Version Information" - Network traffic analyzer」

Servers		
	Backup Server	✓※4
	CIFS file server	✓
	Directory Sever	
	E-mail server	✓※5
	FTP server	✓
	Identity Management Server	
	NFS file server	✓
	Network Infrastructure Server	✓※6
	Network Storage Server	
	Print Server	
	Server Platform	✓
	System administration tools	
Web Services		
	PHP Support	✓
	TurboGears application framework	
	Web Server	✓※7
	Web Servlet Engine	
Databases		
	MySQL Database client	✓
	MySQL Database server	
	PostgreSQL Database client	✓
	PostgreSQL Database server	✓

∗4 Click "Optional packages" and select the following package.
"mt-st-"Version Information" - Tool for controlling tape drives」

∗5 Click "Optional packages" and select the following package.
"sendmail-"Version Information" - A widely used Mail Transport Agent (MTA)」
"sendmail-cf-"Version Information" - The files needed to reconfigure Sendmail」

∗6 Click "Optional packages" and select the following package.
"bind-"Version Information" - The Berkeley Internet Name Domain (BIND) DNS (Domain Name System)server」
"bind-chroot-"Version Information" - A chroot runtime environment for the ISC BIND DNS server, named(8)」
"dhcp-"Version Information" - Dynamic host configuration protocol software」

∗7 Click "Optional packages" and select the following package.
「squid-"Version Information" - The Squid proxy caching server」

System Management		
	Messaging Client Support	
	SNMP Support	✓
	System Management	
	Web-Based Enterprise Management	
Virtualization		
	Virtualization	
	Virtualization Client	
	Virtualization Platform	
	Virtualization Tools	
Desktops		
	Desktop	✓※8
	Desktop Debugging and Performance Tools	
	Desktop Platform	✓
	Fonts	
	General Purpose Desktop	✓
	Graphical Administration Tools	✓
	Input Methods	
	KDE Desktop	
	Legacy X Window System compatibility	✓
	Remote Desktop Clients	
	X Window System	✓※9

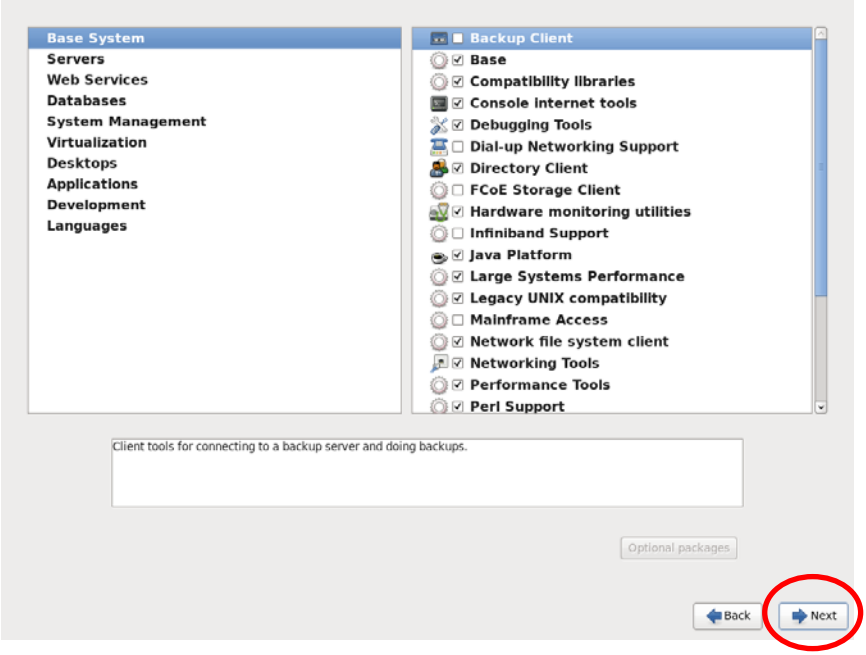
*8 Applying initial configuration script deletes this package even if subscription-manager-gui package is installed.

*9 Applying initial configuration script deletes this package even if subscription-manager-firstboot package is installed.

Tips To use graphical login mode, select package group of "X Window System" and "Desktop".

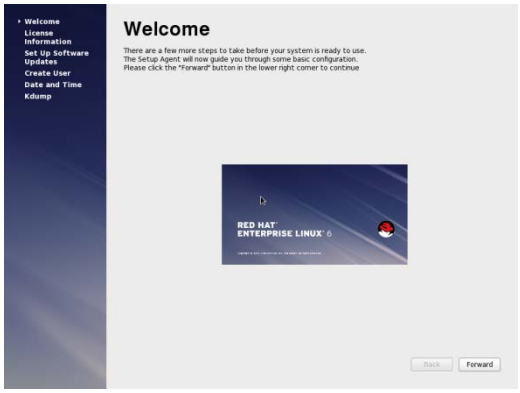
Applications		
	Emacs	
	Graphics Creation Tools	
	Internet Browser	✓
	TeX support	
	Technical Writing	✓
Development		
	Additional Development	✓
	Desktop Platform Development	✓
	Development tools	✓
	Eclipse	
	Server Platform Development	✓

22. Select the necessary package groups and packages, and click [Next]. Installation of the selected packages starts.



23. When the following screen appears, remove the install media, and click [Reboot]. The system restarts.

24. If the package group of "X Window System" and "Desktop" is selected and installed, the Setup Agent starts at the first time. Configure appropriately according to on-screen instructions.



Note

Kdump is automatically configured in the procedure described later. Click [Forward] with default setting.

Do not change settings of kdump.

2.2.3 Installing Packages

Tips

In this section, description is based on the assumption that the optical disk drive has been mounted automatically. If the optical disk drive is not mounted automatically depending on your environment, mount it on the desired location manually. If the mount destination differs, substitute it for the actual destination appropriately.

Take the steps below to install packages in ft Server Control Software and NEC ESMPRO Agent.

1. Login the system with root user. If you login with graphical mode, select [Others...] to login.
2. Set the ft Server Control Software Install CD to optical disk drive. After a while, the drive will be automatically mounted.
3. Run the following command to copy files.

```
# /bin/cp -f /media/FT905380/ftsys/RHEL6.5/pkginst.sh /tmp
```

4. Run the following command to unmount the media.

```
# umount /dev/cdrom
```

5. Remove the ft Server Control Software Install CD from optical disk drive, and insert the install media of Red Hat Enterprise Linux 6.5. After a while, the media is automatically mounted.
6. Run the following command to install the package.

```
# /tmp/pkginst.sh
```

7. When installation completes, the following message is displayed.

```
The install has completed.
```

8. Run the following command to unmount the media.

```
# umount /dev/cdrom
```

9. Remove the install media of Red Hat Enterprise Linux 6.5 from optical disk drive.

2.2.4 Applying Initial Configuration Script

Tips

In this section, description is based on the assumption that the optical disk drive has been mounted automatically. If the optical disk drive is not mounted automatically depending on your environment, mount it on the desired location manually. If the mount destination differs, substitute it for the actual destination appropriately.

Initial Configuration Script provides various settings for stable operation of the system. Be sure to apply the initial configuration script according to the steps below.

See Chapter 1 (2.12.1 Processing detail of initial configuration script) for details of initial configuration script.

1. Set the ft Server Control Software Install CD to optical disk drive. After a while, the drive will be automatically mounted.
2. Run the following command to apply initial configuration script.

```
# /media/FT905380/ftsys/RHEL6.5/nec_setup.sh
```

3. The following message appears when the configuration is applied. The system needs to be rebooted, however, proceed to the next step.

```
Update done.

Finished successfully.
Please reboot your system.
```

4. Run the following command to unmount the media.

```
# umount /dev/cdrom
```

5. Remove the ft Server Control Software Install CD from optical disk drive.

2.2.5 Updating packages

Follow the steps below to update packages.

1. Store the package you have downloaded from Red Hat Network in the desired directory, and go to that directory.
2. Make sure that package files are properly downloaded.

Compare the MD5 checksum described in Red Hat Network with the output result of command shown below. If they match, files are successfully downloaded.

```
# md5sum kernel-2.6.32-431.17.1.el6.x86_64.rpm
# md5sum kernel-devel-2.6.32-431.17.1.el6.x86_64.rpm
# md5sum kernel-doc-2.6.32-431.17.1.el6.noarch.rpm
# md5sum kernel-firmware-2.6.32-431.17.1.el6.noarch.rpm
# md5sum openssl-1.0.1e-16.el6_5.14.x86_64.rpm
# md5sum openssl-devel-1.0.1e-16.el6_5.14.x86_64.rpm
```

3. Run the following command to update packages.

```
# rpm -Uvh kernel-firmware-2.6.32-431.17.1.el6.noarch.rpm
# rpm -Uvh kernel-2.6.32-431.17.1.el6.x86_64.rpm
# rpm -Uvh kernel-doc-2.6.32-431.17.1.el6.noarch.rpm
# rpm -Uvh kernel-devel-2.6.32-431.17.1.el6.x86_64.rpm
# rpm -Uvh openssl-*
```

4. Run the following command to reboot the system.

```
# reboot
```

2.2.6 Installing ft Server Control Software

Tips

In this section, description is based on the assumption that the optical disk drive has been mounted automatically. If the optical disk drive is not mounted automatically depending on your environment, mount it on the desired location manually. If the mount destination differs, substitute it for the actual destination appropriately.

Follow the steps below to install ft Server Control Software.

1. Login the system with root user. If you login with graphical mode, select [Others...] to login.
2. Set the ft Server Control Software Install CD to optical disk drive. After a while, the drive will be automatically mounted.
3. Enter the following command to confirm whether all the RAID devices are synchronized. (If they are in the middle of resync process, wait until the process completes before you move on to the next step.)

```
# cat /proc/mdstat
```

4. Run the following command to install ft Server Control Software.

```
# /media/FT905380/ftsys/RHEL6.5/install.sh
```

5. The following message appears when installation completes.

```
Enter YES to reboot now or NO to allow a manual reboot later: [YES]
```

6. Press the <Enter> key to reboot the system.

Tips

After ft Server Control Software has been installed, the system starts with text login mode (run level 3).

The indication on screen may be corrupted when the system is shutdown or rebooted. However, end processing is normally terminated.

2.2.7 Before installing NEC ESMPRO Agent

Take the steps below before starting installation of NEC ESMPRO Agent.

1. Login the system with root user.
2. When monitoring the server using NEC ESMPRO Agent from NEC ESMPRO Manager, use SNMP. To perform remote shutdown, local polling, and to change threshold from NEC ESMPRO Manager, modify the SNMP environment file (/etc/snmp/snmpd.conf) to set a community privilege to "read write" for ESMPRO MIB, and restart snmpd. If these features are not used, the community privilege can be "read".

When NEC ESMPRO Agent is installed by using rpm command, it adds the following information to snmpd. conf to cope with SNMP request from ESMPRO MIB and Ethernet Like MIB.

```
dlmod ntpass /opt/nec/esmpro_sa/lib/ntpass.so
ntpass .1.3.6.1.4.1.119.2.2.4.4              (ESMPRO MIB)
ntpass .1.3.6.1.2.1.10.7                     (Ethernet Like MIB)
```

In the following example, "read write" privilege is given to every MIB(.1) in default community (public).

```
####
# First, map the community name "public" into a "security name"

#       sec.name  source          community
com2sec notConfigUser  default       public

####
# Second, map the security name into a group name:

#       groupName      securityModel securityName
group   notConfigGroup v1           notConfigUser
group   notConfigGroup v2c           notConfigUser

####
# Third, create a view for us to let the group have rights to:
#       name           incl/excl     subtree         mask(optional)
#view    systemview    included   .1.3.6.1.2.1.1
#view    systemview    included   .1.3.6.1.2.1.25.1.1
view    all           included      .1               80

####
# Finally, grant the group read-only access to the systemview view.
#       group          context sec.model sec.level prefix read   write  notif
#access  notConfigGroup ""      any       noauth    exact  systemview none none
 access  notConfigGroup ""      any       noauth    exact  all    all    none
```

For detailed information, refer to help of snmpd.conf.

Use man command to open snmpd.conf file.

```
# man snmpd.conf
```

3. Confirm the setting of run level 3, 5 in snmpd.

```
# /sbin/chkconfig --list snmpd
snmpd           0:off   1:off   2:off   3:off   4:off   5:off   6:off
```

on: No need to change setting of snmpd.

off: Change setting of snmpd, and restart snmpd.

```
# /sbin/chkconfig --level 35 snmpd on
# service snmpd start
```

4. Confirm the setting of run level 3, 5 in rpcbind.

```
# /sbin/chkconfig --list rpcbind
rpcbind         0:off   1:off   2:off   3:off   4:off   5:off   6:off
```

on: No need to change setting of rpcbind.

off: Change setting of snmpd, and restart rpcbind.

```
# /sbin/chkconfig --level 35 rpcbind on
# service rpcbind start
```

2.2.8 Installing NEC ESMPRO Agent

Tips

In this section, description is based on the assumption that the mount source of optical disk drive is "/dev/scd0", and destination is "/media". If the mount destination differs, substitute it for the actual destination appropriately. If the optical disk drive is automatically mounted, you need not mount it.

Follow the steps below to install NEC ESMPRO Agent.

1. Login the system with root user.
2. Insert the ft Server Control Software Install CD into optical disk drive of the server, and mount it by running the following command.

```
# mount -r -t iso9660 /dev/scd0 /media
```

3. Move to the directory where NEC ESMPRO Agent is stored, and execute install script.

```
# cd /media/esmpro_sa/
# rpm -ivh Esmpro-*
```

4. Remove the ft Server Control Software Install CD from optical disk drive of the server.

```
# cd / ; eject /media
```

If eject command fails to eject CD, unmount it, and remove the ft Server Control Software Install CD from optical disk drive manually.

5. Restart the system.

```
# reboot
```

2.2.9 Setting required after installing NEC ESMPRO Agent

NEC ESMPRO Manager uses the following network port when it monitors the server where NEC ESMPRO Agent is installed.

When configuring access control on your server, allow these ports as accessible.

As for "Auto-assign" in the table, OS assigns available port within the certain range. Accordingly, these ports cannot be fixed. The available range is described in the following file.

```
# cat /proc/sys/net/ipv4/ip_local_port_range
```

Between NEC ESMPRO Agent and NEC ESMPRO Manager

Features	NEC ESMPRO Agent	Direction	NEC ESMPRO Manager	Remarks
Automatic registration (SNMP) Server monitoring (SNMP)	161/udp	← →	161/udp	snmp
Report to Manager (SNMP)	Auto-assign	→	162/udp	snmp-trap
Report to Manager (TCP/IP in Band, TCP/IP Out-of-Band)	Auto-assign	→ ←	31134/tcp	

* If left and right arrows are shown in Direction column, an upper arrow shows the direction at start-up, and the lower shows the return.
* Port numbers not used by SNMP can be changed on alert setting screen.
* Shown below is an example of ports opened on firewall. Setting must be saved finally.

```
# iptables -I INPUT  -p udp --dport 161 -s <IP address of NEC ESMPRO Manager> -j ACCEPT
# iptables -I OUTPUT -p udp --dport 161 -j ACCEPT
# iptables -I OUTPUT -p udp --dport 162 -j ACCEPT
# iptables -I OUTPUT -p tcp --dport 31134 -j ACCEPT

# service iptables save
```

NEC ESMPRO Agent uses the following internal ports. When configuring access control on your server using iptables or TCP Wrapper, allow these ports as accessible.

Between NEC ESMPRO Agent and another NEC ESMPRO Agent

Feature	Port number
rpcbind	111/tcp
	111/udp
NEC ESMPRO Agent	Auto-assign

2.3 Duplex LAN Configuration

The server builds duplex LAN configuration by using onboard and additional LAN adapters.

2.3.1 Network Configuration

This server needs to be run with duplex LAN configuration.

For duplicating LAN, the mode for bonding is used.

The default setting of bonding is active-backup(mode=1).

LAN duplication is achieved by pairing network interfaces of PCI slots in CPU/IO module 0 and network interfaces in the same PCI slots in CPU/IO module 1.

The network interface names are based on the naming convention as described in the table below.

PCI slot and network interface name

PCI slot	Port	CPU/IO module 0	CPU/IO module 1
1G LAN connector	#1	eth100600 (1)	eth110600 (1)
	#2	eth100601 (2)	eth110601 (2)
10G LAN connector *	#1	eth101200 (3)	eth111200 (3)
	#2	eth101201 (4)	eth111201 (4)
PCI slot 1	#1	eth100100 (5)	eth110100 (5)
	#2	eth100101 (6)	eth110101 (6)
PCI slot 2	#1	eth100200 (7)	eth110200 (7)
	#2	eth100201 (8)	eth110201 (8)
PCI slot 3 *	#1	eth100300 (9)	eth110300 (9)
	#2	eth100301 (10)	eth110301 (10)
PCI slot 4 *	#1	eth100400 (11)	eth110400 (11)
	#2	eth100401 (12)	eth110401 (12)

* R320c-E4 model does not have 10G LAN connector, PCI slot 3, and PCI slot 4.

Tips

The number enclosed with brackets in the CPU/IO module column is slot numbers allocated by vndctl command described later. The slot numbers are allocated one-to-one to each interface pair.

2.3.2 Setting Duplex LAN Configuration

Use vndctl command to configure duplex LAN.

Following is an example when configuring the network as shown in <Configuration detail>. For 1G LAN connector, since the dual network is achieved with eth100600 and eth110600 combined as bond0, and eth100601 and eth110601 as bond1 at this point, perform only network configuration (step 2 and after).

<Configuration detail>

Slot number: 5

Network interface name (CPU/IO module 0): eth100100

Network interface name (CPU/IO module 1): eth110100

IP address: 192.168.0.101

Subnet mask: 255.255.255.0

Default gateway: 192.168.0.1

Important

- **You must perform this operation as a root user.**
- **If you implement configurations on IP address, subnet mask or default gateway on the bonding interface, you must use the vndctl command. For other network configuration items, manually configure them by referring to such an online manual page of the man command.**
- **Stop the running interface with the following command before the setup, then go to Step 2.**

  # vndctl down <slot number>

1. Run the following command to construct the network interfaces (eth100100 and eth110100) installed in slot 5 as the bonding interface.

```
# vndctl add 5
```

2. Run the following command to configure the network settings (the parts with * are to be specified by a user) on the bonding interface that has been constructed. For default gateway, you can omit the process by pressing the <ENTER> key without specifying anything.

```
# vndctl config 5
[Virtual Network Setting]
*Boot Protocol? [none/dhcp/bootp] none
*IP address? 192.168.0.101
*Netmask? 255.255.255.0
*Default gateway (IP)? 192.168.0.1

*Are you sure to set it? [y/n] y

DEVICE=bond2
ONBOOT=yes
BOOTPROTO=none
IPADDR=192.168.0.101
NETMASK=255.255.255.0
GATEWAY=192.168.0.1
BONDING_OPTS="miimon=100 mode=1"
```

3. Run the following command to activate the bonding interface that has been constructed.

```
# vndctl up 5
```

4. Run the following command to check if bond2 is configured in slot 5 and the statuses of network interface eth100100 and eth110100 are shown as "DUPLEX".

```
# vndctl status

--Virtual Network Status--
BondingDevice Slot Status  InetAddress     RXErrors TXErrors Collisions
bond0         1    ONLINE  -               0        0        0
bond1         2    ONLINE  -               0        0        0
bond2         5    ONLINE  192.168.0.101   0        0        0
bond3              OFFLINE -               0        0        0
bond4              OFFLINE -               0        0        0
bond5              OFFLINE -               0        0        0
bond6              OFFLINE -               0        0        0
bond7              OFFLINE -               0        0        0
bond8              OFFLINE -               0        0        0
bond9              OFFLINE -               0        0        0
bond10             OFFLINE -               0        0        0
bond11             OFFLINE -               0        0        0

Slot        RealDevice Status           Interface LinkState LinkSpeed
1    top    eth100600  DUPLEX           UP        LINK      1000Mb/s-FD
     bottom eth110600  DUPLEX           UP        LINK      1000Mb/s-FD
2    top    eth100601  DUPLEX           UP        LINK      1000Mb/s-FD
     bottom eth110601  DUPLEX           UP        LINK      1000Mb/s-FD
5    top    eth100100  DUPLEX           UP        LINK      1000Mb/s-FD
     bottom eth110100  DUPLEX           UP        LINK      1000Mb/s-FD
```

<Example of items>

[Bonding interface]

BondingDevice — Name of bonding interface

Slot — Slot number

Status — Status of bonding interface

Status	Description
ONLINE	Online
OFFLINE	Offline
BROKEN	Failure on both interfaces, or disconnected

InetAddress — IP address

RXErrors — Number of received error packets

TXErrors — Number of sent error packets

Collisions — Number of packet collisions

[Network interface]

Slot — Slot number

RealDevice — Network interface name

Status — Status of network interface

Status	Description
DUPLEX	Both interfaces are active
SIMPLEX	Only one interface is active
BROKEN	Failure or disconnected

Interface — Startup status of interface (UP/DOWN)

LinkState — Connection status of LAN cable (LINK/NOLINK)

LinkSpeed — LAN transfer speed [Mb/s-FD]

Now the duplication of LAN is successfully completed.

2.4 Dual Disk Configuration

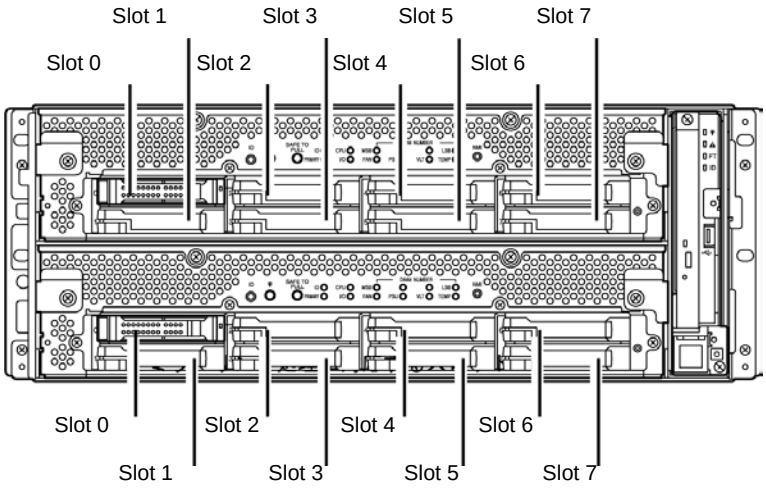
You can skip this section if hard disk drives in your system have been duplicated. Go to Chapter 1 (2.5 Connecting Optional Device (LAN, SAS, FC Card).

Important

- **You must perform this operation as a root user.**
- **If you add hard disk drives, be sure to configure redundancy on them according to the steps described below.**

2.4.1 Disk configuration

RAID1 must be configured for all the internal hard disk drives in this server. This server is composed of RAID1 by software. RAID1 is configured with the hard disk drives installed in the same slot number of CPU/IO modules 0 and 1, as shown in the figure below.



Corresponding slot
CPU/IO module 0 Slot 0 ←→ CPU/IO module 1 Slot 0
CPU/IO module 0 Slot 1 ←→ CPU/IO module 1 Slot 1
CPU/IO module 0 Slot 2 ←→ CPU/IO module 1 Slot 2
CPU/IO module 0 Slot 3 ←→ CPU/IO module 1 Slot 3
CPU/IO module 0 Slot 4 ←→ CPU/IO module 1 Slot 4
CPU/IO module 0 Slot 5 ←→ CPU/IO module 1 Slot 5
CPU/IO module 0 Slot 6 ←→ CPU/IO module 1 Slot 6
CPU/IO module 0 Slot 7 ←→ CPU/IO module 1 Slot 7

The actual operation (e.g. mounting a disk) for partition is performed to the RAID device (md) which is configured by software RAID.

Use [2 List Internal Disks] of ftdiskadm command to confirm hard disk drive information.

```
# ftdiskadm

Command action
   1  List RAID Arrays
   2  List Internal Disks
   3  Make Mirroring Arrays   (RAID1)
   4  Repair Mirroring Arrays (RAID1)
   5  Delete Mirroring Arrays (RAID1)
   6  Remove Disk Partitions  (RAID1)
   7  Make Striping Array     (RAID1+0)
   8  Delete Striping Array   (RAID1+0)
   c  Configurations
   q  Quit

Command: 2

[List Internal Disks]

Slot  Name [use]        Information (Vendor/Model/Serial)      path
============================================================================
   1  sda(sdq) [3]      AAA/BBB/#CCC                           h0c0t0l0
   2  -
   3  -
   4  -
   5  -
   6  -
   7  -
   8  -
   9  sdi(sdr) [3]      AAA/BBB/#DDD                           h1c0t0l0
   10  -
   11  -
   12  -
   13  -
   14  -
   15  -
   16  -
```

<Example of items>

Slot	Slot number used in ftdiskadm command (*1)
Name	Device name (kernel device name) "-" is displayed for hard disk drive that is not recognized by kernel.
use	Current mount count
Information	Vendor name / model / serial number
path	SCSI path Displayed as h<HOST number>c<CHANNEL number>t<TARGET number>l<LUN>.

*1 In ftdiskadm command, slot numbers of the hard disk drive are allocated as shown below.

Physical slot number	Slot number used in ftdiskadm command
Slot 0 (CPU/IO module 0)	Slot 1
Slot 1 (CPU/IO module 0)	Slot 2
Slot 2 (CPU/IO module 0)	Slot 3
Slot 3 (CPU/IO module 0)	Slot 4
Slot 4 (CPU/IO module 0)	Slot 5
Slot 5 (CPU/IO module 0)	Slot 6
Slot 6 (CPU/IO module 0)	Slot 7
Slot 7 (CPU/IO module 0)	Slot 8
Slot 0 (CPU/IO module 1)	Slot 9
Slot 1 (CPU/IO module 1)	Slot 10
Slot 2 (CPU/IO module 1)	Slot 11
Slot 3 (CPU/IO module 1)	Slot 12
Slot 4 (CPU/IO module 1)	Slot 13
Slot 5 (CPU/IO module 1)	Slot 14
Slot 6 (CPU/IO module 1)	Slot 15
Slot 7 (CPU/IO module 1)	Slot 16

2.4.2 Duplicating hard disk drives

Use ftdiskadm command to duplicate hard disk drives.

The following is a configuration example of duplication of hard disk drives installed in Slot 2 (Slot 1 of CPU/IO module 0) and Slot 10 (Slot 1 of CPU/IO module 1).

1. Select [3 Make Mirroring Arrays (RAID1)] on ftdiskadm to create an arbitrary partitions in hard disk drive specified by the Slot number. The created partition is copied to its corresponding pair disk automatically to create duplication.

```
# ftdiskadm

Command action
   1  List RAID Arrays
   2  List Internal Disks
   3  Make Mirroring Arrays   (RAID1)
   4  Repair Mirroring Arrays (RAID1)
   5  Delete Mirroring Arrays (RAID1)
   6  Remove Disk Partitions  (RAID1)
   7  Make Striping Array     (RAID1+0)
   8  Delete Striping Array   (RAID1+0)
   c  Configurations
   q  Quit

Command: 3

[Make Mirroring Arrays  (RAID1)]
* Which scsi SLOT? [1-16] 2 ---------------------------------------------- (*1)

Making the disk partition table: SLOT=2 SIZE=139705(MB)
      Reserved for the last partition: SIZE=1024(MB)
* How many partitions? [1-14] 3 ------------------------------------------ (*2)
* Input the SIZE of partition 1  [1-138680(MB)] 50000
* Input the SIZE of partition 2  [1- 88681(MB)] 50000
                    partition 3                39705
* Input the LABEL [1-12 character(s)]------------------------------------ (*3)
* Are you sure to create it? [y/n] y
```

*1 Enter the slot number of the disk you want to configure duplication. The slot number of the pair disk (10) is also available.

*2 Specify the number of partitions to be created.
Then specify the size for each partition by MB. The remainder is automatically allocated to the partition with the last number. As for partition number, after 3 comes 5, followed in ascending order. Since a certain amount of volume is reserved for the last partition, the range of values that can be specified is smaller than that of the actual disk space. The value of actual partition volume varies slightly depending on the disk configuration.

*3 If necessary, specify the disk volume label.
If the hard disk drive is used with a single partition, the entered value is used as a volume label. If the hard disk drive is used with multiple partitions, "<entered value>_s<partition number>" is used for volume label. The volume labels specified here can be modified later by commands such as e2label.

2. Select [1 List RAID Arrays] on ftdiskadm to verify the disks are duplicated.

```
# ftdiskadm

Command action
   1  List RAID Arrays
   2  List Internal Disks
   3  Make Mirroring Arrays   (RAID1)
   4  Repair Mirroring Arrays (RAID1)
   5  Delete Mirroring Arrays (RAID1)
   6  Remove Disk Partitions  (RAID1)
   7  Make Striping Array     (RAID1+0)
   8  Delete Striping Array   (RAID1+0)
   c  Configurations
   q  Quit

Command: 1

[List RAID Arrays]

Name  Partition       (Label)   Status    Member
================================================================
< Mirroring Array (RAID1)   >
md0   /boot           ( - )     DUPLEX     (1)sda1    (9)sdi1
md1   /var/crash      ( - )     DUPLEX     (1)sda2    (9)sdi2
md2   swap            ( - )     DUPLEX     (1)sda3    (9)sdi3
md3   /               ( - )     DUPLEX     (1)sda5    (10)sdi5
md4                   ( - )     DUPLEX     (2)sdb1    (10)sdj1
md5                   ( - )     DUPLEX     (2)sdb2    (10)sdj2
md6                   ( - )     DUPLEX     (2)sdb3    (10)sdj3
```

<Example of items>

Name RAID device name

Partition Mount point

If this column is blank, it means the partition is not mounted.

Labe Volume label of file system. "-" is displayed when no label is specified.

Status Status of RAID device

Status	Description
DUPLEX	Successfully duplicated.
SIMPLEX	Only one RAID is incorporated. A member that is not incorporated is not displayed. In this case, recovery is required.
RECOVERY(XX.X%)	The devices out of redundant configuration is rebuilt (resynchronized). Upon completion, DUPLEX is displayed.
RESYNC(XX.X%)	Redundant configuration is being recalculated.
CHECK(XX.X%)	Data consistency is being checked.
REPAIR(XX.X%)	Data consistency is checked and/or recovered.
RESYNC	Wait for recovery, resynchronization, data consistency check, or repair. If "R" is added to Member column, that member is on standby for recovery.

Member The information on members that constitute RAID is displayed in the format of "(slot number) device name". If there is an error and the member is out of the RAID, "F" is displayed on the left and needs to be recovered.

Important **When the RAID device is in this status "RESYNC", "RECOVERY", "CHECK" or "REPAIR", do not insert or remove the hard disk drive, halt or restart the system. Wait until the status is turned to "DUPLEX".**

This completes configuration of hard disk drive duplication.

2.4.3 Notes on configuring hard disk drive

If ftdiskadm is used to configure duplication of hard disk drive, Fast Resync feature is enabled by default. This feature shortens the recovery time of partitions in the hard disk drives when the partitions are isolated from redundant configuration. Upon recovery, only refreshed data from the running hard disk drive is copied onto the disk that is isolated from the redundant configuration. If this feature is disabled, all the data is copied onto the hard disk drive. Therefore, enabling the feature can shorten the time required for recovery.

Fast Resync will not work when the hard disk drive is replaced with new one.

Important

The system may not operate properly when this feature is disabled. Always enable this feature.

2.4.4 Creating Striping Array

Striping array (RAID 0) is a RAID device that distributes I/O requests issued to striping array to each member.

This feature improves the I/O capacity and data writing/reading speed on striping array. Available disk capacity on striping array is the total of all members, which is different from RAID1 device in redundant configuration. You must prepare individual hard disk drives for the members of striping array to improve I/O capacity.

When you configure striping array only, the whole array will be unavailable and the fault tolerance becomes low if a failure occurs on any of the members. However, you can configure the devices that have both fault tolerance and I/O capacity (called "RAID1+0 device" in ftdiskadm) by configuring the member of the array with RAID1 devices.

Important

- **You must perform this operation as a root user.**
- **You must add 4 or more hard disk drives to utilize the feature of striping array when you create the array using ftdiskadm.**
- **When you create striping array using ftdiskadm, you must make backup copy of data because the data written on the existing RAID1 device will be erased.**
- **It is recommended to use RAID1 devices of the same capacity to be included in striping array to maximize the feature.**

Use ftdiskadm command to create striping array.

The following procedure is an example of configuring striping array using RAID1 device md4 in Slots 2 and 10 and RAID1 device md6 in Slots 3 and 11.

1. Run ftdiskadm command and select "1 List RAID Arrays" to check if statuses of md4 and md6 are "DUPLEX" and there is no description in Partition (not mounted).

```
# ftdiskadm

Command action
   1  List RAID Arrays
   2  List Internal Disks
   3  Make Mirroring Arrays   (RAID1)
   4  Repair Mirroring Arrays (RAID1)
   5  Delete Mirroring Arrays (RAID1)
   6  Remove Disk Partitions  (RAID1)
   7  Make Striping Array     (RAID1+0)
   8  Delete Striping Array   (RAID1+0)
   c  Configurations
   q  Quit

Command: 1

[List RAID Arrays]

Name  Partition       (Label)   Status    Member
================================================================
< Mirroring Array (RAID1)   >
md0   /boot           ( - )     DUPLEX     (1)sda1    (9)sdi1
md1   /var/crash      ( - )     DUPLEX     (1)sda2    (9)sdi2
md2   swap            ( - )     DUPLEX     (1)sda3    (9)sdi3
md3   /               ( - )     DUPLEX     (1)sda5    (9)sdi5
md4                   ( - )     DUPLEX     (2)sdb1    (10)sdj1
md5                   ( - )     DUPLEX     (2)sdb2    (10)sdj2
md6                   ( - )     DUPLEX     (3)sdc1    (11)sdk1
md7                   ( - )     DUPLEX     (3)sdc2    (11)sdk2
```

2. Select [7 Make Striping Array (RAID1+0)] on ftdiskadm to add RAID1 device into striping array. For the RAID1 device md4 and md6, enter "4,6". The screen shows the message that the process is going on. If the screen does not show any error and goes back to the main menu of ftdiskadm, striping array is properly created.

```
# ftdiskadm

Command action
   1  List RAID Arrays
   2  List Internal Disks
   3  Make Mirroring Arrays   (RAID1)
   4  Repair Mirroring Arrays (RAID1)
   5  Delete Mirroring Arrays (RAID1)
   6  Remove Disk Partitions  (RAID1)
   7  Make Striping Array     (RAID1+0)
   8  Delete Striping Array   (RAID1+0)
   c  Configurations
   q  Quit

Command: 7

[Make Striping Array     (RAID1+0)]
* Which raid1 device numbers? ['?' for help] => 4,6
```

3. Select [1 List RAID Arrays] on ftdiskadm to check if the striping array md8 (RAID device name is automatically assigned) is created, its Status is "ACTIVE", and md4 and md6 are displayed in Member column.

```
# ftdiskadm

Command action
   1  List RAID Arrays
   2  List Internal Disks
   3  Make Mirroring Arrays   (RAID1)
   4  Repair Mirroring Arrays (RAID1)
   5  Delete Mirroring Arrays (RAID1)
   6  Remove Disk Partitions  (RAID1)
   7  Make Striping Array     (RAID1+0)
   8  Delete Striping Array   (RAID1+0)
   c  Configurations
   q  Quit

Command: 1

[List RAID Arrays]

Name  Partition       (Label)   Status    Member
================================================================
< Striping Array  (RAID1+0) >
md8                   ( - )     ACTIVE    md4 md6
< Mirroring Array (RAID1)   >
md0   /boot           ( - )     DUPLEX     (1)sda1    (9)sdi1
md1   /var/crash      ( - )     DUPLEX     (1)sda2    (9)sdi2
md2   swap            ( - )     DUPLEX     (1)sda3    (9)sdi3
md3   /               ( - )     DUPLEX     (1)sda5    (9)sdi5
md4                   ( - )     DUPLEX     (2)sdb1    (10)sdj1
md5                   ( - )     DUPLEX     (2)sdb2    (10)sdj2
md6                   ( - )     DUPLEX     (3)sdc1    (11)sdk1
md7                   ( - )     DUPLEX     (3)sdc2    (11)sdk2
```

This is the end of the procedure to create striping array. The file system of the created striping array is ext4. If you want to change the file system name, use mkfs command.

2.5 Connecting Optional Device (LAN, SAS, FC Card)

If LAN card, FC card, and internal hard disk drive are additionally installed, they must be duplicated.

For how to configure them, see the section below:

LAN card: Chapter 1 (2.3 Duplex LAN Configuration)

Internal hard disk drive: Chapter 1 (2.4 Dual Disk Configuration)

FC card: Chapter 2 (5.7.5 (2) N8803-038 Fibre Channel Board Set) in *Maintenance Guide*.

2.6 Creating Volume

If there is free disk space in the hard disk drive that contains an OS, you can add a volume. In the example below, create a partition of 1024MB in free space of hard disk drive to create RAID1 device md4 in the hard disk drives with OS installed in Slot 1 (slot 0 of CPU/IO module 0) and Slot 9 (slot 0 of CPU/IO module 1).

Important **You must perform this operation as a root user.**

1. Check the device name of the hard disk drive with OS and the RAID device being used by selecting [1 List RAID Arrays] in ftdiskadm.

   The following example shows that the names of hard disk drives with OS are /dev/sda and /dev/sdi, respectively. The RAID device names are md0 to md3.

```
# ftdiskadm

Command action
   1  List RAID Arrays
   2  List Internal Disks
   3  Make Mirroring Arrays   (RAID1)
   4  Repair Mirroring Arrays (RAID1)
   5  Delete Mirroring Arrays (RAID1)
   6  Remove Disk Partitions  (RAID1)
   7  Make Striping Array     (RAID1+0)
   8  Delete Striping Array   (RAID1+0)
   c  Configurations
   q  Quit

Command: 1

[List RAID Arrays]

Name  Partition       (Label)   Status    Member
================================================================
< Mirroring Array (RAID1)   >
md0   /boot           ( - )     DUPLEX     (1)sda1    (9)sdi1
md1   /var/crash      ( - )     DUPLEX     (1)sda2    (9)sdi2
md2   swap            ( - )     DUPLEX     (1)sda3    (9)sdi3
md3   /               ( - )     DUPLEX     (1)sda5    (9)sdi5
```

2. Run fdisk command to check free space in hard disk drive containing an OS. Then create a partition /dev/sda6. Then create a partition /dev/sdi6 of the same size in the same manner.

```
# fdisk /dev/sda
Command (m for help): p ------------------------------------------------- (*1)

Disk /dev/sda: 146.5 GB, 146500042752 bytes
255 heads, 63 sectors/track, 17810 cylinders
Units = cylinders of 16065 * 512 = 8225280 bytes
Sector size (logical/physical): 512 bytes / 512 bytes
I/O size (minimum/optical): 512 bytes / 512 bytes
Disk identifier: 0x000a3934

   Device Boot      Start         End      Blocks   Id   System
/dev/sda1   *           1          66      524288   fd   Linux raid autodetect
Partition 1 does not end on cylinder boundary.
/dev/sda2              66        3199    25165824   fd   Linux raid autodetect
/dev/sda3            3199        4243     8388608   fd   Linux raid autodetect
/dev/sda4            4243       17811   108986368    5   Extended
/dev/sda5            4243        6332    16777216   fd   Linux raid autodetect

Command (m for help): n ------------------------------------------------- (*2)
First cylinder (6332-17811, default 6332):
Using default value 6332
Last cylinder, +cylinders or +size{K,M,G} (6332-17811, default 17811): +1024M

Command (m for help): t ------------------------------------------------- (*3)
Partition number (1-6): 6 ----------------------------------------------- (*4)
Hex code (type L to list codes): fd ------------------------------------- (*5)
Changed system type of partition 6 to fd (Linux raid autodetect)

Command (m for help): w ------------------------------------------------- (*6)
The partition table has been altered!

Calling ioctl() to re-read partition table.

WARNING: Re-reading the partition table failed with error 16: Device or resource
 busy.
The kernel still uses the old table. The new table will be used at
the next reboot or after you run partprobe(8) or kpartx(8)
Syncing disks.
```

*1 Check the free space with command "p".
*2 Create a partition with command "n".
*3 Change Id with command "t".
*4 Specify the partition number "6".
*5 Be sure to specify "fd".
*6 Save changes with command "w".

3. Run the following command to reboot the system.

```
# reboot
```

4. Specify the new partition /dev/sda6, /dev/sdi6, and create RAID1 device md4.

```
# mdadm -C /dev/md4 --metadata=1.1 --bitmap=internal --level=1 --raid-devices=2 /dev/sd[ai]6

(Enter 'y' against the message as shown below:)
mdadm: /dev/sda6 appears to be part of a raid array:
     level=raid1 devices=2 ctime=Wed Jul  2 16:47:38 2014
mdadm: /dev/sdi6 appears to be part of a raid array:
     level=raid1 devices=2 ctime=Wed Jul  2 16:47:38 2014
Continue creating array? y
mdadm: array /dev/md4 started.
```

5. Create a file system in RAID1 device md4.

```
# mkfs -t ext4 /dev/md4
```

6. On [1 List RAID Arrays] of ftdiskadm, check if the RAID1 device (md4) is created.

```
# ftdiskadm

Command action
   1  List RAID Arrays
   2  List Internal Disks
   3  Make Mirroring Arrays   (RAID1)
   4  Repair Mirroring Arrays (RAID1)
   5  Delete Mirroring Arrays (RAID1)
   6  Remove Disk Partitions  (RAID1)
   7  Make Striping Array     (RAID1+0)
   8  Delete Striping Array   (RAID1+0)
   c  Configurations
   q  Quit

Command: 1

[List RAID Arrays]

Name  Partition       (Label)   Status    Member
================================================================
< Mirroring Array (RAID1)   >
md0   /boot           ( - )     DUPLEX     (1)sda1    (9)sdi1
md1   /var/crash      ( - )     DUPLEX     (1)sda2    (9)sdi2
md2   swap            ( - )     DUPLEX     (1)sda3    (9)sdi3
md3   /               ( - )     DUPLEX     (1)sda5    (9)sdi5
md4                   ( - )     DUPLEX     (1)sda6    (9)sdi6
```

7. Update /etc/mdadm.conf file.

```
# cp -a /etc/mdadm.conf /etc/mdadm.bak

# echo 'DEVICE partitions' > /etc/mdadm.conf

# mdadm --detail --scan -v | grep '^ARRAY' >> /etc/mdadm.conf
```

8. Update /boot image file.

```
# mv /boot/initramfs-'uname -r'.img /boot/initramfs-'uname -r'.img.bak

# dracut /boot/initramfs-'uname -r'.img 'uname -r'
```

9. Run the following command to reboot the system. After reboot, perform Step 6 to check if RAID1 device md4 is displayed.

```
# reboot
```

Important

The system may fail start normally if /etc/mdadm.conf and boot image file are not created correctly in Steps 7 and 8.

If the system fails to start, you can restore the backup file you have created in earlier steps to start the system. However, the created volume will be erased.

Restart the system before using the created volume to check if it is correctly created.

This completes creation of volume.

2.7 Installing Bundled Software for the Server

NEC ESMPRO Manager are contained in EXPRESSBUILDER.

(1) Installing bundled software (see Chapter 2)

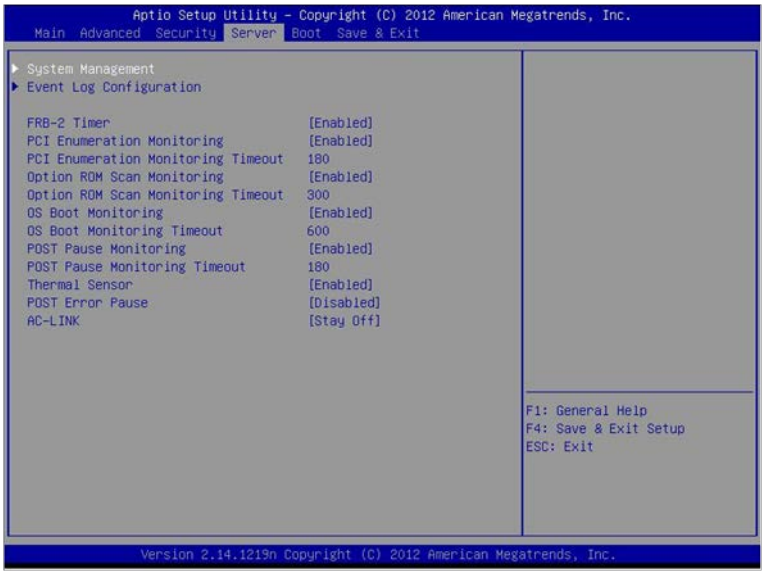
Install the bundled software and configure it according to Chapter 2.

2.8 Enabling OS Boot Monitoring Feature

Enables OS Boot Monitoring feature.

Set OS Boot Monitoring feature to **Enabled** on BIOS SETUP. Then, specify the timeout time for **OS Boot Monitoring Timeout** parameter appropriately.

Tips Specify the timeout time in seconds. Default setting is 600 seconds (10 minutes).



2.9 Backing Up System Information

It is recommended to write down your system information when you finish system setup.

With backup copy of system information, the information and settings that are specific to your server can be restored after the server is repaired. Take the steps below to make a backup copy of your system information:

2.9.1 BIOS SETUP

Power on the server.

While the following message is displayed on POST, press the <F2> key.

Press <F2> SETUP, <F4> ROM Utility, <F12> Network

Write down the new parameter values upon completion of POST.

Example)

[Advanced]-[PCI Configuration]-[SAS Option ROM Scan]

[Advanced]-[PCI Configuration]-[PCI Slot x Option ROM]

[Security]

[Server]-[OS Boot Monitoring]

[Server]-[AC-LINK]

[Server]-[Power On Delay Time]

[Boot]-[Boot Option Priorities]

When you select [Save & Exit]-[Save Changes and Exit], the following message appears.

Save configuration and exit?

Click [Yes] to restart the server.

2.9.2 Device-specific information

Press the <F4> key while the following message is displayed on POST.

Press <F2> SETUP, <F4> ROM Utility, <F12> Network

Upon completion of POST, keyboard selection menu appears.

When you select a keyboard to use, the following menu appears.

Off-line TOOL MENU
Maintenance Utility BMC Configuration Exit

Select [Maintenance Utility]-[System Information Viewer]-[Display System Information]-[System Information], and write down the following device-specific information.

Product Name

FR Number

Serial Number

Press the <Esc> key several times until the following menu appears.

Off-line TOOL MENU
Maintenance Utility BMC Configuration Exit

2.9.3 BMC Configuration

Select [BMC Configuration]-[BMC Configuration] and write down the new parameter value.

Example)

[Network : CPU/IO module0]-[Property]

[Network : CPU/IO module1]-[Property]

[User Management]-[User Account]

Press the <Esc> key several times until the following menu appears.

Off-line TOOL MENU
Maintenance Utility BMC Configuration Exit

Press [Exit] to close the Off-line TOOL MENU.

2.10 Checking Kernel Version

The following describes how to check the version of kernel, which is the core of the software achieving fault tolerance. Perform the procedure when you need to check the kernel version of the current system before adding devices to the server.

Run the following command to confirm the version of kernel.

```
# uname -a
```

The current version of kernel is displayed.

2.11 Checking ft Server Control Software Version

The following describes how to check the version of ft Server Control Software, which consists of various types of software for fault tolerance. Perform the procedure when you need to check the ft Server Control Software version of the current system before adding devices to the server or updating ft Server Control Software.

Run the following command to confirm the version of ft Server Control Software.

```
# rpm -q lsb-ft-eula_display
```

The current version of ft Server Control Software is displayed.

2.12 Appendix

This section describes processing detail of initial configuration script.

2.12.1 Processing detail of initial configuration script

The following processings are executed by initial configuration script.

1. Change of default setting of SELinux

Change setting of SELinux from "Enforcing" (OS's default setting) to "Disabled" so that SELinux is to be used only when it is necessary.

2. Change of activation of service

Stop services that required by unsupported hardware or not to be used for server.

- avahi-daemon
- bluetooth
- cups
- NetworkManager

In system environment where the package group of Virtualization Platform is not installed, stop libvirt-guests service to suppress the unnecessary message issued at shutdown.

3. Exclude update target of yum

To exclude the kernel-related module from update target of yum, add "kernel-*" to exclude line of "/etc/yum.conf".

4. Installation of 32-bit library

When installing the library package that provides both 32-bit and 64-bit version in x86_64 environment by using yum, add "multilib_policy=all" to "/etc/yum.conf" to install 32-bit library together with 64-bit library.

5. Deletion of package of Subscription Manager

Delete subscription-manager, subscription-manager-gui, and subscription-manager-firstboot packages to suppress unnecessary popup message of subscription manager when desktop environment is used.

6. Interval of information collection

Change interval to collect sysstat information from 10 minutes (default) to 1 minute so that system status can be obtained more precisely at the occurrence of failure.

7. Creation of backup file

If the file is modified while running initial configuration script, the backup file immediately before applying the script is created in the following directory.

```
/opt/nec/setup/backup/rhel6_5_x86_64_nec_setup_<date *1>_<Boot kernel *2>
```

*1 Date when script is executed

*2 Boot kernel used when script is executed

* Depending on an environment where the initial configuration script is to be applied, it may not need to modify the file. In such a case, no directory or no file is created under the backup directory.

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2

Installing Bundled Software

This chapter provides brief explanation of bundled software and how to install them.

1. **Bundled Software for the Server**
   Describes the bundled software to be installed in the server system.

2. **Bundled Software for "PC for Management"**
   Describes the bundled software to be installed in "PC for management" that is used to monitor and manage the server system.

1. Bundled Software for the Server

This section introduces the software bundled in the server package. For details, refer to the software documents.

1.1 NEC ESMPRO Agent (Linux)

NEC ESMPRO Agent (Linux) is an application used to monitor the server.

NEC ESMPRO Agent (Linux) is stored in ft Server Constol Software Install CD. For how to install it, see *Chapter 1 (2.2.7 Before installing NEC ESMPRO Agent)*, *(2.2.8 Installing NEC ESMPRO Agent)*, and *(2.2.9 Setting required after installing NEC ESMPRO Agent)*.

2. Bundled Software for "PC for Management"

This section describes the bundled software required to configure "PC for Management" used to manage the server system.

2.1 NEC ESMPRO Manager

NEC ESMPRO Manager remotely controls and monitors the server hardware.

To use these features, install the bundled software such as NEC ESMPRO Agent on the server.

For details about the system requirements of NEC ESMPRO Manager and how to install it, see "*NEC ESMPRO Manager Installation Guide*" in EXPRESSBUILDER.