NEC

SX-Aurora TSUBASA

SX-Aurora TSUBASA

Installation Guide

Proprietary Notice

Preface

This document explains how to install and update required software on Vector Island (Linux server that has a VE card) to enable executing programs on the VE cards.

The latest edition of this document is available at:

https://www.nec.com/en/global/prod/hpc/aurora/document/

Definitions and Abbreviations

Term	Description
Vector Engine (VE、Vector Engine)	Vector Operation Engine implemented as a PCI Express Card attached to an x86 server. This is the core component of the SX-Aurora TSUBASA system.
Vector Host (VH、Vector Host)	An x86 server equipped with VEs. Vector Island (VI、Vector Island) means a set of a VH and VEs that are attached to the VH. Tower model and Rack mount model described below are provided as VI unit.
Tower model	One of SX-Aurora TSUBASA product models. Tower model is a desk side model that can be simply set-up.
Rack mount model	One of SX-Aurora TSUBASA product models. Rack mount model is a 1U or 4U server model with a server rack. It covers from small system to large scale system.
Supercomputer model	One of SX-Aurora TSUBASA product models. Supercomputer model is positioned as a next generation model of SX series. It can mount Max. 8 of 4U rack mount servers. All Vector Engines have water cooling devices.
VMC	VE Management Controller
IB	InfiniBand
HCA	Host Channel Adapter. A PCIe card that is used to connect a server to IB network.
MPI	MPI (Message Passing Interface) implementation by NEC. MPI is A specification for a standard library for communication. It can be used together with OpenMP or automatic parallelization.

Contents

List of tables

List of figures

Chapter1 Introduction

1.1 Scope

This document explains about the software for SX-Aurora TSUBASA system listed in the following table.

Table 1 Software

Software Name	Description	Components	How to get (*)
VEOS	VE management software	VEOS Application Runtime VEOS Application Development	A
MMM	Monitoring & Maintenance Manager	MMM	A
VMC Firmware	VMC Firmware	VMC Firmware	A
InfiniBand for SX-Aurora TSUBASA	InfiniBand control software	InfiniBand for SX-Aurora TSUBASA	A
License Server	License management software	License server	A
License Access Library	License check library	License access library	A
NEC Software Development Kit for Vector Engine (abbreviation: SDK)	Software Development Software	C/C++ Compiler Fortran Compiler binutils Numeric Library Collection NEC Parallel Debugger Tuning Tool	B
NEC MPI	MPI	NEC MPI	B
NEC Scalable Technology File System (abbreviation: ScaTeFS)	Scalable Technology File System	ScaTeFS/Client	B
NEC Network Queuing System V (abbreviation: NQSV)	Batch Execution System	NQSV/JobServer NQSV/Client	B

(*)A: Download them for free from the NEC Web site. Refer to "2.2 Getting the Software Packages".

B: Paid software. Please contact the person in charge to get update packages.

1.2 System requirement

1.2.1 Hardware

SX-Aurora TSUBASA models are as follows.

Table 2 Models

	Tower	Rack Mount			Supercomputer
Model Name	A100-1	A300-2	A300-4	A300-8	A500-64
Max Vector Engines (VEs)	1	2	4	8	64
# of Vector Hosts (VHs)	1	1	1	1	8

Please refer to a catalog of SX-Aurora TSUBASA for details.

⚠ Note BIOS Settings

Please use UEFI mode as factory default at BOOT mode in BIOS settings. System boot or OS installation might be possible if you change the BIOS settings, but this equipment does not support it except factory default.

1.2.2 Target Operating System

Target operating systems for SX-Aurora TSUBASA system are described in the following contents of NEC support portal. And one of the listed versions of kernel is required for VHs.

[SX-Aurora TSUBASA]Verified Linux kernel

http://www.support.nec.co.jp/en/View.aspx?id=4140100078

Only the described version's kernel is supported for RHEL 7.4 and RHEL 7.5. And it isn't the kernel included in the ISO image. So it is necessary to get the update package.

1.3 Machine configuration

This section introduces machine configuration examples of SX-Aurora TSUBASA

(1) Configuration 1: Standalone (single SX-Aurora TSUBASA machine)

Install the following software on the SX-Aurora TSUBASA machine.

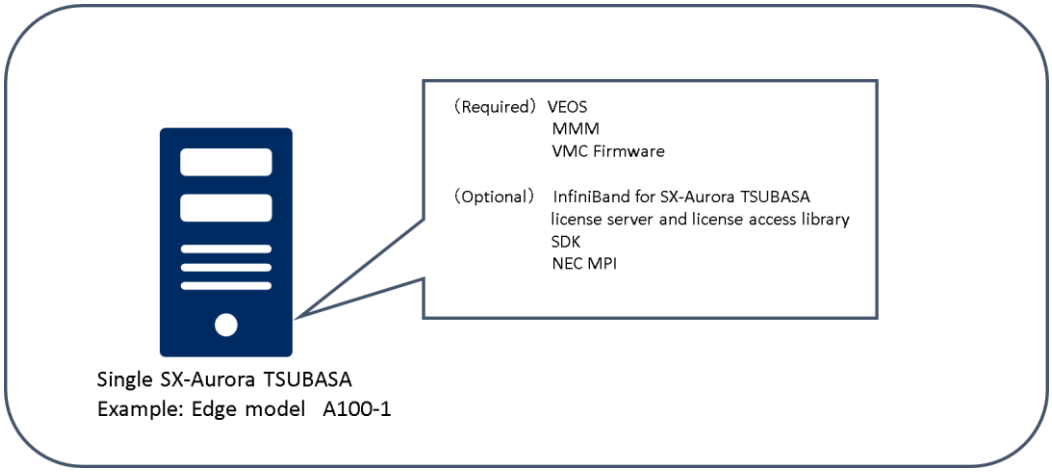

Figure 1 Configuration 1: Standalone

(2) Configuration 2: SX-Aurora TSUBASA machines and a Management server

This figure describes the software to be installed on each model of SX-Aurora TSUBASA machines and on the management server.

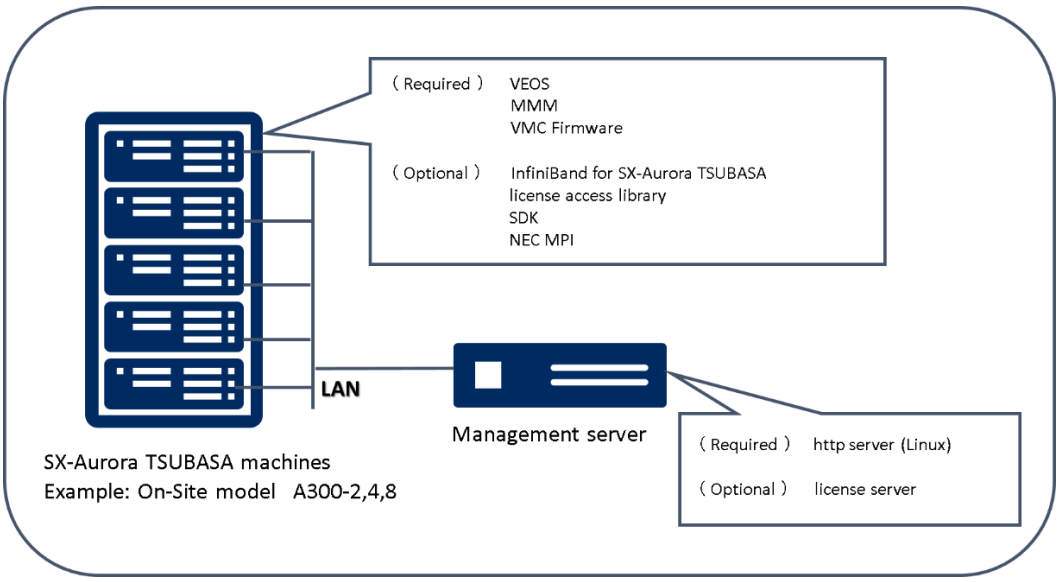

Figure 2 Configuration 2: SX-Aurora TSUBASA machines and a Management server

(3) Configuration 3: Large scale system

Please contact our sales or SE.

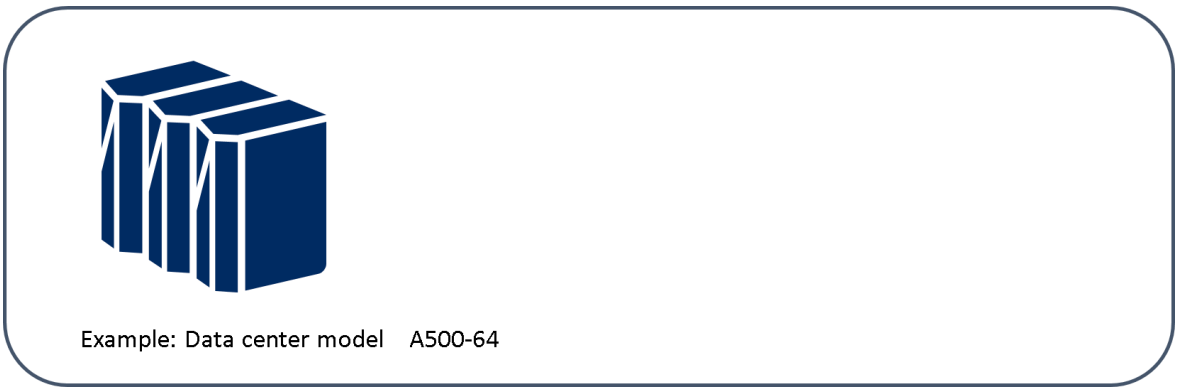

Figure 3 Configuration 3: Large scale system

1.4 Request for recompilation of programs (for users migrating from old SX-Aurora TSUBASA software environment)

glibc (The GNU C Library) has started to be supported as the official C library on VE from the release of SX-Aurora TSUBASA software on January, 2019. The old C library, musl-libc, will be supported until the end of March, 2019.

If you are now using musl-libc environment, please migrate to glibc environment by the following procedure.

- Install new SX-Aurora TSUBASA software of glibc environment.
- Recompile your programs in the glibc environment.

In the sections below, the migration schedule of C library, version of each software package for glibc environment, and software environment which coexists glibc and musl-libc are described in detail.

1.4.1 Migration Schedule of C library

glibc started to be supported as SX-Aurora TSUBASA software for RHEL 7.5 and CentOS 7.5 environment from January, 2019. After that, glibc for VE on RHEL 7.4/7.3 and CentOS 7.4/7.3 environment has been available from February, 2019.

The support of the old C library, musl-libc, will be terminated at the end of March, 2019.

Table 3 Support schedule of glibc and musl-libc

OS Version	C library	2019				
		Jan	Feb	Mar	Apr	May
RHEL 7.5, CentOS 7.5	musl-libc					
	glibc					
RHEL 7.4/7.3, CentOS 7.4/7.3	musl-libc					
	glibc					

1.4.2 Version of software package with glibc support

glibc is supported by the following version of SX-Aurora TSUBASA software packages.

Table 4 Software version of each component with glibc support

OS Version	Software Name	Version	Note
RHEL 7.5, CentOS 7.5	VEOS	2.0.1	Included in ve-software-1.0.5.zip or veos-2.0.1-el7-x86_64.zip and later.
	InfiniBand for SX-Aurora TSUBASA	depends on packages	Included in ve-software-1.0.5.zip or VESW-1.0.12-el7-x86_64.zip and later.
	Numeric Library Collection	1.0.0-2.*X*	
	C/C++ compiler Fortran Compiler	2.*X.X*	
	NEC MPI	2.*X.X*	
	nec-veperf package in TuningTool	2.*X.X*	
	ScaTeFS Client	3.0.20.7	

RHEL 7.4/7.3, CentOS 7.4/7.3	VEOS	2.0.2	Included in ve-software-1.0.6.zip or veos-2.0.2-el7-x86_64.zip and later.
	InfiniBand for SX-Aurora TSUBASA	depends on packages	Included in ve-software-1.0.6.zip or VESW-1.0.13-el7-x86_64.zip and later.
	Numeric Library Collection	1.0.0-2.*X*	
	C/C++ compiler Fortran Compiler	2.*X*.*X*	
	NEC MPI	2.*X*.*X*	
	nec-veperf package in TuningTool	2.*X*.*X*	
	ScaTeFS Client	3.0.*X*.*X*	

Other software that is not included in the above table can work under glibc environment without any update.

1.4.3 Migration to the glibc environment from the musl-libc environment

To migrate to the glibc environment from the musl-libc environment, each component is required to update to the version corresponding to glibc indicated on 1.4.2 with a procedure in the chapter of "Update".

1.4.4 Software environment coexisting glibc and musl-libc

glibc and musl-libc can coexist in a VE environment, while it is highly recommended to use glibc or musl-libc exclusively. If you need to run a binary which is compiled with musl-libc under glibc environment, musl-libc and related libraries should be installed in glibc environment.

Please refer to Appendix C for how you can check C library used for your VE binary.

1.5 Installation flow chart

The flow charts of the installation process are as follows.

(1) Installation flow chart with easy install tool

When you install SX-Aurora TSUBASA system software except for ScaTeFS and NQSV on a standalone system (single SX-Aurora TSUBASA machine), you can use the easy install tool to automate the install operation of the free software packages, SDK and NEC MPI.

The flow chart with the easy install tool is as follows. Please refer to chapter 2 for details.

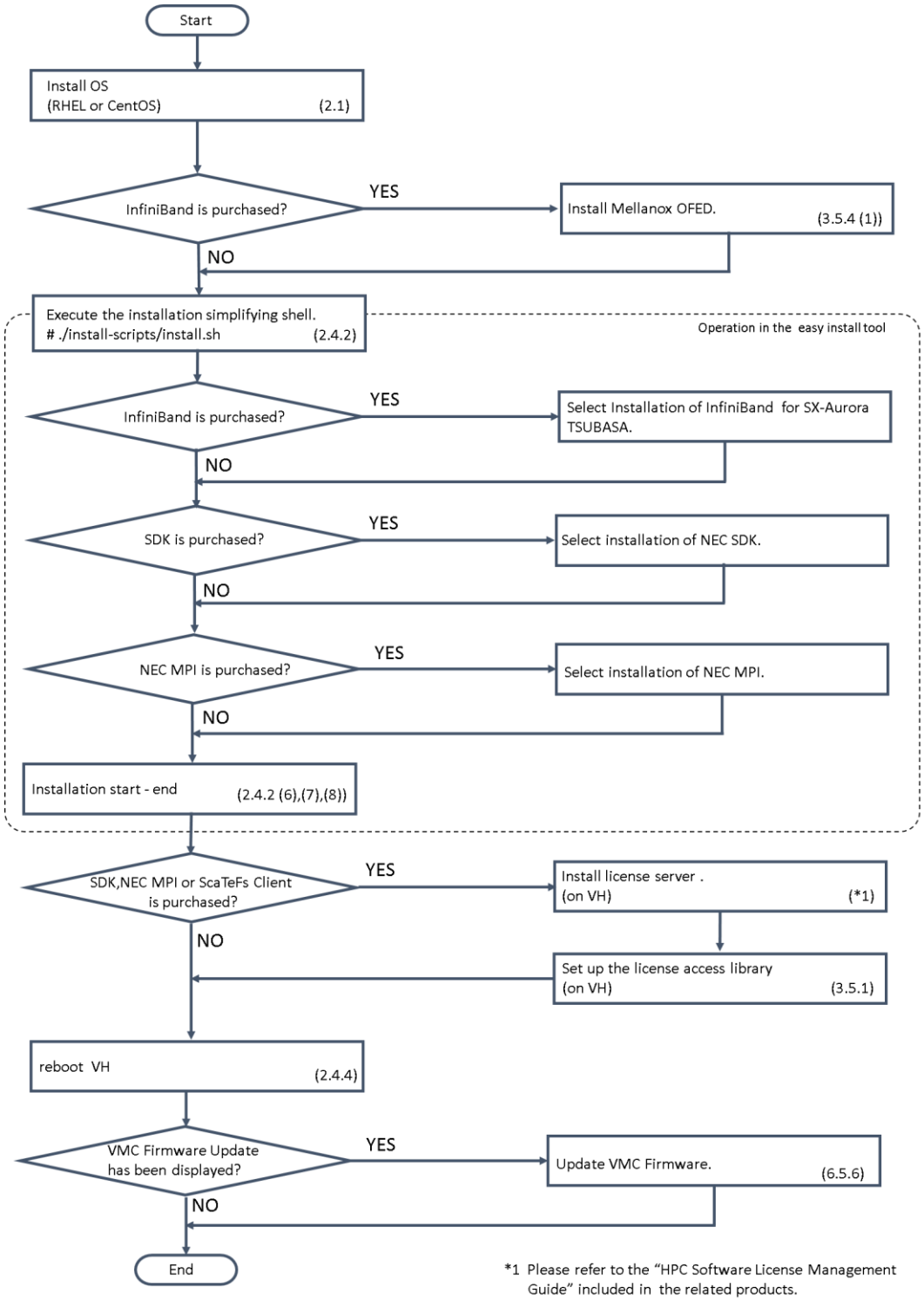

Figure 4 Installation Flow Chart with the easy install tool

(2) Manual installation flow

This is the manual installation flow chart that is used when you install SX-Aurora TSUBASA system software without the easy install tool described below.

Please refer to chapter 3 for details.

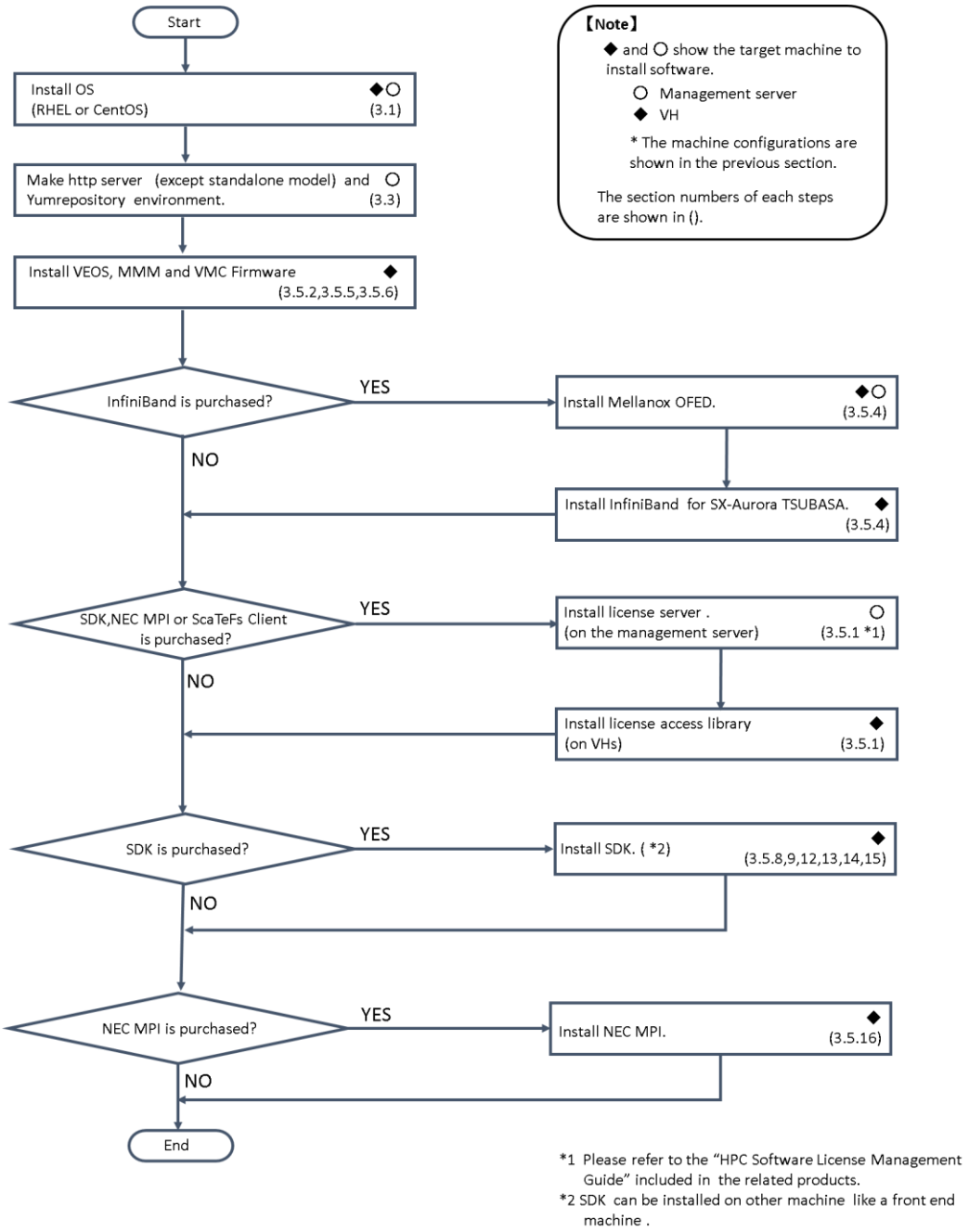

Figure 5 Standard Installation Flow Chart

⚠ Note

To start operation of VE, perform the “Chapter4 Before start using” after installation.

Chapter2 Installation with easy install tool

⚠ Note

- The target system of the easy install tool is standalone system.
- There are some command lines started with '#' prompt in this chapter. They should be executed with super user privileges.

2.1 Installing OS

Before installing SX-Aurora TSUBASA system software, the supported operating system should be installed on VHs and on the management server, and set up the network between VHs and the management server.

And also setup Yum repository for installing additional software in the OS distribution (*). Please refer to Red Hat Customer Portal site and Red Hat Enterprise Linux 7 Installation guide for installation of the supported operating system on VHs.

(*) When you set the yum repository manually, please set 1 to XXX of the yum repository settings until installation procedure finished.

⚠ Note

When you install/update the OS, be sure not to install the kernel package of other version than described in the section 1.2.2 Target Operating System.

2.2 Getting the Software Packages

The software packages for installation with the easy install tool can be gotten from the following locations. Please get software packages.

Table 5 Location of the Software

Software	Location	File Name
VEOS	VE Software download site: **https://jpn.nec.com/hpc/aurora/ve-software/** or **https://www.nec.com/en/global/prod/hpc/aurora/ve-software/**	ve-software-*X.X.X*.zip
MMM		
VMC Firmware		
InfiniBand for SX-Aurora TSUBASA		
License Server		
License Access Library(*1)		
SDK	Internet Delivery and NEC support portal (*2)	
NEC MPI		

(*1) License access library is needed for the license management of C/C++ compiler, Fortran compiler or NEC MPI on VHs. How to configure the license management of the software is described in “HPC Software License Management Guide”. This document is included in the products of SDK and NEC MPI. And also it can be downloaded from the following HPC Software License Creation web site when you get the license file.

https://www.hpc-license.nec.com/aurora/top/en/

(*2) Non-free products of SX-Aurora TSUBASA are release by internet delivery system. And their updates and bug fixes are provided in NEC support portal. Download both of the product packages and their update packages. The latest update information is also available in the NEC support portal. (Please contact the person in charge to get the software packages.)

2.3 Preparation

(1) Install perl and unzip

```
# yum install perl unzip
```

(2) Locate the ve-software-*X.X.X*.zip on an arbitrary directory and extract it by unzip command.

```
# unzip ve-software-X.X.X.zip
```

The following files are extracted in ve-software-X.X.X directory.

- README
- install-scripts/install.sh
- mmm_vmcfw-*X.X.X*-el7-x86_64.zip
- veos-*X.X.X*-el7-x86_64.zip
- VESW-*X.X.X*-el7-x86_64.zip

(3) Locate the ZIP files of SDK or NEC MPI downloaded from the internet delivery system in ve-software-X.X.X directory.

- SDK_VE-*XX*.zip (SDK)
- NECMPI-*XX*.zip (NEC MPI)

(4) If you purchased SDK or NEC MPI, after confirming NEC support portal web site, download and locate update packages (zip files) into ve-software-X.X.X directory if some updates are released for the products.

The latest update information for revision up or bug fix is provided in NEC support portal. (Please contact the person in charge to get update packages.)

2.4 Installation

2.4.1 Installing Mellanox OFED

If you use InfiniBand, refer “3.5.4 InfiniBand for SX-Aurora TSUBASA (optional)” and install Mellanox OFED.

2.4.2 Execution of installation by the easy install tool

(1) Execute the install script

Execute the install script on the directory on which ve-software-*X.X.X*.zip is extracted.

```
# ./install-scripts/install.sh
```

(2) Select the installation mode

Select ‘i’ for the selection of install or update.

```
Please select the installation mode. (i:install/u:update) default:install : i
```

(3) Install InfiniBand for SX-Aurora TSUBASA

If you use InfiniBand, select the installation of InfiniBand for SX-Aurora TSUBASA.

```
Information: InfiniBand for SX-Aurora TSUBASA included 1 Group(s)
============================================================
InfiniBand for SX-Aurora TSUBASA
============================================================
Are you sure to install InfiniBand for SX-Aurora TSUBASA? (y/n) default:n : y
```

(4) Install SDK

If you use SDK, select ‘y’.

```
Information: NEC VE SDK included 7 Group(s)
============================================================
License access library
NEC Tuning tool
```

```
NEC Parallel Debugger
NEC Numeric Library Collection 1.0.0
NEC Binutils
NEC C/C++ compiler
NEC Fortran compiler
============================================================
Are you sure to install NEC VE SDK? (y/n) default:n : y
```

(5) Install NEC MPI

If you use NEC MPI, select 'y'.

```
Information: NEC MPI included 3 Group(s)
============================================================
License access library
NEC MPI (Runtime)
NEC MPI 1-0-0
============================================================
Are you sure to install NEC MPI? (y/n) default:n : y
```

(6) Confirm the installing software

List of the software that is ready to install is displayed. To start installation, enter 'y'.

```
Install 14 Group(s)
============================================================
License access library
VEOS Application Runtime
VEOS Application Development
InfiniBand for SX-Aurora TSUBASA
Monitoring and Maintenance Manager
VMC Firmware package
NEC Tuning tool
NEC Parallel Debugger
NEC Numeric Library Collection 1.0.0
NEC Binutils
NEC C/C++ compiler
NEC Fortran compiler
NEC MPI (Runtime)
NEC MPI 1-0-0
============================================================
Is this ok? (y/n) default:n : y
```

(7) Complete of installation

The following message shows the complete of installation.

```
NEC SX-aurora TSUBASA basic ve-software install Complete!
```

(8) Confirm VMC Firmware to be updated

When the tool determines VMC Firmware should be updated, the following message will be displayed. In this case, it is necessary to execute the VMC Firmware update operation as described below.

```
VMCFW version is differ from now installed.
please update VMCFW after install all softwares,
See installation guide
```

⚠ Note

The easy install tool will make local repository under /var/www/html/repos/TSUBASA on the VH.
If you will additionally install ScaTeFS or NQSV, locate the rpm files on the directory and perform the repository update (see 3.3.2 (2)) and installation using yum command (see 3.5.7 ScaTeFS Client or 3.5.11 NQSV/Client).

2.4.3 Settings of license server

When you have installed SDK or NEC MPI, the following message will be displayed. Please refer to “3.5.1 License access library (optional)” and make a settings for the license server.

```
please set License_server_host and License_server_port
in /opt/nec/aur_license/aur_license.conf
```

2.4.4 Reboot the VH

After complete of all installations, reboot the VH.

2.4.5 Update of VMC Firmware

If the message of the VMC Firmware update is displayed in “2.4.2 (8)”, please refer to “6.5.6 VMC Firmware” and update VMC Firmware.

2.5 Confirmation

Please refer to “3.7 Confirmation” and confirm the VEs are ONLINE.

Chapter3 Manual Installation

⚠ Note

There are some command lines started with '#' prompt in this chapter. They should be executed with super user privileges.

3.1 Installing OS

Install a supported operating system on all VHs. (See 2.1 Installing OS.)

3.2 Getting the Software Packages

The software packages for SX-Aurora TSUBASA system and some additional files to install them can be gotten from the following locations. Please get software packages (rpm files) to install on your system and the additional files.

Table 6 Location of the Software

Software	Location	File Name
VEOS	VE Software download site: **https://jpn.nec.com/hpc/aurora/ve-software/** or **https://www.nec.com/en/global/prod/hpc/aurora/ve-software/**	veos-*X.X.X*-el7-x86_64.zip
MMM		mmm_vmcfw-*X.X.X*-el7-x86_64.zip
VMC Firmware		
InfiniBand for SX-Aurora TSUBASA		VESW-*X.X.X*-el7-x86_64.zip (VESW (others))
License Server		
License Access Library(*1)		
Additional files for installation (TSUBASA-groups.xml, TSUBASA-soft-release-X.X-X.noarch.rpm)		
SDK	Internet Delivery and NEC support portal (*2)	
NEC MPI		
ScaTeFS		
NQSV		

(*1) License access library is needed for the license management of C/C++ compiler, Fortran compiler, NEC MPI or ScaTeFS on VHs. How to configure the license management of the software is described in “HPC Software License Management Guide”. This document is included in the products of SDK, NEC MPI, ScaTeFS and NQSV. And also it can be downloaded from the following HPC Software License Creation web site when you get the license file.

https://www.hpc-license.nec.com/aurora/top/en/

(*2) Non-free products of SX-Aurora TSUBASA are release by internet delivery system. And their updates and bug fixes are provided in NEC support portal. Download both of the product packages and their update packages. The latest update information is also available in the NEC support portal. (Please contact the person in charge to get the software packages.)

3.3 Making SX-Aurora TSUBASA software repository

A Yum repository for SX-Aurora TSUBASA software should be made to install SX-Aurora TSUBASA system software. This Yum repository can be located on one of the VH hosts (including in case of standalone system) or on the management server.
On the host computer on which the Yum repository is located (called 'the repository server' below), make a SX-Aurora TSUBASA software Yum repository in the following procedure.

3.3.1 Install HTTP server

Except for standalone system, install Apache HTTP Server and start it. For standalone system, http server is note necessary.

```
# yum -y install httpd
# systemctl start httpd
# systemctl enable httpd
```

3.3.2 Install createrepo

Install createrepo package.

```
# yum -y install createrepo
```

3.3.3 Make Yum repository

(1) Copy package files

Make a directory to contain the package files to distribute from the Yum repository and copy the package files gotten in "3.2 Getting the Software Packages" (except C/C++ compiler and Fortran compiler) into it.

```
# mkdir -p /var/www/html/repos/TSUBASA/rpms
```

Copy the files under /var/www/html/repos/TSUBASA/rpms.

⚠ Note

- Some of the packages are released separately for each OS version under the corresponding OS version's directory. So check the OS version's directory and download and locate the packages for using system.
- Packages of VEOS and InfiniBand for SX-Aurora TSUBASA are distributed in separated directories for each OS version. Please locate packages under only one directory on the SX-Aurora TSUBASA system software repository server. For example, packages for RHEL 7.4 and CentOS 7.4 are distributed under "RHEL7.4" directory. The followings are the procedures as an example to remove directories other than "RHEL7.4".

  1. Confirm directories to remove, which are not for RHEL 7.4, under the directory SX-Aurora TSUBASA system software packages are expanded.

```
# find -name "RHEL*" ! -name "*7.4" -type d
./RHEL7.3
./RHEL7.5
./software/SX-Aurora_TSUBASA_InfiniBand/RHEL7.3
./software/SX-Aurora_TSUBASA_InfiniBand/RHEL7.5
./veos/RHEL7.3
./veos/RHEL7.5
```

  2. Remove directories found on 1.

```
# find -name "RHEL*" ! -name "*7.4" -type d -exec rm -rf {} +
```

  And ve_peermem package of InfiniBand for SX-Aurora TSUBASA is distributed as separated packages for each kernel version. Please locate only one ve_peermem package on the SX-Aurora TSUBASA system software repository server. For example, ve_peermem for kernel 3.10.0-693-21.1.el7 is "ve_peermem-X.X.X-3.10.0_693.21.1_MLNX_OFED_X.X.el7.x86_64.rpm".

And also locate the group definition file for the SX-Aurora TSUBASA system software repository (TSUBASA-groups.xml) under /var/www/html/repos/TSUBASA.

The group definition files are released separately for RHEL7.3, RHEL7.4 and RHEL7.5. So locate the group definition file for using system.

(2) Make repository

Run createrepo command to create the repository. The software group configuration file （TSUBASA-groups.xml） included in the VESW-*X.X.X*-el7-x86_64.zip that is gotten in "3.2 Getting the Software Packages" should be specified with –g option to create the repository.

```
# createrepo –v –g TSUBASA-groups.xml /var/www/html/repos/TSUBASA
```

⚠ Note

- TSUBASA-groups.xml is provided for each OS version. Please use the file under the directory of corresponding version.
- Whenever you update some of the package files in /var/www/html/repos/TSUBASA/rpms, you should update the repository data using createrepo command.

3.4 Yum settings

On all VHs to install SX-Aurora TSUBASA system software, perform the following settings.

(1) Install the repository configuration package for SX-Aurora TSUBASA

Install TSUBASA-soft-release-1.0-1.noarch.rpm included in the VESW-*X.X.X*-el7-x86_64.zip that is gotten in "3.2 Getting the Software Packages".

```
# rpm -ivh TSUBASA-soft-release-1.0-1.noarch.rpm
```

The following files are installed by this package.

- /etc/pki/rpm-gpg/RPM-GPG-KEY-TSUBASA-soft
  GPG public key file
- /etc/yum.repos.d/TSUBASA-local.repo
  Yum repository setting file

(2) Edit the repository setting file

Edit the /etc/yum.repos.d/TSUBASA-local.repo file installed in (1) as follows.

- For standalone system
  Edit TSUBASA-local.repo file so as to refer the local repository by 'baseurl'.

```
  :
baseurl=file:///var/www/html/repos/TSUBASA
```

- Except for standalone system
  Edit TSUBASA-local.repo file and change the host name of 'baseurl' to the host name or the IP address of the yum repository server for SX-Aurora TSUBASA software. The following example shows the IP address of the repository server is 192.168.0.1.

```
                :
```

```
baseurl=http://192.168.0.1/repos/TSUBASA
```

(3) Update the yum cache data

Update the cache data of yum command to reflect the change.

```
# yum --disablerepo=* --enablerepo=TSUBASA-local makecache
```

⚠ Note

Whenever you update the repository settings, you should update the cache data too.

3.5 Installing SX-Aurora TSUBASA system software

Please install each software by mentioned order at this chapter.
Please be sure to install the software indicated with “required”. Please install the software indicated with “optional” as the need case.

3.5.1 License access library (optional)

On all hosts on which the HPC System Software is executed, client settings to be able to connect to license server are required. The software that connect to license server are as follows:

- ScaTeFS Client
- NEC MPI
- C/C++ compiler
- Fortran compiler

Install the license access library package on all client hosts.

```
# yum -y install aurlic-lib
```

On client hosts, it is required to set information of the license server from which the HPC software programs will allocate licenses. There are two methods to set license server from which the client programs will allocate licenses.

(1) Configuration file

When all programs on a client host use the same license server, the configuration file /opt/nec/aur_license/aur_license.conf can be used to set the license server information such as hostname and port number.

The items to be set are hostname of license server and port number as follows.

Table 7 Client Settings

Items	Titles	Values
Hostname of license server	License_server_host	Hostname string
Port number	License_server_port	Port number (decimal)

Example of aur_license.conf

```
License_server_host=sv_host
License_server_port=7300
```

This setting is necessary to use the license for ScaTeFS/Client.

(2) Environment variables

For the client programs (daemon program of NEC MPI, C/C++ compiler, Fortran compiler), destination license server can be set to each program's process by using the following environment variables.

Table 8 Environment variables to set destination license server

Items	Environment variables
Hostname of license server	AURLIC_SERVER_HOSTNAME
Port number	AURLIC_SERVER_PORT

Example using bash

```
$ export AURLIC_SERVER_HOSTNAME="sv_host"
$ export AURLIC_SERVER_PORT="7300"
```

The setting by the environment variables is prior to the configuration file.

⚠ Note

Please refer to “HPC Software License Management Guide” included in the related software product, and set up the license server.

3.5.2 VEOS Application Runtime (required)

Install VEOS packages by yum command on the VH.

```
# yum -y groupinstall veos-apprun
```

The following packages will be installed.

- coreutils-ve
- gdb-ve
- glibc-ve
- libsysve
- libthread_db-ve
- libved
- procps-ng-ve
- psacct-ve
- psmisc-ve
- strace-ve
- sysstat-ve
- time-ve
- util-linux-ve
- ve-memory-mapping
- ve_drv-kmod
- velayout
- veos

- veos-libveptrace
- veosinfo
- vesysinit
- vesysinit-udev
- vp-kmod

VEOS services are invoked as the post process of installation and they are configured to be invoked automatically at boot time of VH except for psacct-ve.

In case you need to install musl-libc environment, please run the following command additionally.

```
# yum -y install musl-libc-ve libsysve-musl
```

3.5.3 VEOS Application Development (optional)

Install VEOS packages by yum command on the VH.

```
# yum -y groupinstall veos-appdev
```

The following packages will be installed.

- autoconf-ve
- automake-ve
- gdb-ve
- glibc-ve
- glibc-ve-devel
- kernel-headers-ve
- libgcc-ve-static
- libsysve
- libsysve-devel
- libthread_db-ve
- libtool-ve

- libved
- vedebuginfo
- velayout
- veos-headers
- veos-libveptrace

In case you need to install musl-libc environment, please run the following command additionally.

```
# yum -y install musl-libc-ve musl-libc-ve-devel libsysve-musl libsysve-musl-devel veos-musl-headers
```

3.5.4 InfiniBand for SX-Aurora TSUBASA (optional)

(1) This package requires Mellanox OFED. Please download ISO image, Mellanox OFED for Linux User Manual and Mellanox OFED for Linux Release Notes from following website of Mellanox Technologies, and install Mellanox OFED on the target VH.

http://www.mellanox.com/page/products_dyn?product_family=26

The correspondence of the OS version of VHs and version of Mellanox OFED to be installed is as follows. Please install the corresponding version of Mellanox OFED.

Table 9 Corresponding version of Mellanox OFED

OS	Mellanox OFED
RHEL/CentOS 7.3	Mellanox OFED 3.4-2.1.9.0.1
RHEL/CentOS 7.4	Mellanox OFED 4.2-1.2.0.0
RHEL/CentOS 7.5	Mellanox OFED 4.3-3.0.2.1

⚠ Note

Some packages are required at “2.3 Installing Mellanox OFED” in “Mellanox OFED for Linux User Manual”. Please refer “1.3 Hardware and Software Requirements” in “Mellanox OFED for Linux Release Notes” before installation of Mellanox OFED.

Rebooting the target VH may be required after installation of Mellanox OFED. Please

refer “Mellanox OFED for Linux User Manual” for details.

When the kernel has been updated, installation by mlnxofedinstall may fail. In this case, executing mlnx_add_kernel_support.sh or mlnxofedinstall with --add-kernel-support option is required. Please add --kmp option when executing these commands.

(2) Install the packages by yum command on the VH.

```
# yum -y groupinstall ve-infiniband
```

If you use musl-libc, install the packages for musl-libc as follows.

```
# yum -y install libibverbs-ve-musl libmlx5-ve-musl libvedma-ve-musl
```

(3) Start ve_peermem service

```
# /etc/init.d/ve_peermem start
```

This service will be started automatically on reboot of VH.

(4) Invoke VEMM service.

```
# systemctl start vemmd
```

(5) Restart VEOS service to enable InfiniBand.

```
# systemctl restart ve-os-launcher@*
```

(6) Configure VEMM service to invoke automatically at boot time of VH.

```
# systemctl enable vemmd
```

3.5.5 MMM (required)

Install MMM packages by yum command on the VH.

```
# yum -y groupinstall mmm
```

The following packages will be installed.

- mmm
- libsignature
- ve-power

- mmm-msl
- mmm-analysis
- ve-firmware
- ftmon
- rtmon

Host boot up services will be automatic startup.

3.5.6 VMC Firmware (required)

Install VMCFW packages by yum command on the VH.

```
# yum -y install vmcfw
```

3.5.7 ScaTeFS Client (optional)

Install the packages by yum command on the VH.

```
# yum -y groupinstall scatefs-client-tsubasa
```

The following packages will be installed.

[RHEL 7.3/CentOS 7.3]

- scatefs-client-modules-mlnx_ofed
- scatefs-client-mount-utils
- scatefs-client-libscatefsib
- scatefs-client-libscatefsib_ve
- scatefs-client-utils
- scatefs-client-rcli-utils

[RHEL 7.4 or later/CentOS 7.4 or later]

- kmod-scatefs-client-modules-mlnx_ofed
- scatefs-client-mount-utils
- scatefs-client-libscatefsib
- scatefs-client-libscatefsib_ve
- scatefs-client-utils

- scatefs-client-rcli-utils

The service is configured to be invoked automatically at boot time of VH.

3.5.8 Tuning Tool (optional)

Install the packages by yum command on the VH.

```
# yum -y groupinstall nec-tuningtool
```

The following packages will be installed.

- nec-veperf
- nec-ftraceviewer

3.5.9 NEC Parallel Debugger (optional)

NEC Parallel Debugger is an Eclipse PTP plugin for debugging. Install the packages by yum command on the host where Eclipse PTP is launched and on the VH.

```
# yum -y install nec-paralleldebugger
```

3.5.10 NQSV/JobServer (optional)

Install the package by yum command on the VH.

```
# yum -y install NQSV-JobServer
```

3.5.11 NQSV/Client (optional)

It is no need to install NQSV/Client when you don't use NQSV commands on VHs.
Install the package by yum command on the VH.

```
# yum -y install NQSV-Client
```

3.5.12 Numeric Library Collection (optional)

Install the packages by yum command on the VH.

```
# yum -y groupinstall nec-nlc-1.0.0
```

The following packages will be installed.

- nec-nlc-base-1.0.0
- nec-asl-ve-1.0.0
- nec-aslfftw-ve-1.0.0
- nec-blas-ve-1.0.0
- nec-sblas-ve-1.0.0
- nec-lapack-ve-1.0.0
- nec-scalapack-ve-1.0.0
- nec-heterosolver-ve-1.0.0
- nec-sca-ve-1.0.0
- nec-nlc-doc-1.0.0

3.5.13 binutils (required)

Install the package by yum command on the VH.

```
# yum -y install binutils-ve
```

3.5.14 C/C++ compiler (optional)

(1) Make the package files available on the machine where the installation is performed.

(2) Install the packages by rpm command on the VH.(binutils-ve has to be installed.)

```
# rpm -i nec-nc++-X.X.X-X.X.X-X.x86_64.rpm
# rpm -i nec-nc++-inst-X.X.X-X.noarch.rpm
# rpm -i nec-nc++-doc-X.X.X-X.X.X-X.noarch.rpm
```

Note

If the musl-libc version (1.*X*.*X*) is installed, execute the following command.

```
# rpm -i nec-nc++-X.X.X-X.x86_64.rpm
# rpm -i nec-nc++-musl-inst-X.X.X-X.noarch.rpm
# rpm -i nec-nc++-doc-X.X.X-X.noarch.rpm
```

3.5.15 Fortran compiler (optional)

(1) Make the package files available on the machine where the installation is performed.

(2) Install the packages by rpm command on the VH.(binutils-ve and nec-nc++ have to be installed.)

```
# rpm -i nec-nfort-X.X.X-X.X.X-X.x86_64.rpm
# rpm -i nec-nfort-inst-X.X.X-X.noarch.rpm
# rpm -i nec-nfort-doc-X.X.X-X.X.X-X.noarch.rpm
```

Note

If the musl-libc version (1.*X*.*X*) is installed, execute the following command.

```
# rpm -i nec-nfort-X.X.X-X.x86_64.rpm
# rpm -i nec-nfort-musl-inst-X.X.X-X.noarch.rpm
# rpm -i nec-nfort-doc-X.X.X-X.noarch.rpm
```

(3) Install the packages by rpm command on all VHs.

```
# rpm -i nec-nfort-runtime-X.X.X-X.x86_64.rpm
```

3.5.16 NEC MPI (optional)

NEC MPI software consists of the following two package sets. A portion of Library Group Package “X-Y-Z” means a version number. If X is 2, the packages support glibc. If X is 1, the packages support musl-libc.

- Runtime Package

  nec-mpi-runtime package

- Library Group Packages

  nec-mpi-devel-X-Y-Z, nec-mpi-libs-X-Y-Z, nec-mpi-utils-X-Y-Z packages

To install NEC MPI, the following instructions (1) and (2) perform installation the Runtime Package and the Library Group Packages.

Additionally, NEC MPI requires nec-veperf package of Tuning Tool. You should install Tuning Tool on the VHs where NEC MPI is installed referring 3.5.8.

(1) Install of the Runtime Package

Install the package with the following yum command on the install target VHs

```
# yum -y install nec-mpi-runtime
```

(2) Install of the Library Group Packages

Find the available groups with the following yum command on the install target VHs.

```
# yum grouplist -v "nec-mpi-*"
Available Groups:
   NEC MPI 1-3-0 (nec-mpi-1-3-0)
   NEC MPI 2-0-0 (nec-mpi-2-0-0)
```

In the list, group names beginning with “NEC MPI” refer to NEC MPI Library Groups. Please install the listed Library Group Package. If a Library Group “NEC MPI 2-0-0” (nec-mpi-2-0-0) is listed, please install the package group with the following yum command.

```
# yum -y groupinstall nec-mpi-2-0-0
```

The following packages are installed with this command.

- nec-mpi-devel-2-0-0
- nec-mpi-libs-2-0-0
- nec-mpi-utils-2-0-0

3.6 VH Restart

After installation of necessary software, please reboot the VH. Execute reboot command on the VH.

```
# reboot
```

3.7 Confirmation

After the VH restarted, please confirm that VE card is ONLINE by the following ways.

- By using vecmd command:

```
# /opt/nec/ve/bin/vecmd state get
Vector Engine MMM-Command v1.0.0
Command:
state -N 0 get
--------------------------------------------------------------------------------
VE0 [03:00.0] [ ONLINE                    ] Last Modif:2017/11/29 10:18:00
--------------------------------------------------------------------------------
Result: Success
```

- By using uptime command:

```
$ unset VE_NODE_NUMBER
$ /opt/nec/ve/bin/uptime | grep Node
VE Node: 0
```

The “*N*” in “VE Node: *N*” of the above result is the usable VE node number.

Chapter4 Before start using

To begin to use SX-Aurora TSUBASA system, please set the next every each software.

⚠ Note

There are some command lines started with '#' prompt in this chapter. They should be executed with super user privileges.

4.1 Operation Network Setup

Set up ib0 interface when using Infiniband (IP over IB) for operation network. Please refer to “Appendix B Network” about the operation network.

```
# nmcli connection add type infiniband autoconnect yes con-name ib0 ifname ib0
# nmcli connection mod ib0 ipv4.method manual ipv4.address “XX.XX.XX.XX/YY”(*Note)
```

(*Note: XX.XX.XX.XX is IP address for IP over IB, YY is bit number of netmask)

In case two or more HCA cards are installed, add bond0 interface with active-backup mode using two HCAs, and set up bond0 interface.

```
# nmcli connection add type bond con-name bond0 ifname bond0 mode active-backup
# nmcli connection mod bond0 ipv4.method disabled ipv6.method ignore
# nmcli connection add type infiniband autoconnect yes ifname ib0 master bond0
# nmcli connection add type infiniband autoconnect yes ifname ib1 master bond0
# nmcli connection mod bond0 +bond.options primary=ib0
# nmcli connection mod bond0 +bond.options miimon=100,updelay=100,downdelay=100
# nmcli connection mod bond0 ipv4.method manual ipv4.address “XX.XX.XX.XX/YY”(*Note)
```

(*Note: XX.XX.XX.XX is IP address for IP over IB, YY is bit number of netmask)

Set up Ethernet interface when using Ethernet for operation network. The name of Ethernet interface may vary depending on models. You need to check the Ethernet interface name using ifconfig or ip command and then, set it up.

```
# ifconfig –a
enp129s0f0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
        inet xx.xx.xx.xx  netmask yy.yy.yy.yy  broadcast zz.zz.zz.zz
        inet6 fe80::ec4:7aff:feea:d338  prefixlen 64  scopeid 0x20<link>
        ether 0c:c4:7a:ea:d3:38  txqueuelen 1000  (Ethernet)
        RX packets 215948  bytes 27415658 (26.1 MiB)
```

```
        RX errors 0   dropped 0   overruns 0   frame 0
        TX packets 943   bytes 475319 (464.1 KiB)
        TX errors 0   dropped 0 overruns 0   carrier 0   collisions 0

enp129s0f1: flags=4099<UP,BROADCAST,MULTICAST>   mtu 1500
        ether 0c:c4:7a:ea:d3:39   txqueuelen 1000   (Ethernet)
        RX packets 0   bytes 0 (0.0 B)
        RX errors 0   dropped 0   overruns 0   frame 0
        TX packets 0   bytes 0 (0.0 B)
        TX errors 0   dropped 0 overruns 0   carrier 0   collisions 0

# nmcli connection add type ethernet autoconnect yes con-name enp129s0f1 ifname enp129s0f1
# nmcli connection mod enp129s0f1 ipv4.method manual ipv4.address "XX.XX.XX.XX/YY"(Note)
```

(Note: enp129s0f1 is operation network interface name (This may vary depending on models). XX.XX.XX.XX is IP address for IP over IB, YY is bit number of netmask.)

Finally, restart network service.

```
# systemctl restart network
```

4.2 ScaTeFS Client Setup

When you use ScaTeFS on VHs, the following settings are necessary.
See "Chapter6 Setting the Linux client" section of "NEC Scalable Technology File System (ScaTeFS) Administrator's Guide".
In addition, the HugePages configuration is also necessary. Perform the HugePages configuration in "4.7 HugePages Setup".

4.3 NQSV Setup

When you use NQSV on VHs, perform the setting of job server and client described in NEC Network Queuing System V (NQSV) User's Guide [Management].
Then, place a configuration file (/etc/opt/nec/nqsv/resource.def) to configure device resources on the each job server host, according to "5.4 HCA Assignment Feature" of NEC Network Queuing System V (NQSV) User's Guide [JobManipulator].

4.4 NEC MPI Setup

This section describes the settings needed on all VHs where MPI programs are launched.

In addition, the HugePages configuration is also necessary. Perform the HugePages configuration in "4.7 HugePages Setup".

4.4.1 SELinux

If SELinux is enabled, please perform the following setting. Otherwise it is not needed.

Please turn on the parameter use_nfs_home_dirs of SELinux if MPI programs are executed over multiple VHs and the home directory is mounted via NFS or ScaTeFS:

```
# setsebool -P use_nfs_home_dirs 1
```

It means success if the message "use_nfs_home_dirs --> on" is displayed by executing the following command:

```
# getsebool use_nfs_home_dirs
use_nfs_home_dirs --> on
```

4.4.2 Firewall

If the firewall is enabled, please perform the following setting. Otherwise it is not needed.

NEC MPI uses TCP/IP ports from 25257 through 25266 by default in order to accept connections. Therefore, please execute the following commands to open the ports.

```
# firewall-cmd --zone=public --permanent --add-port=25257-25266/tcp
# firewall-cmd --reload
```

It means success if the open ports are displayed by executing the following command:

```
# firewall-cmd --list-port --zone=public
25257-25266/tcp
```

Note that the TCP/IP ports used by NEC MPI can be changed with the environment variable NMPI_PORT_RANGE. The following example sets the TCP/IP port range from 25257 to 25266.

```
# export NMPI_PORT_RANGE=25257:25266
```

4.4.3 InfiniBand QoS

If QoS (Quality of Service) is enable on InfiniBand Subnet Manager, please set the service level used by NECMPI. If QoS it not enable, this setting is not needed.

The service level used by NECMPI is set in the configuration file /etc/opt/nec/ve/mpi/necmpi.conf. In this file, set the service level after the keyword "ib_qos_venode" with blank. If there is no setting, the service level 0 is applied. If the beginning of the line is "#", the line is treated as a comment and ignored.

```
# Ex) In the case that the service level 2 is set
ib_qos_venode    2
```

4.5 NEC Parallel Debugger Setup

When you use NEC Parallel Debugger on VHs, the settings described in this section are necessary.

NEC Parallel Debugger is an Eclipse PTP plugin for debugging. This section describes the settings needed on the host where the Eclipse PTP is launched and on the VH where the debugged programs by NEC Parallel Debugger are launched.

4.5.1 Install Eclipse PTP

On the host where the Eclipse PTP is launched, download Eclipse PTP distribution from the Eclipse official site, Oxygen verion3 which is the latest version.

Expand downloaded file under the install directory (/INST-DIR in the following example).

```
# tar zxvf eclipse-parallel-oxygen-3-linux-gtk-x86_64.tar.gz –C /INST-DIR
```

The execution command of Eclipse PTP is /INST-DIR/eclipse/eclipse. Please setup PATH environment variable for this command.

4.5.2 Set up NEC Parallel Debugger plugin

On the host where the Eclipse PTP is launched, store NEC Parallel Debugger plugin

under the plugins directory in the Eclipse PTP environment.

```
# cp /opt/nec/ve/npdb/plugins/com.nec.ParallelDebugger_*.jar /INST-DIR/eclipse/plugins/
```

4.5.3 Install the necessary software for Eclipse PTP

On the VH, install the necessary software for Eclipse PTP. The software is as follows. Please download the latest version of the software from the CPAN Search Site etc.

- Devel-GDB
- Expect
- IO-Tty

The installation procedure is described below.

(1) Devel-GDB

Expand downloaded file under arbitrary directory, make and install it.

```
# tar zxvf Devel-GDB-2.02.tar.gz
# cd Devel-GDB-2.02
# perl Makefile.PL
# make
# make test
# make install
```

(2) Expect

Expand downloaded file under arbitrary directory, make and install it.

```
# tar zxvf Expect-1.35.tar.gz
# cd Expect-1.35
# perl Makefile.PL
# make
# make test
# make install
```

(3) IO-Tty

Expand downloaded file under arbitrary directory, make and install it.

```
# tar zxvf IO-Tty-1.12.tar.gz
# cd IO-Tty-1.12
# perl Makefile.PL
# make
```

```
# make test
# make install
```

4.5.4 Set up Firewall

On the VH, if the firewall is enabled, please perform the following setting. Otherwise it is not needed.

SDM (Scalable Debug Manager) which is a component of Eclipse PTP working with NEC Parallel Debugger is launched per a debugged program and uses TCP/IP ports from 50000 through 50079 by default in order to accept connections. Therefore, please execute the following commands to open the ports.

```
# firewall-cmd --zone=public --permanent --add-port=50000-50079/tcp
# firewall-cmd --reload
```

It means success if the open ports are displayed by executing the following command:

```
# firewall-cmd --list-port --zone=public
50000-50079/tcp
```

Note that the TCP/IP ports used by NEC Parallel Debugger can be changed with the environment variable NPDB_SDM_PORTRANGE. The following example changes the TCP/IP ports from 51000 to 51100.

```
# export NPDB_SDM_PORTRANGE=51000:51100
```

4.6 The confirmation of memlock resource setting

When you install "VEOS Application Runtime", the memlock resource is set to "unlimited". Confirm it executing the following command.

```
# ulimit -l
unlimited
```

If the printed value is not "unlimited", please logout and login the host, then re-confirm it.

4.7 HugePages Setup

ScaTeFS Client, NEC MPI and VEOS use HugePages. Please configure the HugePages following the sections below.

4.7.1 Check the installed package version

(1) ScaTeFS Client version can be seen by the following command.

```
# rpm -qi scatefs-client-utils | grep -i version
Version      : 3.0.10.1
```

(2) NEC MPI version can be seen by the following command.

```
# rpm -qi nec-mpi-runtime | grep -i version
Version      : 1.1.1
```

(3) VEOS version can be seen by the following command.

```
# rpm -qi veos | grep -i version
Version      : 2.0.1
```

The above version is an example. The displayed version may be different from the above.

4.7.2 HugePages parameter setting

When any of the following conditions are met, perform the setting of this section.

- ScaTeFS Client version 3.0.10.1 or later has been installed
- NEC MPI version 1.1.0 or later has been installed
- VEOS version 2.0.1 or later has been installed

(1) Check the number of HugePages

The number of HugePages to be configured is different depending on each models and packages version. The number of HugePages for each models and packages version is shown in the following table.

For example, in case of Model A300-2, NEC MPI version 1.1.1 or later uses 128, ScaTeFS/Client version 3.0.10.1 or later uses 512 and VEOS version 2.0.1 or later

uses 512. So, the number of HugePages should be set to 1152.

2MB memory is allocated for every single HugePage.

a) Model A100-1

Installed package	Required the number of huge pages
NEC MPI 1.1.0 or later	0
ScaTeFS/Client 3.0.10.1 or later	0 (ScaTeFS/Client cannot be installed)
VEOS 2.0.1 or later	256

b) Model A300-2

Installed package	Required the number of huge pages
NEC MPI 1.1.0 or later	128
ScaTeFS/Client 3.0.10.1 or later	512
VEOS 2.0.1 or later	512

c) Model A300-4

Installed package	Required the number of huge pages
NEC MPI 1.1.0 or later	256
ScaTeFS/Client 3.0.10.1 or later	2048
VEOS 2.0.1 or later	1024

d) Model A300-8

Installed package	Required the number of huge pages
NEC MPI 1.1.0 or later	0
ScaTeFS/Client 3.0.10.1 or later	512
VEOS 2.0.1 or later	2048

e) Model A500-64

Installed package	Required the number of huge pages
NEC MPI 1.1.0 or later	0
ScaTeFS/Client 3.0.10.1 or later	512
VEOS 2.0.1 or later	2048

(2) HugePages configuration

The following steps are one example to configure HugePages when using the model A300-2, NEC MPI version 1.1.1 or later, ScaTeFS/Client version 3.0.10.1 or later and VEOS 2.0.1 or later.

① Check the current number of HugePages by the following command.

If the number is not zero, check /etc/sysctl.conf to see if the configuration has already been done. If it has configured for the software other than SX-Aurora TSUBASA, it could be a not zero.

```
# sysctl vm.nr_hugepages
vm.nr_hugepages = 0
```

② Calculate the number of HugePages to be configured by adding the current number and the number checked by the table in (1). If the current number is equal to zero, the total number of HugePages to be configured becomes 1152 (= 0 + 1152).

③ Edit the /etc/sysctl.conf to add one line of vm.nr_hugepages with the total number of HugePages calculated in the previous step. If such a line has already there, replace the number of HugePages.

```
# vi /etc/sysctl.conf
vm.nr_hugepages = 1152
```

Make the HugePages configuration available by the following command.

```
# sysctl --system
```

④ Confirm the number of HugePages by the following command. In this example, it means the HugePages configuration successfully completed, if the message “vm.nr_hugepages = 1152” is displayed.

```
# sysctl vm.nr_hugepages
vm.nr_hugepages = 1152
```

4.8 How to execute programs on VEs of SX-Aurora TSUBASA

There are two ways to execute programs on VEs as below.

- Execution with ve_exec command
- Execution without ve_exec command

(1) Execution with ve_exec command

It is necessary to use ve_exec command to execute programs on VEs in the SX-Aurora TSUBASA system. To omit the ve_exec command in the command lines, see (2) Execution without ve_exec command.

```
[Example]
In the case of an MPI program:
  $ mpirun -host 0 -ve 0-1 -np 16 /opt/nec/ve/bin/ve_exec ./mpi.lm
mpi.lm is the file name of the program to execute.

In the case of a non-MPI program:
  $ /opt/nec/ve/bin/ve_exec ./nonmpi.lm
nonmpi.lm is the file name of the program to execute.
```

(2) Execution without ve_exec command

You can use “binfmt” function of Linux system to execute programs on VEs without specifying ve_exec command in the command line as follows.

The settings are already done in the installation of veos 1.0.3 or later.

```
In the case of an MPI program:
$ mpirun -host 0 -ve 0-1 -np 16 ./mpi.lm
mpi.lm is the file name of the program to execute.

In the case of a non-MPI program:
$ ./nonmpi.lm
nonmpi.lm is the file name of the program to execute.
```

The above description fits for all of the execution in batch job, in interactive batch job and in interactive mode.

Chapter5 Update with easy install tool

This section explains how to update software on Vector Island with the easy install tool.
Please refer to “Chapter6 Manual update” for the steps of manual updating.

⚠ Note

- The target software of update by the easy install tool is only the SX-Aurora TSUBASA free software.
- The easy install tool makes SX-Aurora TSUBASA local repository under /var/www/html/repos/TSUBASA. If the local repository has already been made at the same location and the Yum repository configuration file (/etc/yum.repos.d/TSUBASA-local.repo) is set as below,
  baseurl=http://(hostname or IP address of VH)/repos/TSUBASA
  you can use the easy install tool for updating the SX-Aurora TSUBASA software by changing the Yum repository configuration file settings as below.
  baseurl=file:///var/www/html/repos/TSUBASA
- There are some command lines started with '#' prompt in this chapter. They should be executed with super user privileges.

5.1 Getting the Software Packages

Update package of the free software of SX-Aurora TSUBASA system for the easy install tool is provided as ve-software-*X.X.X*.zip at the location below.

Getting the Software Packages

VE Software Download Site:

- https://jpn.nec.com/hpc/aurora/ve-software/

or

- https://www.nec.com/en/global/prod/hpc/aurora/ve-software/

Please confirm the package version and get it.

5.2 Before update

5.2.1 Disconnect the VH from the scheduler

If you use job scheduler, refer to “6.4.1 Disconnect the VH from the scheduler” and disconnect the target VHs from the scheduler operation.

5.2.2 Exclude the VH from monitoring

At the monitoring software (Zabbix or Ganglia+Nagios), Please set all VEs into MAINTENANCE mode which is installed on the VH.

5.2.3 Prepare the easy install tool

Extract the ve-software-*X.X.X*.zip file that is gotten from VE software download site under an arbitrary directory as follows.

```
# unzip ve-software-X.X.X.zip
```

The next files are extracted under the directory.

- README
- install-scripts/install.sh
- mmm_vmcfw-*X.X.X*-el7-x86_64.zip
- veos-*X.X.X*-el7-x86_64.zip
- VESW-*X.X.X*-el7-x86_64.zip

5.3 Update software

Execute the following steps at the directory under which the zip file is extracted.

(1) Execute installation script

Execute install.sh. Please refer to “2.4.2 Execution of installation by the easy install tool”

```
# ./install-scripts/install.sh
```

(2) Select Update

Select update (u) for the installation mode.

```
Please select the installation mode. (i:install/u:update) default:install : u
```

(3) Confirm starting update

The software to be updated will be listed. To start update, enter ‘y’.

```
Update 6 Group(s)
============================================================
License access library
VEOS Application Runtime
VEOS Application Development
InfiniBand for SX-Aurora TSUBASA
Monitoring and Maintenance Manager
VMC Firmware package
============================================================
Is this ok? (y/n) default:n : y
```

(4) Confirm completion

The following message will be displayed when the update is completed.

```
NEC SX-aurora TSUBASA basic ve-software update Complete!
```

(5) Update VMC firmware

The following message will be displayed when a new version of VMC firmware is found to be updated.

```
VMCFW version is differ from now installed.
please update VMCFW after install all softwares,
See installation guide
```

If the message is displayed, refer to “6.5.6 VMC Firmware” and update VMC firmware.

5.4 After update

5.4.1 Restart monitoring of the VH

At the monitoring software (Zabbix or Ganglia+Nagios), Please release all VEs from MAINTENANCE mode which connect to the VH, and put all VEs into the monitoring target.

5.4.2 Return the VH to job scheduler's operation

If you use job scheduler, refer to “6.6.4 Return the VH to job scheduler's operation” and return the target VHs to the scheduler operation.

Chapter6 Manual update

This section explains how to update software on Vector Island manually.

⚠ Note

There are some command lines started with '#' prompt in this chapter. They should be executed with super user privileges.

When you update the SX-Aurora TSUBASA system software, the free software packages can be updated automatically with the easy install tool. Please refer to “Chapter5 Update with easy install tool” for the steps of updating with the tool.

6.1 Getting the Software Packages

For the free software of SX-Aurora TSUBASA system, update packages can be gotten from the location described in “3.2 Getting the Software Packages Table 6 Location of the Software”.

And the non-free software’s update packages are delivered at the NEC support portal site (Please contact the person in charge to get update packages.).

6.2 Update of SX-Aurora TSUBASA software repository

In case of update SX-Aurora TSUBASA software, the SX-Aurora TSUBASA software repository is needed. Prepare the repository on the management server as follow steps.

(1) Copy package files

If the repository has already been made at installation, copy the update package files (except C/C++ compiler and Fortran compile) into the rpms directory under the repository (/var/www/html/repos/TSUBASA/rpms).

Otherwise, make the repository using the update package files according to “3.3 Making SX-Aurora TSUBASA software repository”.

(2) Update group definition file

When you update NEC MPI, you should add a group definition for new version of

NEC MPI in the YUM group configuration file (TSUBASA-groups.xml) by referencing an existing group definition for NEC MPI.

The following example shows the modification to add the group definition for “NEC MPI version 2.1.0” when the group “NEC MPI version 2.0.0” is defined. The element “<name>NEC MPI 2-0-0</name>” in the <group> element is the group definition for “NEC MPI version 2.0.0”. “2-0-0” in this group definition represents its version number “2.0.0”. The group definition for “NEC MPI version 2.1.0” is added by copying the <group> element for “NEC MPI version 2.0.0” and replacing “2-0-0” (version 2.0.0) with “2-1-0” (version 2.1.0) in the elements <id>, <name>, and <packagereq>.

⚠ Note

If a <packagereq> element whose content is nec-mpi-runtime exists, you should delete the <packagereq> element to remove the nec-mpi-runtime package from the NEC MPI group definition.

```
<?xml version="1.0" encoding="UTF-8"?>
<!DOCTYPE comps PUBLIC "-//Red Hat, Inc.//DTD Comps info//EN" "comps.dtd">
<comps>
    :
  <group>
    <id>nec-mpi-2-0-0</id>
    <default>false</default>
    <uservisible>true</uservisible>
    <display_order>1024</display_order>
    <name>NEC MPI 2-0-0</name>
    <description></description>
     <packagelist>
       <packagereq type="default">nec-mpi-devel-2-0-0</packagereq>
       <packagereq type="default">nec-mpi-libs-2-0-0</packagereq>
       <packagereq type="default">nec-mpi-utils-2-0-0</packagereq>
     </packagelist>
  </group>
  <group>
    <id>nec-mpi-2-1-0</id>
    <default>false</default>
    <uservisible>true</uservisible>
    <display_order>1024</display_order>
    <name>NEC MPI 2-1-0</name>
    <description></description>
     <packagelist>
```

```
        <packagereq type="default">nec-mpi-devel-2-1-0</packagereq>
        <packagereq type="default">nec-mpi-libs-2-1-0</packagereq>
        <packagereq type="default">nec-mpi-utils-2-1-0</packagereq>
      </packagelist>
    </group>
</comps>
```

(3) Update the repository

Update the SX-Aurora TSUBASA software repository with createrepo command.

```
# createrepo -v -g TSUBASA-groups.xml /var/www/html/repos/TSUBASA
```

(4) Update the yum cache data

Update the yum cache data **on all VHs**.

```
# yum --disablerepo=* --enablerepo=TSUBASA-local makecache
```

6.3 Update steps

The before procedures and the after steps for update of software are different every software.

Please confirm the necessary steps every software. Please be sure to do the before steps and the after steps for update of software. Please do the steps by the order indicated in the following.

Table 10 Update Steps

	Before update				After update			
order	1	2	3	4	1	2	3	4
Steps / Software	Disconnect the VH from job scheduler.	Exclude the VH from monitoring.	Put VEs into MAINTENANCE mode.	Stop VEOS and MMM.	Restart VEOS and MMM.	Confirm VE into ONLINE.	Restart monitoring of the VH.	Return the VH to job scheduler's
License Access Library								
VEOS Application Runtime	✓	✓	✓	✓	✓	✓	✓	✓
VEOS Application Development								
InfiniBand for SX-Aurora TSUBASA(ve_peermem)	✓	✓	✓	✓	✓	✓	✓	✓
InfiniBand for SX-Aurora TSUBASA (other than ve_peermem)								
MMM	✓	✓	✓	✓	✓	✓	✓	✓
VMC Firmware	✓	✓	✓	(*1)		✓	✓	✓
ScaTeFS Client	✓	✓					✓	✓
NEC MPI								
Tuning Tool								
NQSV/JobServer	✓							✓
NQSV/Client								
Numeric Library Collection								
binutils								
C/C++ compiler								
Fortran compiler								
NEC Parallel Debugger								

(*1) Don’t stop VEOS and MMM on the target VHs when updating VMC Firmware.

Details of each steps are described below.

6.4 Before update

This section explains the before procedures for updating software. Please confirm the necessary steps by Chapter 6.3 Update steps.

6.4.1 Disconnect the VH from the scheduler

If you use job scheduler, disconnect the target VHs from the scheduler operation.

(1) Unbind a job server on target VH from the queue which is being operated using the unbind execution_queue sub command of qmgr(1M) on the host installing NQSV/Client. For example the 100th job server is unbound from the bq queue by the following operation.

```
$ qmgr -Pm
Mgr: unbind execution_queue job_server bq job_server_id = 100
```

Use unbind interactive_queue sub command for interactive queue.

(2) Confirm that no jobserver ID of the jobserver which are unboud by above operation are not displayed in JSVNO column of the result of sstat -J.

```
$ qstat –J –Pm
```

When job exist on the jobserver, perform the one of the following operation according to your operation policy.

- waiting of finishing of execution of a target job
- re-execution of a target job on different execution host by qrerun
- delete target job by qdel

(3) Stop the jobserver and launcher on the target VH using systemctl.

```
# systemctl stop nqs-jsv.target
```

6.4.2 Exclude the VH from monitoring

At the monitoring software (Zabbix or Ganglia+Nagios), Please set all VEs into MAINTENANCE mode which is installed on the VH.

6.4.3 Put VEs into MAINTENANCE mode

```
# /opt/nec/ve/bin/vecmd state set off
# /opt/nec/ve/bin/vecmd state set mnt
```

6.4.4 Stop VEOS and MMM

```
# systemctl stop vemmd
# /opt/nec/ve/veos/sbin/terminate-all-veos
# systemctl stop mmm
# modprobe -r ve_drv
```

6.5 Update software

This section explains how to update each software. Please confirm the necessary steps by “Chapter 6.3 Update steps” and be sure to do the steps.

6.5.1 License access library

Update the packages by yum command on the VH.

```
# yum update aurlic-lib
```

6.5.2 VEOS Application Runtime

Update VEOS packages by yum command on the VH.

```
# yum groupupdate veos-apprun
```

The following packages will be updated.

- coreutils-ve
- gdb-ve
- glibc-ve
- libsysve
- libthread_db-ve
- libved

- procps-ng-ve
- psacct-ve
- psmisc-ve
- strace-ve
- sysstat-ve
- time-ve
- util-linux-ve
- ve-memory-mapping
- ve_drv-kmod
- velayout
- veos
- veos-libveptrace
- veosinfo
- vesysinit
- vesysinit-udev
- vp-kmod

In case you need to update musl-libc environment, please run the following command additionally.

```
# yum -y update musl-libc-ve libsysve-musl
```

6.5.3 VEOS Application Development

Update VEOS packages by yum command on the VH.

```
# yum groupupdate veos-appdev
```

The following packages will be updated.

- autoconf-ve
- automake-ve
- gdb-ve

- glibc-ve
- glibc-ve-devel
- kernel-headers-ve
- libgcc-ve-static
- libsysve
- libsysve-devel
- libtool-ve
- libved
- vedebuginfo
- velayout
- veos-headers
- veos-libveptrace

In case you need to update musl-libc environment, please run the following command additionally.

```
# yum -y update musl-libc-ve musl-libc-ve-devel libsysve-musl libsysve-musl-devel veos-musl-headers
```

6.5.4 InfiniBand for SX-Aurora TSUBASA

(1) When musl-libc is already installed and glibc is newly installed, mark the already installed packages as ve-infiniband group as follows.

```
# yum groups mark convert ve-infiniband
# yum groups mark remove ve-infiniband
```

(2) Confirm ve_peermem package will be updated or not.

```
# yum list updates | grep ve_peermem
```

When the ve_peermem package is displayed, ve_peermem's update is available. In that case, stop the ve_peermem service in (3). Otherwise, skip (3).

(3) Stop the service on the target VH

```
# /etc/init.d/ve_peermem stop
```

(4) Update the packages by yum command as follows.

```
# yum groupupdate ve-infiniband
```

(5) If you use musl-libc, also update the packages for musl-libc.

```
# yum update libibverbs-ve-musl
# yum update libmlx5-ve-musl
# yum update libvedma-ve-musl
```

(6) When you have stopped the ve_peermem service in (3), restart the service.

```
# /etc/init.d/ve_peermem start
```

6.5.5 MMM

Update MMM packages by yum command on the VH.

```
# yum groupupdate mmm
```

The following packages will be updated.

- mmm
- libsignature
- ve-power
- mmm-msl
- mmm-analysis
- ve-firmware
- ftmon
- rtmon

6.5.6 VMC Firmware

(1) Update VMCFW package by yum command on the VH.

```
# yum update vmcfw
```

(2) Update VMCFW data on VE with the following command on the VH.

```
# /opt/nec/ve/bin/vecmd fwup vmc aurora_MK10.bin
```

＊ Updating VMCFW data，it will take a few minutes.

(3) Reboot VH with the following command on the VH.

```
# reboot
```

After reboot the VH, VEOS, MMM are invoked automatically.

6.5.7 ScaTeFS Client

(1) When the ScaTeFS file system is exported by NFS on the VH to be updated, unmount the ScaTeFS file system that is exported by NFS on all the NFS clients, then go to (2).
When the ScaTeFS file system is not exported by NFS on the VH to be updated, go to (3).

(2) Stop the nfs service on the VH.

```
# systemctl stop nfs
```

(3) When the ScaTeFS file system is exported by the share of Samba on the VH to be updated, stop accessing the share on all the CIFS clients such as Windows, then go to (4).
When the ScaTeFS file system is not exported by the share of Samba on the VH to be updated, go to (5).

(4) Stop the smb service and the nmb service on the VH.

```
# systemctl stop smb
# systemctl stop nmb
```

(5) Unmount the ScaTeFS file system on the VH.

```
# umount -a -t scatefs
```

(6) Stop the scatefs-client service on the VH.

```
# systemctl stop scatefs-client
```

(7) Update the scatefs-client packages by yum command on the VH.

```
# yum groupupdate scatefs-client-tsubasa
```

The following packages will be updated.

[RHEL 7.3/CentOS 7.3]

- scatefs-client-modules-mlnx_ofed
- scatefs-client-mount-utils
- scatefs-client-libscatefsib
- scatefs-client-libscatefsib_ve
- scatefs-client-utils
- scatefs-client-rcli-utils

[RHEL 7.4 or later/CentOS 7.4 or later]

- kmod-scatefs-client-modules-mlnx_ofed
- scatefs-client-mount-utils
- scatefs-client-libscatefsib
- scatefs-client-libscatefsib_ve
- scatefs-client-utils
- scatefs-client-rcli-utils

(8) Configure system environment

ScaTeFS VE direct IB library uses HugePages. If all of the following conditions are met, and HugePages configuration has not been done, then configure HugePages. See "4.7 HugePages Setup" for details.

- Using A300-2 model or A300-4 model.
- Applying the ScaTeFS Client version 3.0.10.1 or later.

(9) Reboot the VH by reboot command. The ScaTeFS Client service will start by rebooting the VH.

```
# reboot
```

6.5.8 NEC MPI

NEC MPI is composed of the following two kinds of packages. Multiple versions of library group packages can be installed on a VH. “X-Y-Z” in the library group packages represents their version number. If X is 2, the packages support glibc. If X is 1, the packages support musl-libc.

- run-time package

  nec-mpi-runtime package

- library group packages

  nec-mpi-devel-X-Y-Z, nec-mpi-libs-X-Y-Z and nec-mpi-utils-X-Y-Z

To update NEC MPI, the following instructions (1), (2), and (3) perform update of the run-time package, install of the library group packages, and uninstall of library group packages, respectively.

⚠ Note

In order to run an NEC MPI program, the run-time package which was used to generate the executable file must be installed, and the versions of the library group packages must be the same.

(1) Update of the run-time package

If update files include a nec-mpi-runtime package, update the package with the following command.

```
# yum -y update nec-mpi-runtime
```

(2) Install of the library group packages

If update files include, for example, nec-mpi-devel-2-1-0, nec-mpi-libs-2-1-0, and nec-mpi-utils-2-1-0, update the packages with the following command after updating the group definition file, TSUBASA-groups.xml so that the group definition for “nec-mpi-2-1-0” is added, while referring to 6.2 (2) and its note.

```
# yum -y groupinstall nec-mpi-2-1-0
```

This command installs the following packages in addition to the existing packages.

- nec-mpi-devel-2-1-0
- nec-mpi-libs-2-1-0
- nec-mpi-utils-2-1-0

(3) Uninstall of the library group packages

If there are unnecessary library group packages installed, uninstall the packages.

See 7.3.8 (1) for details.

(4) Configure system environment

For a Rack Mount model and a Supercomputer model, but a Tower model, NEC MPI version 1.1.0 or later uses HugePages. When you use the corresponding version and HugePages is not configured yet, configure HugePages. See "4.7 HugePages Setup" for details.

6.5.9 Tuning Tool

Update the packages by the execution of yum command on the VH.

```
# yum groupupdate nec-tuningtool
```

The following packages will be updated.

- nec-veperf
- nec-ftraceviewer

6.5.10 NQSV/JobServer

Update the package by yum command on the VH.

```
# systemctl stop nqs-jsv.target
# yum update NQSV-JobServer
# systemctl start nqs-jsv.target
```

6.5.11 NQSV/Client

Update the package by yum command on the VH.

```
# systemctl stop nqs-cui.target
# yum update NQSV-Client
# systemctl start nqs-cui.target
```

6.5.12 Numeric Library Collection

Update the packages by yum command on the VH.

```
# yum groupupdate nec-nlc-1.0.0
```

The following packages will be updated.

- nec-nlc-base-1.0.0
- nec-asl-ve-1.0.0
- nec-aslfftw-ve-1.0.0
- nec-blas-ve-1.0.0
- nec-sblas-ve-1.0.0
- nec-lapack-ve-1.0.0
- nec-scalapack-ve-1.0.0
- nec-heterosolver-ve-1.0.0
- nec-sca-ve-1.0.0
- nec-nlc-doc-1.0.0

6.5.13 binutils

Update the package by yum command on the VH.

```
# yum update binutils-ve
```

6.5.14 C/C++ compiler

Multiple versions of the compiler can be installed on one machine.
Update Installation

(1) Remove an old version currently installed. Refer to Chapter 7.3.14 C/C++ compiler.

(2) Install a New Version. Refer to Chapter 3.5.14 C/C++ compiler (optional).

Multiple Installation

(1) Make the package files available on the machine where the installation is performed.

(2) Remove an old version currently installed. Execute the following command.

```
# rpm -e nec-nc++-inst-X.X.X-X.noarch
```

Note

If an old version is musl-libc version (1.*X*.*X*), execute the following command.

```
# rpm -e nec-nc++-musl-inst-X.X.X-X.noarch
```

(3) Install the packages by rpm command on the VH.

```
# rpm -i nec-nc++-X.X.X-X.X.X-X.x86_64.rpm
# rpm -i nec-nc++-inst-X.X.X-X.noarch.rpm
# rpm -i nec-nc++-doc-X.X.X-X.X.X-X.noarch.rpm
```

Note

If the musl-libc version (1.*X*.*X*) is installed, execute the following command.

```
# rpm -i nec-nc++-X.X.X-X.x86_64.rpm
# rpm -i nec-nc++-musl-inst-X.X.X-X.noarch.rpm
# rpm -i nec-nc++-doc-X.X.X-X.noarch.rpm
```

6.5.15 Fortran compiler

Multiple versions of the compiler can be installed on one machine.

Update Installation

(1) Remove an old version currently installed Refer to Chapter 7.3.15 Fortran compiler.

(2) Install a New Version. Refer to Chapter 3.5.15 Fortran compiler (optional).

Multiple Installation

(1) Make the package files available on the machine where the installation is performed.

(2) Remove an old version currently installed. Execute the following command.

```
# rpm -e nec-nfort-inst-X.X.X-X.noarch
```

Note

If an old version is musl-libc version (1.*X*.*X*), execute the following command.

```
# rpm -e nec-nfort-musl-inst-X.X.X-X.noarch
```

(3) Install the packages by rpm command on the VH.

```
# rpm -i nec-nfort-X.X.X-X.X.X-X.x86_64.rpm
```

```
# rpm -i nec-nfort-inst-X.X.X-X.noarch.rpm
# rpm -i nec-nfort-doc-X.X.X-X.X.X-X.noarch.rpm
```

Note

If the musl-libc version (1.*X*.*X*) is installed, execute the following command.

```
# rpm -i nec-nfort-X.X.X-X.x86_64.rpm
# rpm -i nec-nfort-musl-inst-X.X.X-X.noarch.rpm
# rpm -i nec-nfort-doc-X.X.X-X.noarch.rpm
```

Update the nec-nfort-runtime packages by the execution of following command on all VHs.

```
# rpm -U nec-nfort-runtime-X.X.X-X.x86_64.rpm
```

6.5.16 NEC Parallel Debugger

Update the packages by the execution of yum command on the host.

```
# yum update nec-paralleldebugger
```

On the host where the Eclipse PTP is launched, store the NEC Parallel Debugger plugin under plugins directory in the Eclipse PTP environment. In the following example, the directory where the Eclipse PTP is /INST-DIR.

```
# cp /opt/nec/ve/npdb/plugins/com.nec.ParallelDebugger_*.jar /INST-DIR/eclipse/plugins/
```

6.6 After update

This section explains the after procedures for updating software. Please confirm the necessary steps by Chapter 6.3 Update steps.

6.6.1 Restart VEOS and MMM

Start vemmd service in the environment where InfiniBand for SX-Aurora TSUBASA is installed in prior to invoking mmm service.

- In case InfiniBand for SX-Aurora TSUBASA is installed,

```
# systemctl start vemmd
```

```
# modprobe ve_drv
# systemctl start mmm
```

- In case InfiniBand for SX-Aurora TSUBASA is not installed.

```
# modprobe ve_drv
# systemctl start mmm
```

6.6.2 Confirm VE into ONLINE

After restart VEOS and MMM, please confirm that VE card is ONLINE by the following way.

```
# /opt/nec/ve/bin/vecmd state get
Vector Engine MMM-Command v1.0.0
Command:
state -N 0 get
--------------------------------------------------------------------------------
VE0 [03:00.0] [ ONLINE                    ] Last Modif:2017/11/29 10:18:00
--------------------------------------------------------------------------------
Result: Success
```

6.6.3 Restart monitoring of the VH

At the monitoring software (Zabbix or Ganglia+Nagios), Please release all VEs from MAINTENANCE mode which connect to the VH, and put all VEs into the monitoring target.

6.6.4 Return the VH to job scheduler's operation

(1) Bind a job server on target VH to the queue which is being operated using the bind execution_queue sub command of qmgr(1M) on the host installing NQSV/Client. For example the 100th job server is bound to the bq queue by the following operation.

```
$ qmgr -Pm
Mgr: bind execution_queue job_server bq job_server_id = 100
```

Use bind interactive_queue sub command for interactive queue.

(2) Start the jobserver and launcher on the target VH using systemctl.

```
# systemctl start nqs-jsv.target
```

Chapter7 Uninstallation

This section explains how to uninstall software from Vector Island.

⚠ Note

There are some command lines started with '#' prompt in this chapter. They should be executed with super user privileges.

7.1 Uninstall steps

The before steps for uninstall of software are different every software.

Please confirm the necessary steps every software. Please be sure to do the before steps for uninstall of software. Please do the steps by the order indicated in the following.

Table 11 Uninstall Steps

	Before uninstall			
order	**1**	**2**	**3**	**4**
Steps / **Software**	**Disconnect the VH from job scheduler.**	**Exclude the VH from monitoring.**	**Put VEs into MAINTENANCE mode.**	**Stop VEOS and MMM.**
License Access Library				
VEOS Application Runtime	✓	✓	✓	✓
VEOS Application Development				
InfiniBand for SX-Aurora TSUBASA(ve_peermem)	✓	✓	✓	✓

InfiniBand for SX-Aurora TSUBASA (other than ve_peermem)				
MMM	✓	✓	✓	✓
VMC Firmware	✓	✓	✓	
ScaTeFS Client	✓	✓		
NEC MPI				
Tuning Tool				
NQSV/JobServer	✓			
NQSV/Client				
Numeric Library Collection				
binutils				
C/C++ compiler				
Fortran compiler				
NEC Parallel Debugger				

Each procedure is explained in the next section.

7.2 Before uninstall

7.2.1 Disconnect the VH from the scheduler

Refer to “Chapter 6.4.1 Disconnect the VH from the scheduler”.

7.2.2 Exclude the VH from monitoring

Refer to “Chapter 6.4.2 Exclude the VH from monitoring”.

7.2.3 Put VEs into MAINTENANCE mode

Refer to “Chapter 6.4.3 Put VEs into MAINTENANCE mode”.

7.2.4 Stop VEOS and MMM

Refer to “Chapter 6.4.4 Stop VEOS and MMM”.

7.3 Uninstall software

7.3.1 License access library

Uninstall the package by yum command on the VH.

```
# yum remove aurlic-lib
```

⚠ Note

License access library is used by ScaTeFS Client, NEC MPI, C/C++ compiler and Fortran compiler. While these software are used, don't uninstall the license access library.

7.3.2 VEOS Application Runtime

Uninstall VEOS packages by the following commands on the VH.

```
# yum groupremove veos-apprun
```

The following packages will be uninstalled.

- coreutils-ve
- gdb-ve
- glibc-ve
- libsysve
- libthread_db-ve
- libved
- procps-ng-ve
- psacct-ve
- psmisc-ve
- strace-ve
- sysstat-ve
- time-ve
- util-linux-ve
- ve-memory-mapping
- ve_drv-kmod

- velayout
- veos
- veos-libveptrace
- veosinfo
- vesysinit
- vesysinit-udev
- vp-kmod

If the above command fails, uninstall the individual packages by executing the following commands.

```
# yum –y remove coreutils-ve gdb-ve glibc-ve libsysve libthread_db-ve libved procps-ng-ve psacct-ve psmisc-ve strace-ve sysstat-ve time-ve util-linux-ve ve-memory-mapping ve_drv-kmod velayout veos veos-libveptrace veosinfo vesysinit vesysinit-udev vp-kmod
# yum group mark remove veos-apprun
```

In case you need to uninstall musl-libc environment, please run the following command additionally.

```
# yum -y remove musl-libc-ve libsysve-musl
```

7.3.3 VEOS Application Development

Uninstall VEOS packages by the following commands on the VH.

```
# yum groupremove veos-appdev
```

The following packages will be uninstalled.

- autoconf-ve
- automake-ve
- gdb-ve
- glibc-ve
- glibc-ve-devel
- kernel-headers-ve

- libgcc-ve-static
- libsysve
- libsysve-devel
- libthread_db-ve
- libtool-ve
- libved
- vedebuginfo
- velayout
- veos-headers
- veos-libveptrace

If the above command fails, uninstall the individual packages by executing the following commands.

```
# yum remove autoconf-ve automake-ve gdb-ve glibc-ve glibc-ve-devel kernel-headers-ve libgcc-ve-static libsysve libsysve-devel libthread_db-ve libtool-ve libved vedebuginfo velayout veos-headers veos-libveptrace
# yum group mark remove veos-appdev
```

In case you need to uninstall musl-libc environment, please run the following command additionally.

```
# yum -y remove musl-libc-ve musl-libc-ve-devel libsysve-musl libsysve-musl-devel veos-musl-headers
```

7.3.4 InfiniBand for SX-Aurora TSUBASA

(1) Stop the service on the target VH.

```
# /etc/init.d/ve_peermem stop
```

(2) Uninstall packages by yum command on the VH.

```
# yum groupremove ve-infiniband
```

If you have used musl-libc, uninstall the corresponding packages.

```
# yum remove libibverbs-ve-musl libmlx5-ve-musl libvedma-ve-musl
```

7.3.5 MMM

Uninstall MMM packages by yum command on the VH.

```
# yum groupremove mmm
```

The following packages will be uninstalled.

- mmm
- libsignature
- ve-power
- mmm-msl
- mmm-analysis
- ve-firmware
- ftmon
- rtmon

If the above command fails, uninstall the individual packages by executing the following commands.

```
# yum remove mmm libsignature ve-power mmm-msl mmm-analysis ve-firmware ftmon rtmon
# yum group mark remove mmm
```

7.3.6 VMC Firmware

Uninstall VMCFW package by yum command on the VH.

```
# yum remove vmcfw
```

7.3.7 ScaTeFS Client

(1) When the ScaTeFS file system is exported by NFS on the VH to be uninstalled, unmount the ScaTeFS file system that is exported by NFS on all the NFS clients, then go to (2).
When the ScaTeFS file system is not exported by NFS on the VH to be uninstalled, go to (3).

(2) Stop the nfs service on the VH.

```
# systemctl stop nfs
```

(3) When the ScaTeFS file system is exported by the share of Samba on the VH to be uninstalled, stop accessing the share on all the CIFS clients such as Windows, then go to (4).
When the ScaTeFS file system is not exported by the share of Samba on the VH to be uninstalled, go to (5).

(4) Stop the smb service and the nmb service on the VH.

```
# systemctl stop smb
# systemctl stop nmb
```

(5) Unmount the ScaTeFS file system on the VH.

```
# umount -a -t scatefs
```

(6) Stop the scatefs-client service on the VH.

```
# systemctl stop scatefs-client
```

(7) Uninstall the scatefs-client packages by yum command on the VH.

```
# yum groupremove scatefs-client-tsubasa
```

The following packages will be uninstalled.

[RHEL 7.3/CentOS 7.3]

- scatefs-client-modules-mlnx_ofed
- scatefs-client-mount-utils
- scatefs-client-libscatefsib
- scatefs-client-libscatefsib_ve
- scatefs-client-utils
- scatefs-client-rcli-utils

[RHEL 7.4 or later/CentOS 7.4 or later]

- kmod-scatefs-client-modules-mlnx_ofed
- scatefs-client-mount-utils
- scatefs-client-libscatefsib

- scatefs-client-libscatefsib_ve
- scatefs-client-utils
- scatefs-client-rcli-utils

If the above command fails, uninstall the individual packages by executing the following commands.
[RHEL 7.3/CentOS 7.3]

```
# yum remove scatefs-client-modules-mlnx_ofed scatefs-client-mount-utils scatefs-client-libscatefsib scatefs-client-libscatefsib_ve scatefs-client-utils scatefs-client-rcli-utils
# yum group mark remove scatefs-client-tsubasa
```

[RHEL 7.4 or later/CentOS 7.4 or later]

```
# yum remove kmod-scatefs-client-modules-mlnx_ofed scatefs-client-mount-utils scatefs-client-libscatefsib scatefs-client-libscatefsib_ve scatefs-client-utils scatefs-client-rcli-utils
# yum group mark remove scatefs-client-tsubasa
```

7.3.8 NEC MPI

NEC MPI is composed of the following two kinds of packages. Multiple versions of library group packages can be installed on a VH. “X-Y-Z” in the library group packages represents their version number. If X is 2, the packages support glibc. If X is 1, the packages support musl-libc.

- run-time package
  nec-mpi-runtime package
- library group packages
  nec-mpi-devel-X-Y-Z, nec-mpi-libs-X-Y-Z and nec-mpi-utils-X-Y-Z

To uninstall NEC MPI, the following instructions (1) and (2) perform uninstall of the run-time package and library group packages, respectively.

⚠ Note

In order to run an NEC MPI program, the run-time package which was used to generate the executable file must be installed, and the versions of the library group

packages must be the same.

(1) Uninstall of the library group packages

Find the installed groups with the following yum command on the uninstall target VHs.

```
# yum grouplist -v "nec-mpi-*"
Installed Groups:
   NEC MPI 2-0-0 (nec-mpi-2-0-0)
   NEC MPI 2-1-0 (nec-mpi-2-1-0)
```

In the list, group names beginning with “NEC MPI” refer to NEC MPI Library Groups. For example, when you remove the library group packages “NEC MPI 2-0-0” (nec-mpi-2-0-0), execute the following command.

```
# yum groupremove nec-mpi-2-0-0
```

Check that the packages to be removed are as follows and perform the removing operation.

- nec-mpi-devel-2-0-0
- nec-mpi-libs-2-0-0
- nec-mpi-utils-2-0-0

⚠ Note

If the run-time package is included in the packages to be removed, cancel the removing operation, and after excluding the run-time package from all the group definitions of NEC MPI while referring to “6.2 (2)” and its note, execute the above command again.

If this operation fails, the following commands can remove those packages.

```
# yum remove nec-mpi-devel-2-0-0 nec-mpi-libs-2-0-0 nec-mpi-utils-2-0-0
# yum group mark remove nec-mpi-2-0-0
```

If another version also has to be uninstalled, repeat the uninstalling steps.

(Note) If the library group packages were installed individually without specifying the library group, the following command can remove those packages. The following example removes the library group packages of NEC MPI version 1.0.1.

```
# yum remove nec-mpi-devel-1-0-1 nec-mpi-libs-1-0-1 nec-mpi-utils-1-0-1
```

(2) Uninstall of the run-time package

The following command uninstalls the run-time package.

```
# yum remove nec-mpi-runtime
```

7.3.9 Tuning Tool

Uninstall the packages by the execution of yum command on the VH.

```
# yum group remove nec-tuningtool
```

The following packages will be uninstalled.

- nec-veperf
- nec-ftraceviewer

If the above remove command fails in such a case that the packages of NEC Ftrace Viewer, PROGINF/FTRACE (nec-tuningtool) are installed separately without yum group installation, remove the packages separately as follows.

```
# yum remove nec-veperf nec-ftraceviewer
# yum group mark remove nec-tuningtool
```

7.3.10 NQSV/JobServer

Uninstall the package by yum command on the VH.

```
# systemctl stop nqs-jsv.target
# yum remove NQSV-JobServer
```

7.3.11 NQSV/Client

Uninstall the package by yum command on the VH.

```
# systemctl stop nqs-cui.target
# yum remove NQSV-Client
```

7.3.12 Numeric Library Collection

Uninstall the packages by yum command on the VH.

```
# yum groupremove nec-nlc-1.0.0
```

The following packages will be uninstalled.

- nec-nlc-base-1.0.0
- nec-asl-ve-1.0.0
- nec-aslfftw-ve-1.0.0
- nec-blas-ve-1.0.0
- nec-sblas-ve-1.0.0
- nec-lapack-ve-1.0.0
- nec-scalapack-ve-1.0.0
- nec-heterosolver-ve-1.0.0
- nec-sca-ve-1.0.0
- nec-nlc-doc-1.0.0

If the above command fails, uninstall the individual packages by executing the following commands.

```
# yum remove nec-nlc-base-1.0.0 nec-asl-ve-1.0.0 nec-aslfftw-ve-1.0.0 nec-blas-ve-1.0.0 nec-sblas-ve-1.0.0 nec-lapack-ve-1.0.0 nec-scalapack-ve-1.0.0 nec-heterosolver-ve-1.0.0 nec-sca-ve-1.0.0 nec-nlc-doc-1.0.0
# yum group mark remove nec-nlc-1.0.0
```

7.3.13 binutils

Uninstall the package by yum command on the VH.

```
# yum remove binutils-ve
```

7.3.14 C/C++ compiler

Uninstall the packages by rpm command on the VH.

```
# rpm -e nec-nc++-doc-X.X.X-X.X.X-X.noarch
# rpm -e nec-nc++-inst-X.X.X-X.noarch
# rpm -e nec-nc++-X.X.X-X.X.X-X.x86_64
```

Note

If an installed package is musl-libc version (1.*X*.*X*), execute the following command.

```
# rpm -e nec-nc++-doc-X.X.X-X.noarch
# rpm -e nec-nc++-musl-inst-X.X.X-X.noarch
# rpm -e nec-nc++-X.X.X-X.x86_64
```

7.3.15 Fortran compiler

Uninstall the packages by rpm command on the VH.

```
# rpm -e nec-nfort-doc-X.X.X-X.X.X-X.noarch
# rpm -e nec-nfort-inst-X.X.X-X.noarch
# rpm -e nec-nfort-X.X.X-X.X.X-X.x86_64
```

Note

If an old version is musl-libc version (1.*X*.*X*), execute the following command.

```
# rpm -e nec-nfort-doc-X.X.X-X.noarch
# rpm -e nec-nfort-musl-inst-X.X.X-X.noarch
# rpm -e nec-nfort-X.X.X-X.x86_64
```

Uninstall the nec-nfort-runtime packages by rpm command on all VHs.

```
# rpm -e nec-nfort-runtime-X.X.X-X.x86_64
```

7.3.16 NEC Parallel Debugger

Uninstall the package by yum command on the host.

```
# yum remove nec-paralleldebugger
```

Chapter8 Notices and Restrictions

8.1 IPoIB (IP over IB)

[Restriction]

In case the OS is RHEL 7.3, when using IPoIB bonding interface, kernel panic may occur when interface slave is unplugged or no cable is attached when booting OS.

Appendix A Software Information

Package List

Table 12 Package List

Software	Package File	How to get (*)
License Access Library	aurlic-lib.x86_64	A
VEOS Application Runtime	coreutils-ve.x86_64 gdb-ve.x86_64 glibc-ve.x86_64 libsysve.x86_64 libthread_db-ve.x86_64 libved.x86_64 procps-ng-ve.x86_64 psacct-ve.x86_64 psmisc-ve.x86_64 strace-ve.x86_64 sysstat-ve.x86_64 time-ve.x86_64 util-linux-ve.x86_64 ve-memory-mapping.x86_64 ve_drv-kmod.x86_64 velayout.x86_64 veos.x86_64 veos-libveptrace.x86_64 veosinfo.x86_64 vesysinit.noarch vesysinit-udev.noarch vp-kmod.x86_64	A
VEOS Application Development	autoconf-ve.noarch automake-ve.noarch gdb-ve.x86_64 glibc-ve.x86_64 glibc-ve-devel.x86_64 kernel-headers-ve.x86_64 libgcc-ve-static.x86_64 libsysve.x86_64 libsysve-devel.x86_64 libthread_db-ve.x86_64 libtool-ve.x86_64 libved.x86_64 vedebuginfo.noarch velayout.x86_64 veos-headers.x86_64	A

	veos-libveptrace.x86_64	
InfiniBand for SX-Aurora TSUBASA	libibverbs-ve-musl.x86_64 libmlx5-ve-musl.x86_64 libvedma-ve-musl.x86_64 libveib.x86_64 ve_peermem.x86_64 libibverbs-ve.x86_64 libmlx5-ve.x86_64 libvedma-ve.x86_64	A
MMM	ftmon.x86_64 libsignature.x86_64 mmm.x86_64 mmm-analysis.x86_64 mmm-msl.x86_64 rtmon.x86_64 ve-firmware.noarch ve-power.x86_64	A
VMC Firmware	vmcfw.noarch	A
ScaTeFS Client	[RHEL 7.3/CentOS 7.3] scatefs-client-libscatefsib.x86_64 scatefs-client-libscatefsib_ve.x86_64 scatefs-client-modules-mlnx_ofed.x86_64 scatefs-client-mount-utils.x86_64 scatefs-client-rcli-utils.x86_64 scatefs-client-utils.x86_64 [RHEL 7.4 or later/CentOS 7.4 or later] kmod-scatefs-client-modules-mlnx_ofed.x86_64 scatefs-client-libscatefsib.x86_64 scatefs-client-libscatefsib_ve.x86_64 scatefs-client-mount-utils.x86_64 scatefs-client-rcli-utils.x86_64 scatefs-client-utils.x86_64	B(ScaTeFS/Client)
NEC MPI	nec-mpi-devel-X-X-X.x86_64 nec-mpi-libs-X-X-X.x86_64 nec-mpi-utils-X-X-X.x86_64 nec-mpi-runtime.x86_64	B(NEC MPI)
Tuning Tool	nec-veperf.x86_64 nec-ftraceviewer.x86_64	B(SDK)
NEC Parallel Debugger	nec-paralleldebugger.x86_64	B(SDK)
NQSV/JobServer	NQSV-JobServer.x86_64	B(NQSV/JobServer)
NQSV/Client	NQSV-Client.x86_64	B(NQSV/Resource

		Manager)
Numeric Library Collection	nec-asl-ve-X.X.X.x86_64 nec-aslfftw-ve-X.X.X.x86_64 nec-blas-ve-X.X.X.x86_64 nec-heterosolver-ve-X.X.X.x86_64 nec-lapack-ve-X.X.X.x86_64 nec-nlc-base-X.X.X.noarch nec-nlc-doc-X.X.X.noarch nec-sblas-ve-X.X.X.x86_64 nec-sca-ve-X.X.X.x86_64 nec-scalapack-ve-X.X.X.x86_64	B(SDK)
binutils	binutils-ve.x86_64	B(SDK)
C/C++ compiler	nec-nc++.x86_64 nec-nc++-musl-inst.noarch nec-nc++-doc.noarch	B(SDK)
Fortran compiler	nec-nfort.x86_64 nec-nfort-musl-inst.noarch nec-nfort-doc.noarch nec-nfort-runtime.x86_64	B(SDK)

(*)A: Download them for free from the NEC Web site. Refer to "3.2 Getting the Software Packages".

B: Paid software. Please contact the person in charge to get update packages.

Appendix B Network

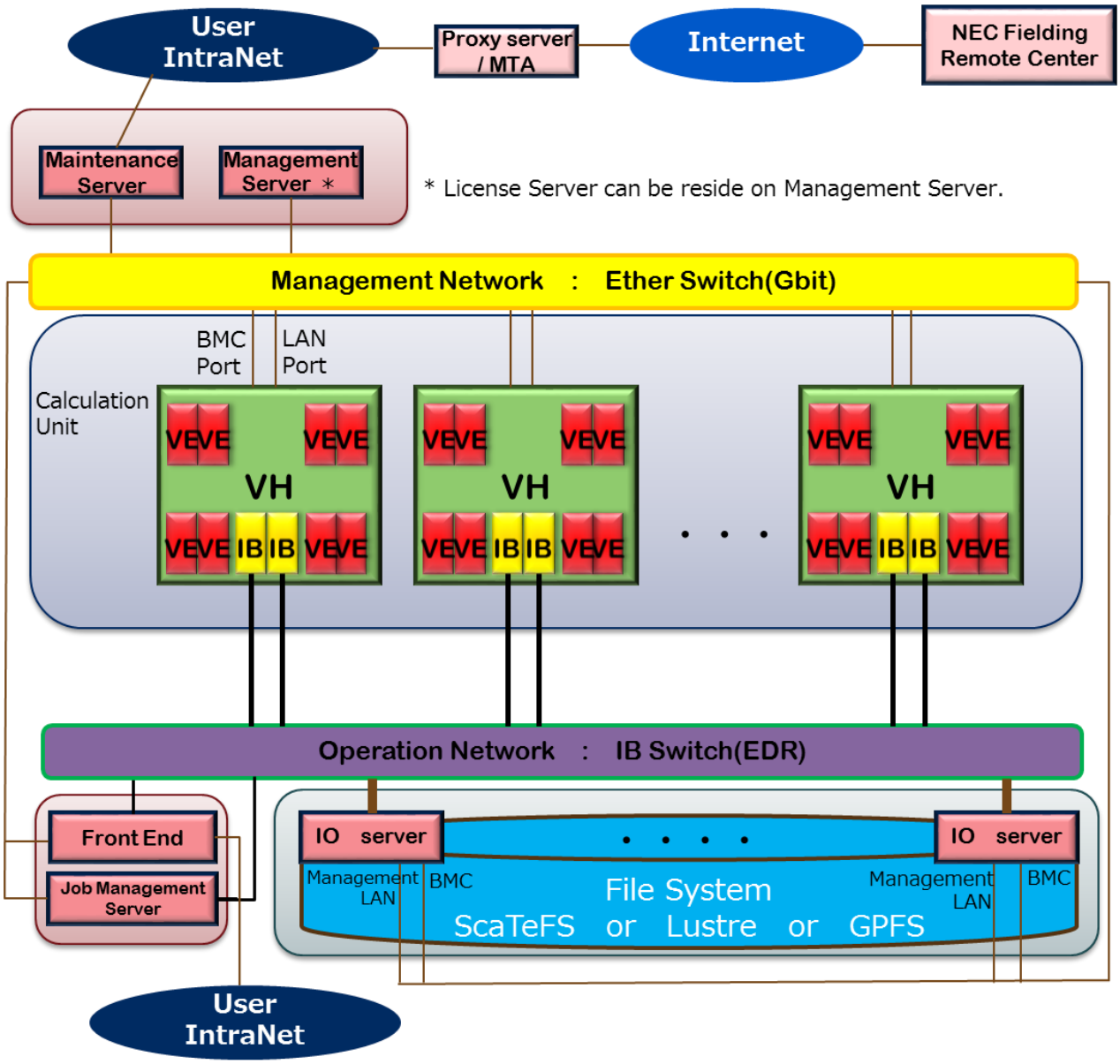

Figure 6 Network structure

Operation Network

It is a high bandwidth network connected by InfiniBand EDR. Servers which are connected to the network need to implement InfiniBand EDR HCA (Host Channel Adapter).

When using single-system (Only VH), you can configure operational network with Ethernet.

In case using IB network for operation network, each server is connected to IB EDR switch by IB cable. It is not possible to separate them physically, but it is possible to assign the maximum bandwidth for each function by QoS setting. The network is mandatory when a VI cluster is constructed.

The operational network has the following three functions.

- Functions of operation network
    a) MPI communication network (In the case of using InfiniBand)
    b) IO network (network for filesystem)
    c) Operation management network (Used for job control/transfer, IP over IB interface is used in case using InfiniBand)

Assumed servers/devices which will be connected to the network are shown below. However, you can freely decide to take any flexible network configuration according to customer's requirements. These are not mandatory devices.

- Servers assumed to be connected to operation network
    d) Computing unit (Core part in the system, consisted of two or more Vis)
    e) FE (Front-End) server
    f) Job management server
    g) IO server (that is connected to filesystem)

Management network

It is a network which is connected by Ethernet. Gigabit Ethernet (GbE) is recommended. VH equips a free LAN port as default. Each server is connected to an Ethernet switch by a cable and configures a network. In addition, it is recommended that BMC port on VI is connected to the management network.
The management network has the following two functions.

- Functions of management network
    h) Operation management network (System operation, monitoring operation resource)
    i) Maintenance management network (Monitoring hardware)

Assumed servers/devices which will be connected to the network are shown below. However, you can freely decide to take any flexible network configuration according to customer's requirements.

- Servers assumed to be connected to management network
  - j) Computing unit (Core part in the system, consisted of two or more Vis)
  - k) Operation management server (including license server)
  - l) Maintenance server
  - m) Yum repository server
  - n) Front-end
  - o) Job management server
  - p) Interface for IO server management and interface for storage management

Later explanation assumes that one of Ethernet interface on the VH is connected to Management network.

Appendix C How to check C library used for VE binary

There is no interoperability between binaries that is compiled with glibc and that is compiled with musl-libc. If you need to distinguish which C library is linked for a binary, you can use “ve-libc-check” script as follows. The script supports any kind of VE binaries, such as “a.out”, “.o”, “.a”, “.so”.

```
$ /opt/nec/ve/bin/ve-libc-check ./a.out
  This is compiled with musl-libc: /home/userxxx/a.out
```

In the case above, it is indicated that your “a.out” is compiled with musl-libc. If no message is printed, the binary does not require musl-libc, that is compiled with glibc.

⚠ Note

- "ve-libc-check" does not support an object files that is created from ".s" files. Please be very careful not to mix binaries compiled with musl-libc and binaries compiled with glibc when you have “.s” source code.
- “ve-libc-check” does not support checking a library dynamically linked with a program, i.e. if a program compiled and linked with glibc loads or links a library compiled and linked with musl-libc dynamically, "ve-libc-check" cannot check it. Please do not forget to re-make all of your libraries with glibc.

Appendix D History

History table

Feb. 2018	1st edition
Mar. 2018	5th edition
Mar. 2018	6th edition
May. 2018	7th edition
Jun. 2018	8th edition
Jul. 2018	9th edition
Aug. 2018	10th edition
Oct. 2018	11th edition
Jan. 2019	12th edition
Feb. 2019	13th edition

Change notes

13th edition	• glibc is supported for RHEL 7.3 and 7.4. (1.4, etc.)

Index

SX-Aurora TSUBASA System Software

SX-Aurora TSUBASA

Installation Guide

13th. Edition February 2019

NEC Corporation