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## Preface

This document is intended for first-time users of the SX-Aurora TSUBASA, and explains how to set up the SX-Aurora TSUBASA system, including hardware setup, installation of the OS and SX-Aurora TSUBASA software, basic environment settings, and execution of sample programs.

This document assumes that the SX-Aurora TSUBASA system is connected to the network that has access to the Internet, customers have bought the support pack, and readers have basic knowledge of Linux and can edit files on Linux using editors such as vi.

The procedures in this document are available for the SX-Aurora TSUBASA software released on January 2023 or later.

--- Mar. 2023 Edition ---

## **Definitions and Abbreviations**

Term	Description
Vector Engine (VE)	The core part of the SX-Aurora TSUBASA system, on which applications are executed. A VE is implemented as a PCI Express card and attached to a server called a vector host.
Vector Host (VH)	A Linux (x86) server to which VEs are attached, in other words, a host computer equipped with VEs.
VMC	Abbreviation of VE Management Controller.
Internet Delivery	The service to provide NEC software products over the Internet. We will notify customers of the URL providing the download service by email, from which you can obtain our software products.
InfiniBand	One of the high-seed and highly reliable interface standards used to connect computers and storage devices (external storage devices) in large-scale system and between computation nodes in supercomputers (HPC clusters). Please refer Installation Guide to install InfiniBand in SX- Aurora TSUBASA system.
License Server	A server that manages licenses for the paid software on the SX-Aurora TSUBASA. This is needed to use the C/C++ compiler and Fortran compiler, which are included in the NEC Software Development Kit for Vector Engine (SDK), or NEC Compat C++ Standard Library for Vector Engine (Compat C++).
NEC yum repository	The yum repository for NEC SX-Aurora TSUBASA software. The yum repository for the free software can be accessed by any user. The yum repository for the paid software can be accessed only by users with PP support contract.
МРІ	Abbreviation of Message Passing Interface. MPI is a standard specification for a communication library. It can be used together with OpenMP or automatic parallelization.
Installation Guide	Abbreviation of "SX-Aurora TSUBASA Installation Guide". The latest version of Installation Guide exists in NEC Aurora Forum. https://sxauroratsubasa.sakura.ne.jp/documentation

## Contents

Chapter	r1 Preparation	1
1.1	Hardware	1
1.2	Network Environment	2
1.3	OS Installation DVD	2
1.4	Check of the Serial Number of the Support Pack	3
1.5	Setup Procedure	4
Chapter	r2 Hardware Setup	6
2.1	Front and Back Panel Components of the VH	6
2.2	Connection of a Display	6
2.3	Connection of a Keyboard and Mouse	7
2.4	Connection of a LAN Cable	8
2.5	Connection of a Power Cable	8
Chapter	r3 OS Installation	9
3.1	Boot of the VH	9
3.2	Start of the OS Installer	10
3.3	Selection of a Language	11
3.4	Selection of Timezone	11
3.5	Selection of Software	12
3.6	Creation of Installation Destination	13
3.7	Configuration of Network and Hostname	14
3.8	Setting of the Root Password	17
3.9	Creation of a User	18
3.10	Start of OS Installation	19
3.11	Reboot of the VH	20
3.12	Configuration of the Yum Repository for the OS Installation DVD	21
3.13	Acquisition of the Host Information	22
Chapter	r4 Preparation of the SX-Aurora TSUBASA Software	23
4.1	Acquisition of Kernel Update Packages	23
4.2	Acquisition of the License Certificates	26
4.3	Acquisition of the License File	29
4.4	Transfer of the Files Downloaded	39
Chapter	r5 Installation of the SX-Aurora TSUBASA Software	40

5.1	Update of the Kernel and bash	40
5.2	Mount of the OS Installation DVD	40
5.3	Setup of the Yum Repository	41
5.4	Software Installation	42
5.5	Status Check of the VE	43
5.6	Update of the VMC Firmware	43
Chapte	er6 Configuration	45
6.1	Configuration of the License Server	45
6.2	Configuration of NEC MPI	47
6.3	Configuration of HugePages	47
Chapte	er7 Program Execution	48
7.1	Compilation	48
7.2	Execution	48
7.3	Sample Programs	49

## List of tables

Table 1 Network Information	2
Table 2 The List of the Files Downloaded	39

## List of figures

Figure 1 Setup Environment	1
Figure 2 Serial Number Card	

## Chapter1 Preparation

This chapter describes preparation for setting up the SX-Aurora TSUBASA system.

#### 1.1 Hardware

Prepare the following equipment to set up the SX-Aurora TSUBASA system.

- A Vector host (A100-1)
  - VE cards (built-in)
  - A DVD drive (built-in)
  - A power cable

#### (The setup procedure is explained using a tower type vector host as an example.)

- A Display, display cable, and power cable
- A USB Mouse and USB keyboard
- A LAN cable
- A computer with a writable DVD drive and connection to the Internet for downloading the SX-Aurora TSUBASA software.
- An OS installation DVD (refer to section 1.3 for details)



**Figure 1 Setup Environment** 

#### **1.2 Network Environment**

To connect the vector host (VH) to a network, prepare network information such as a hostname and IP address in advance. This document uses the following values as an example.

Information	Example Value	
Hostname of the vector host	vh001	
Vector host IP address	192.168.1.100/24 (Fixed)	
Gateway IP address	192.168.1.1	
DNS server IP address	192.168.1.2	

**Table 1 Network Information** 

• Hereafter, vector host is abbreviated to VH.

### **1.3 OS Installation DVD**

The SX-Aurora TSUBASA software runs on the Linux operating system compatible with the Red Hat Linux.

Please refer to the NEC support portal below for the latest information of the supported distributions and kernel versions.

https://www.support.nec.co.jp/en/View.aspx?id=4140100078(English)https://www.support.nec.co.jp/View.aspx?id=3140106285(Japanese)

Please prepare an installation DVD of one of the operating systems. The OS installation DVD is needed even if you have already installed the OS on the VH, because the DVD contains packages on which the SX-Aurora TSUBASA software depends. Also, it must not be the one for network installation, but has to contain software package files.

### **1.4** Check of the Serial Number of the Support Pack

This document explains how to install the free software and paid software for the SX-Aurora TSUBASA from the yum repository on the Internet. The access to the yum repository for the paid software is restricted and requires the serial number of the support pack for the paid software. The serial number is described on the serial number card included in the files you can download from the internet delivery product download service. Section 5.3 shows an example of the serial number card. Please check the serial ID in advance.

## 1.5 Setup Procedure

The following figure shows the steps for setting up the SX-Aurora TSUBASA system, which are described in the subsequent chapters.



### ▲ NOTE

This document describes the setup procedure on Rocky Linux 8.6 (Kernel: 4.18.0-372.19.1.el8\_6.x86\_64) as an example. The procedure can vary depending on the OS and its kernel version.

# [Memo] Please use the tables below as a memo when setting up the SX-Aurora TSUBASA system

#### ■ Network Information of the VH

Hostname of the VH	
IP address of the VH	
MAC address of the VH (Refer to section 3.13)	

#### ■ Account Information

User ID for the NEC Support portal	
Download ID for the Internet Delivery	
Serial Number of the Support Pack for NEC SDK	

## Chapter2 Hardware Setup

This chapter illustrates the connection between a VH and peripherals. Layout of panel components of the VH such as ports in the pictures may vary depending on the shipping time.

## 2.1 Front and Back Panel Components of the VH



Front Panel

Back Panel

## 2.2 Connection of a Display

Connect the display port on the back panel and a display with a display cable. Also, connect a power cable to the power port of the display and plug the power cable into an outlet.



## 2.3 Connection of a Keyboard and Mouse

Connect the cables of a USB keyboard and USB mouse to USB ports on the back panel.



## 2.4 Connection of a LAN Cable

Connect one end of a LAN cable to the network and the other end to the LAN port (on the left side) on the back panel.



## 2.5 Connection of a Power Cable

Connect a power cable to the power port on the back panel and plug the power cable into an outlet.



## Chapter3 OS Installation

This chapter describes OS installation onto the VH.

## 3.1 Boot of the VH

Put the OS installation DVD into the DVD drive of the VH immediately after turning on the VH.



Wait a little until you see the NEC logo on the display, and then press the F11 key on the keyboard.



After a short while, the following boot menu will be displayed.

Please select boot device:
<pre>RedHat Enterprise Linux (P0: HGST HUS726020ALE610) UEFI OS (P0: HGST HUS726020ALE610) UEFI: ATAPI iHAS124 F UEFI: Built-in EFI Shell UEFI: PXE IP4 Intel(R) Ethernet Connection X722 for 1GbE UEFI: PXE IP4 Intel(R) Ethernet Connection X722 for 1GbE Enter Setup</pre>
↑ and ↓ to move selection ENTER to select boot device ESC to boot using defaults

Select "UEFI: ATAPI iHAS124 F" with the arrow keys on the keyboard, and press the Return key to start booting from the DVD.

## 3.2 Start of the OS Installer

In a while, the following screen will be displayed.

• This example shows the case of Rocky Linux 8



Select "Install Rocky Linux 8" with the arrow keys on the keyboard and press the Return key to start the OS installer.

## 3.3 Selection of a Language

The OS installer will first display the screen for selecting a language used for the installation. Select your language with the mouse and click on the "Continue" button on the lower right.

Roc	WELCOME TO ROCKY	LINUX 8.		ROCKY LINUX 8 INSTALLATION
<b>ky</b> Linux	English Afrikaans সপরেই ৰম্মুটা অসমীয়া Asturianu Быларски বাংলা ইণ্যম্ব Bosanski Català Čeština	English > Afrikaans Amharic Arabic Assamese Asturian Belarusian Bulgarian Bulgarian Bangla Tibetan Bosnian Catalan Czech	English (United States) English (United Kingdom) English (India) English (Australia) English (Canada) English (Canada) English (Ireland) English (Ireland) English (New Zealand) English (Nigeria) English (Nigeria) English (Philippines) English (South Africa) English (Sauth Africa) English (Zambia) English (Zimbabwe)	Quit

## 3.4 Selection of Timezone

Click on "Time & Date" in the "LOCALIZATION" part to select the timezone of your country.

	INSTALLATION SUMMA	RY			ROCKY LINUX	8 INSTALLATION
Å					🖽 us	Help!
<b>ocky</b> Linux		LOCALIZATION         English (US)         English (United States)         English	SOFTWARE	SYSTEM Substallation Des Automatic partitioning: Constallation des Automatic partitioning: Constallation des Automatic d	tination elected t Name Quit your disks until you	Begin Installation i click 'Begin Installation'.
	🛕 Please complete items ma	arked with this icon before continuing to	o the next step.			

In the "TIME & DATE" screen, select the timezone of your country, and confirm the time and date.



## 3.5 Selection of Software

Click on "Software Selection" in the "SOFTWARE" part to select software to install.

Ro	INSTALLATION SUMMARY		
<u> </u>	LOCALIZATION	SOFTWARE	SYSTEM
$\mathbf{\hat{\mathbf{v}}}$	Keyboard English (US)	Installation Source     Local media	Installation Destination Automatic partitioning selected
	English (United States)	Software Selection Server with GUI	KDUMP Kdump is enabled
n	Time & Date Americas/New York timezone		Network & Host Name
X	USER SETTINGS		Security Policy No profile selected
	Root Password Root account is disabled.		
	User Creation No user will be created		
			Quit Begin Installation
			We won't touch your disks until you click 'Begin Installation'.
	A Please complete items marked with this icon before continuing	g to the next step.	

In the "SOFTWARE SELECTION" screen, "Server with GUI" is selected by default. You can change other base environment and select additional software as necessary.

OFTWARE SELECTION Done	ROCKY LINUX 8 INSTALLATION
Dure         Sescent with GUI An integrated, easy-to-manage server with a graphical interface.         Server An integrated, easy-to-manage server.         Minimal Install Basic functionality.         Workstation is a user-friendly desktop system for laptops and PCs.         Ostom Operating System Basic building block for a custom Rocky system.         Ortualization Host Minimal virtualization host.	Additional software for Selected Environment      Windows File Server      This package group allows you to share files between Linux and MS Windows(tm) systems.      Debugging Tools     Tools for debugging misbehaving applications and diagnosing performance problems.     DNS Name Server     This package group allows you to run a DNS name server (BIND) on the system.     File and Storage Server     CIFS, SMB, NFS, ISCSI, ISER, and ISNS network storage server.     FTP Server     These tools allow you to run an FTP server on the system.     Guest Agents     Agents used when running under a hypervisor.     Infiniband Support     Software designed for supporting clustering, grid connectivity, and low-latency, high bandwidth     storage using RDMA-based InfiniBand, WARP, RoCE, and OPA fabrics.     Mail Server     These packages allow you to configure an IMAP or SMTP mail server.     Network File System Client     Enables the system to attach to network storage.     Network Servers     Tools for diagnosing system and application-level performance problems.     Remote Management for Linux     Remote Management for Rorky Linux.
	Virtualization Client Clients for installing and managing virtualization instagras

Click on the "Done" button on the upper left after the selection.

## **3.6** Creation of Installation Destination

Click on "Installation Destination" in the "SYSTEM" part to set the drive and partition onto which the OS is installed.

Ro	INSTALLATION SUMMARY		ROCKY LINUX 8 INSTALLATION
ocky Linux	LOCALIZATION   Image: Reyboard English (US)   Image: Reyboard English (United States)   Image: Reyboard English (United S	SOFTWARE Softwares Softwareselection Merinal Install Software selection Merinal Install Software selection Software selection Software selection Software selection Merinal Install Software selection Software selection Merinal Install Software selection Software selection So	tion Destination mathematical mathematical k & Host Name ted y Policy elected
	▲ Please complete items marked with this icon before continuing to	We w	on't touch your disks until you click 'Begin Installation'.

By selecting a disk in the "Device Selection" section and checking "Automatic" in the "Storage Configuration" section, a partition for OS installation using the whole disk is automatically created.



Click on the "Done" button on the upper left after the creation.

## 3.7 Configuration of Network and Hostname

Click on "Network & Host Name" in the "SYSTEM" part to show the "NETWORK & HOST NAME" screen.

Ro	INSTALLATION SUMMARY		ROCKY LINUX 8 INSTALLATION
ocky Lir	LOCALIZATION Weight (US) Language Support English (United States) Time & Date	SOFTWARE  Software Selection Minimal Install	SYSTEM  Substitution Substitut
NUX	Americas:/New York timezone USER SETTINGS Root Password Root account is disabled. User Creation User Creation		Not connected      Security Policy     No profile selected
	No user will be created     No user will be created	o the next step.	Quit Begin Installation We won't touch your disks until you click 'Begin Installation'.

Enter an arbitrary hostname of the VH in the "Host name" field on the lower left (vh001 in this example) and click on the "Apply" button on the right of the field.



Then click on the "Configure…" button on the lower right to show a screen for configuring the network (as shown in the "Editing eno1" screen below), on which you can configure network information of the VH such as the IP address, gateway, and DNS server. The following uses the example described in section 1.2.

	Editing enp0s3	×
Connection name enpo	53	
General Etherne	t 802.1X Security DCB Proxy IPv4 Settings	IPv6 Settings
Device	enp0s3	•
Cloned MAC address		•
MTU	automatic	- + bytes
Wake on LAN	✓ Default     Phy     Unicast     Multicast       □ Ignore     □ Broadcast     Arp     Magic	
Wake on LAN password		
Link negotiation	Ignore	•
Speed	100 Mb/s	•
Duplex	Full	•
	Car	ncel Save

Click on the "IPv4 Settings" tab, and then select "Manual" from the drop-down menu on the "Method" field.

			Edi	ting enp	0s3		×
Connection	n name	enp0s3					
Genera	al Eth	ernet	802.1X Security	DCB	Proxy	IPv4 Settings	IPv6 Settings
Method	Automa	tic (DHCP	) ) addresses only				
Addition	Manual		addresses only				
	Link-Loo Shared	cal Only to other c	omputers				
	Disable	d					
Add	ditional DI	NS servers	3				
Additio	nal searc	h domain:	3				
Rec	DHC quire IPv4	addressir	g for this connection	to comple	te		
							Routes
						Ca	ncel Save

Next, click on the "Add" button on the right of the "Addresses" section, and enter the IP address of the VH, netmask, and IP address of the gateway in the corresponding cells. Also, enter the IP address of the DNS server in the "DNS servers" field under the cells.

	Edi	iting enp0	s3			×
Connection name enp0s3						
General Ethernet	802.1X Security	DCB	Proxy	IPv4 Settings	IPv6 S	ettings
Method Manual						•
Addresses						
Address	Netmask		Gate	way		Add
192.168.1.100	24	(	192.1	68.1.1		Delete
DNS servers 192.168	.1.2					
Search domains						
DHCP client ID						
Require IPv4 addressin	g for this connection	to complete	e			
					R	outes
				Ca	ncel	Save

In addition, click on the "General" tab on the screen, and check "Connect automatically with priority".

After this, click on the "Save" button on the lower right to finish the network configuration.

Connection name       enp0s3         General       Ethernet       802.1X Security       DCB       Proxy       IPv4 Settings       IPv6 Settings         Image: Setting Seting Setting Setting Seting Setting Setting Setting Seting Setting	ings +
General       Ethernet       802.1X Security       DCB       Proxy       IPv4 Settings       IPv6 Settings         Image: Comparison of the set of the se	ings +
Image: Constraint of the second s	+
☑ All users may connect to this network	
Automatically connect to VPN	•
Metered connection Automatic	•
Cancel	21/0

Lastly, click on the "Done" button on the upper left of the "NETWORK & HOST NAME" screen.



## 3.8 Setting of the Root Password

Click on "Root Password" in the "USER SETTINGS" part to show the "ROOT PASSWORD" screen.

Rc	INSTALLATION SUMMARY		ROCKY LINUX 8 INSTALLATION
ocky Linux	LOCALIZATION   Image: Support English (Usi)   Image: Support English (United States)   Image:	SOFTWARE  () Installation Source Local media  () Software Selection Minimal Install	SYSTEM   Simple statistical partitioning selected   Simple statistical partitioning selected   Simple statistical partitioning selected   Simple selected   Simple selected   Data   Description   Data   Description   Data   Description   Data   Description   Data   Description   Data   Description   Data   Description Descriptio
	Please complete items marked with this icon before continuing to the second	to the next step.	

Set the root password by entering it in both of the "Root Password" and "Confirm" fields. Then click on the "Done" button on the upper left.

		ROCKY LINUX 8 INS	TALLATION Help!
The root account	is use bloc administering the system. Enter a partword for the root user		
Root Pass word:			
	Strong		
Confirm:	••••••		

## 3.9 Creation of a User

Click on the "User Creation" of the "USER SETTINGS" screen to show the screen for creating a user.

	INSTALLATION SUMMARY		ROCKY LINUX 8 INSTALLATION
			题 us Help!
Q			
$\mathbf{C}$	LOCALIZATION	SOFTWARE	SYSTEM
Ŷ	Keyboard English (US)	Installation Source     Local media	Installation Destination Automatic partitioning selected
<u> </u>	Language Support     English (United States)	Software Selection	KDUMP Kdump is enabled
nu	O Time & Date Americas/New York timezone		Vetwork & Host Name Wired (enp0s3) connected
×	USER SETTINGS		Security Policy No profile selected
	Root Password Root password is set		
	User Creation No user will be created	>	
			Quit Begin Installation

Enter the full name of the user in the "Full name" field, login-name in the "User name" field, and password in both of the "Password" and "Confirm password" fields on the screen. If you want to give the user administrative privileges, check the checkbox "Make this user administrator".

Done		ROCKY LINUX 8 INSTALLATION I us Help!
Full name	sysadmin	
User name	sysadmin	
	Make this user administrator	
	$\blacksquare$ Require a password to use this account	
Password	•••••	
	Strong	
Confirm password	••••••	
	Advanced	

Click on the "Done" button on the upper left to return to the screen showing the progress of the installation, which is displayed on the bottom.

## 3.10 Start of OS Installation

Click on the "Begin Installation" button on the lower right of the "INSTALLATION SUMMARY"

screen to show the "INSTALLTION PROGRESS" screen.

	INSTALLATION SUMMA	RY				
					🖽 us	Help!
$\mathbf{\tilde{c}}$						
X						
		LOCALIZATION	SOFTWARE	SYSTEM		
Ŷ		Keyboard English (US)	Installation Source     Local media	Automatic partitioning	stination selected	
<u> </u>		English (United States)	Software Selection	KDUMP Kdump is enabled		
nu		O Time & Date Americas/New York timezone		Vetwork & Ho Wired (enp0s3) conne	st Name	
$\mathbf{X}$		USER SETTINGS		Security Policy No profile selected	1	
		Root Password				
		User Creation User sysadmin will be created				
					Quit Beg	in Installation
				We won't touc	h your disks until you lick 'F	egin Installation.

When the installation is completed, the screen will say "Complete!" on the lower left and display the "Reboot System" button on the lower right.

Rocky Linux	INSTALLATION PROGRESS  Complete!	ROCKY LINUX 8 INSTALLATION
	▲ Use of this product is subject to the license agreement found at /usr/share/rocky-release/EULA	Rocky Linux is now successfully installed and ready for you to usel Go ahead and reboot your system to start using it Reboot System

### 3.11 Reboot of the VH

Click on the "Reboot" button on the lower right of the screen to reboot the VH. The booted OS will display the login prompt on the console screen.



Please log in as the root user with the password set in section 3.8 as the following operations require administrative privileges.

## 3.12 Configuration of the Yum Repository for the OS Installation DVD

This section describes how to configure the yum repository for software in the OS installation DVD, which is required for installation of the SX-Aurora TSUBASA software.

(1) Mount of the OS Installation DVD

Put the OS installation DVD into the DVD drive of the VH, if you have ejected it after the installation, and mount it at the directory /media/cdrom.

```
# mkdir /media/cdrom
# mount /dev/cdrom /media/cdrom
```

#### (2) Creation of the Yum Repository

This step creates a repository configuration file (Rocky-Media.repo) after saving the existing repository so as to install packages from the OS installation DVD with the yum command.

Firstly, save the existing repository configuration files under the directory /etc/yum.repos.d as follows

```
# cd /etc/yum.repos.d
# mkdir repo.save
# mv Rocky-* repo.save
```

Next, create a repository configuration file Rocky-Media.repo with the following content with an editor.

/etc/yum.repos.d/Rocky-Media.repo

```
[media-base]
name=Rocky Linux - x86_64 - Media - BaseOS
baseurl=file:///media/cdrom/BaseOS
enabled=1
gpgcheck=0
[media-appstream]
name=Rocky Linux - x86_64 - Media - AppStream
baseurl=file:///media/cdrom/AppStream
enabled=1
gpgcheck=0
```

Please keep the DVD mounted until installation of the SX-Aurora TSUBASA software is completed.

## 3.13 Acquisition of the Host Information

Obtain the hostname and MAC address of the VH and take a memo of them, which are needed for obtaining the license file for the SX-Aurora TSUBASA software.

The hostname command shows the hostname.

<pre># hostname</pre>	
vh001	

Also, find out the MAC address of the network card of the VH from the information displayed with the ip command.

# ip addr							
1: lo: <loopback,up,lower_up> mtu 65536 qdisc noqueue state UNKNOWN qlen 1</loopback,up,lower_up>							
link/loopback 00:00:00:00:00 brd 00:00:00:00:00							
inet 127.0.0.1/8 scope host lo							
valid_lft forever preferred_lft forever							
inet6 ::1/128 scope host							
valid_lft forever preferred_lft forever							
2: enp129s0f0: <broadcast,multicast,up,lower_up> mtu 1500 qdisc mq state UP qlen 1000</broadcast,multicast,up,lower_up>							
link/ether <a href="https://acida.com">acida.com</a> brd ff:ff:ff:ff:ff:ff							
inet 192.168.1.100/24 brd 192.168.1.255 scope global dynamic enp129s0f0							
valid_lft 1410sec preferred_lft 1410sec							
inet6 fe80::ae1f:6bff:fe2d:8cb4/64 scope link							
valid_lft forever preferred_lft forever							
3: enp129s0f1: <no-carrier,broadcast,multicast,up> mtu 1500 qdisc mq state DOWN qlen 1000</no-carrier,broadcast,multicast,up>							
link/ether ac:1f:6b:2d:8c:b5 brd ff:ff:ff:ff:ff							

## Chapter4 Preparation of the SX-Aurora TSUBASA Software

This chapter describes how to obtain software required for the SX-Aurora TSUBASA and the license file for it.

#### **▲ NOTE**

Please perform the operations in this chapter on the computer for download that has access to the Internet prepared in section 1.1.

#### 4.1 Acquisition of Kernel Update Packages

This section explains how to obtain the kernel update packages corresponding to the OS and its version running on the VH. The following kernel update packages are required, in which "X.XX.X-XXX.X.X" corresponds to the kernel version.

- RHEL/CentOS 7.X
  - kernel-*X.XX.X-XXX.X.X*.el7.x86\_64.rpm
  - kernel-headers- X.XX.X-XXX.X.X.el7.x86\_64.rpm
- ➢ RHEL/CentOS/Rocky Linux 8.X
  - kernel-X.XX.X-XXX.X.X.el8\_X.x86\_64.rpm
  - kernel-headers-*X.XX.X-XXX.X.X*.el8\_*X*.x86\_64.rpm
  - kernel-core-X.XX.X-XXX.X.A.el8\_X.x86\_64.rpm
  - kernel-modules-X.XX.X-XXX.X.el8\_X.x86\_64.rpm

Please refer to the NEC support portal below for the latest information of the supported OSes and kernel versions.

https://www.support.nec.co.jp/en/View.aspx?id=4140100078	(English)
https://www.support.nec.co.jp/View.aspx?id=3140106285	(Japanese)

#### ▲ NOTE

This section explains the operations for Rocky Linux 8.6 (Kernel:4.18.0-372.19.1.el8\_6) as an example. The operations may vary depending on the OS and its kernel version.

(1) Access to the Download Site

Launch a web browser on the computer for download and access the following Rocky Linux download site.

🗖 📀 Download Rocky   Rocky Linux 🗙 🕂								-	٥	×
$\leftarrow$ $\rightarrow$ C $\textcircled{a}$ https://rocky	/linux.org/download/			ic A	έõ	≨≣	Ē	$\overline{\uparrow}$	۲	
<b>∧ Rocky</b> Linux <sup>™</sup> News	About v Comm	unity v Documentation v						Downlo	bad	*
	<b>Dov</b> Download the	e official release of Rocky Linux from one trusted mirrors.	<b>y</b> of our							
		Rocky Linux 9 Planned EOL: May 31 2032								
	ARCHITECTURE	ISOS	PACKAGES							
	x86_64	Minimal   DVD   Boot   Torrent   Checksum	BaseOS							
	ARM64 (aarch64)	Minimal   DVD   Boot   Torrent   Checksum	BaseOS							
	ppc64le	Minimal   DVD   Boot   Torrent   Checksum	BaseOS							
	s390x	Minimal   DVD   Boot   Torrent   Checksum	BaseOS							
		Rocky Linux 8 Planned EOL: May 31 2029								
	ARCHITECTURE	ISOS	PACKAGES							
	x86_64	Minimal   DVD   Boot   Torrent   Checksum	BaseOS							
	ARM64 (aarch64)	Minimal   DVD   Boot   Torrent   Checksum	BaseOS							
										Ŧ

https://rockylinux.org/download/

Select x86\_64 of your OS version (8.6 in this example), and navigate through the links "os", "Packages", and then "k".

#### (2) Download of Update Packages

Create an arbitrary directory (folder) to store downloaded files (hereafter, the download directory "Aurora" is used as an example in this document). Then click on the kernel package corresponding to your OS version (kernel-4.18.0-372.19.1.el8\_6.x86\_64.rpm in this example) on the download site and download it onto the directory.

In addition, download the following packages onto the same directory.

- kernel-headers-4.18.0-372.19.1.el8\_6.x86\_64.rpm
- kernel-core-4.18.0-372.19.1.el8\_6.x86\_64.rpm
- kernel-modules-4.18.0-372.19.1.el8\_6.x86\_64.rpm

Index of /pub/rocky/&6/BaseOS: × +		- • x
← → C බ ⊡ https://download.rockylinux.org/pub/rocky/8	.6/BaseOS/x86_64/os/Packages/I	,k/ A <sup>N</sup> € Ga 🛨 😩 …
Index of /pub/rocky/8	3.6/BaseC	OS/x86_64/os/Packages/k/
/ kabi-dw-0-0.10.20200515gitb52ac13.el8.x86_64.rpm kbd-legacy-2.0.4-10.el8.noarch.rpm kbd-misc-2.0.4-10.el8.noarch.rpm kernel-4.18.0-372.13.1.el8_6.x86_64.rpm kernel-4.18.0-372.16.1.el8_6.0.1.x86_64.rpm	12-Apr-2021 05:10 12-Apr-2021 03:05 12-Apr-2021 03:05 12-Apr-2021 03:05 29-Jun-2022 23:34 15-Jul-2022 01:50	71796 398612 491624 1538456 8426636 8435564
kernel-4.18.0-372.16.1.el8_6.x86_64.rpm kernel-4.18.0-372.19.1.el8_6.x86_64.rpm kernel-4.18.0-372.26.1.el8_6.x86_64.rpm kernel-4.18.0-372.9.1.el8.x86_64.rpm kernel-abi-stablelists-4.18.0-372.13.1.el8_6.no> kernel-abi-stablelists-4.18.0-372.16.1.el8_6.0> kernel-abi-stablelists-4.18.0-372.61_el8_6.0>	13-Jul-2022 21:44 02-Aug-2022 18:46 13-Sep-2022 23:18 10-May-2022 22:01 29-Jun-2022 23:34 15-Jul-2022 01:49 13-Jul-2022 01:46	8435540 8440112 8458676 8420412 8439092 8448028 8448023
<pre>kernel-abi-stablelists-4.18.0-372.19.1.el8_6.no&gt; kernel-abi-stablelists-4.18.0-372.19.1.el8_6.no&gt; kernel-abi-stablelists-4.18.0-372.26.1.el8_6.no&gt; kernel-core-4.18.0-372.13.1.el8_6.x86_64.rpm kernel-core-4.18.0-372.16.1.el8_6.x86_64.rpm</pre>	13-501-2022 21:44 13-Sep-2022 23:18 10-May-2022 23:34 15-Jul-2022 21:50 13-Jul-2022 01:50	8452568 8471140 8432868 41204284 41216944 41138384
kernel-core-4.18.0-372.19.1.el8_6.x86_64.rpm kernel-core-4.18.0-372.26.1.el8_6.x86_64.rpm kernel-core-4.18.0-372.2.1.el8.x86_64.rpm kernel-cross-headers-4.18.0-372.13.1.el8_6.x6> kernel-cross-headers-4.18.0-372.16.1.el8_6.x86> kernel-cross-headers-4.18.0-372.16.1.el8_6.x86>	202-Aug-2022 18:46 13-Sep-2022 23:18 10-May-2022 22:01 29-Jun-2022 23:34 15-Jul-2022 01:50 13-Jul-2022 01:44	41220880 41267828 41191920 13827056 13836476 13836588
kernel-cross-headers-4,18.0-372.19.1.el8_6.x86> kernel-cross-headers-4,18.0-372.26.1.el8_6.x86> kernel-cross-headers-4,18.0-372.26.1.el8_6.x86_64.rpm kernel-debug-4,18.0-372.13.1.el8_6.x86_64.rpm kernel-debug-4,18.0-372.16.1.el8_6.x86_64.rpm	202-Aug-2022 18:46 13-Sep-2022 23:18 10-May-2022 23:34 15-Jul-2022 01:50 13-Jul-2022 01:50	13841036 13859548 13820460 8425920 8434848 8/34846
<pre>kernel_debug-4.18.0-372.19.1.el8_6.x86_64.rpm kernel_debug-4.18.0-372.26.1.el8_6.x86_64.rpm kernel_debug-4.18.0-372.9.1.el8.x86_64.rpm kernel_debug-core-4.18.0-372.13.1.el8_6.x86_64.rpm kernel_debug-core-4.18.0-372.13.1.el8_6.x86_64.rpm</pre>	02-Aug-2022 18:46 13-Sep-2022 18:46 13-Sep-2022 23:18 10-May-2022 22:01 29-Jun-2022 23:34 15-Jul-2022 01:50	8439396 8457960 8419696 70828176 708581308 70763168
<pre>Kernel-debug-core-4.18.0-372.91.1et8_6.x86_64.rpm kernel-debug-core-4.18.0-372.95.1et8_6.x86_64.rpm kernel-debug-core-4.18.0-372.95.1et8_6x6_64.rpm kernel-debug-core-4.18.0-372.95.1et8_x86_64.rpm</pre>	02-Aug-2022 21:44 02-Aug-2022 18:46 13-Sep-2022 23:18 10-May-2022 22:01	7085488 70854828 70907144 70824104

### **▲ NOTE**

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The bash-4.4 has a known problem that adversely affects the operation of the SX-Aurora TSUBASA System. It is included in the ISO image of the RHEL/CentOS 8.4. Please update bash-4.4 to a fixed or later version.

The updated packages of bash for each OS are describe at the following URL.

https://www.support.nec.co.jp/en/View.aspx?id=4140100118

The bash package for CentOS 8.4 is below, download it onto the "Aurora" directory. https://vault.centos.org/8.4.2105/BaseOS/x86\_64/os/Packages/

bash-4.4.20-1.el8\_4.x86\_64.rpm or later

## 4.2 Acquisition of the License Certificates

If you have purchased paid software for the SX-Aurora TSUBASA, please obtain the license certificates from the internet delivery product download service according to the operations described in this section.

(1) Access to the Internet Delivery Product Download Service

Access the internet delivery product download service at the URL below with a web browser.

https://idpsv.wsrs.m-dmz1.nec.co.jp/dlservice/

#### インターネット配信製品ダウンロードサービス Internet Delivery Product Download Service

ヘルプ Help >	2019年1月26日(土) 09:00~13:30 2019年1月28日(月) 06:00~08:00 システムメンテナンスのため本サービスを一時停止取します。 Saturday, January 26 2019, 09:00 to 13:30 (JST) Monday, January 28 2019, 06:00 to 08:00 (JST)
II ご利用手順 > II Operation Manual >	STEP1         STEP2         STEP3         STEP4           使用条件同意         ログイン         対象選択         ダウンロード
お問い合わせ Inquiry お問い合わせ先は弊社からお送 りしている納品通知メールに記 載されています。エラーが発生 した場合は、まず「トラブル シューティング」をご覧くださ	<b>使用条件同意 License agreement</b> メール件名が「I配信製品」で始まる場合
No Refer to the Delivery Notification e-mail for contact information. See Troubleshooting guide for your assistance.	使用条件にご同意頂く必要がある製品の場合、納品通知メールに使用条件ファイルが添付されています。使用条件にご同意頂 ける場合は「使用条件に同意する」をクリックしてください。 お客様が同時に複数のソフトウェア製品をお求めになった場合、お客様は、使用条件に一度ご同意頂くことにより、当該お求 めになった全てのソフトウェア製品(納品通知メール記載の数量)について、使用条件にご同意頂いたものと致します。 使用条件のない製品の場合も「使用条件に同意する」をクリックしてください。 使用条件にご同意頂けない場合は、納品通知メールに記載の問い合わせたまでお問い合わせ願います。
<ul> <li>▶ トラブルシューティング &gt;</li> <li>▶ Troubleshooting &gt;</li> </ul>	For those received e-mail with "Internet Delivery Notification" subject line.
	PRIOR TO THE DOWNLOAD OF SOFTWARE PRODUCT(S), NEC SALES COMPANIES MUST ENSURE THAT THE END USER AGREES TO THE END USER LICENSE AGREEMENT (EULA) OF THE PRODUCT(S) ATTACHED TO THE INTERNET DELIVERY NOTIFICATION E-MAIL. IF THE END USER AGREES TO THE EULA, CLICK THE LINK BELOW TO DOWNLOAD THE PRODUCT(S). IF THE END USER DOES NOT AGREE TO THE EULA, YOU MUST NOT DOWNLOAD, INSTALL, OR USE THE PRODUCT(S). BY CLICKING THE LINK BELOW ONCE, THE END USER OF THE NEC SALES COMPANIES AGREES TO BE BOUND BY THE TERMS OF ALL THE EULA, EITHER SINGLE PRODUCT OR MULTIPLE PRODUCTS. IN CASE THERE IS NO EULA ATTACHED TO THE PURCHASED PRODUCT(S), CLICK THE LINK BELOW TO PROCEED.

> 使用条件に同意する I agree to the license agreement

Please read the license agreement carefully and click on the "I agree to the license agreement" button on the bottom of the window if you agree with it.

You will be transferred to the login window. Enter the download ID and password described in the I-distribution product delivery notification, and then click on the "Log in" button on the bottom of the window.

NEC \Orchestrating a brighter world							
インターネット配信 Internet Delivery	製品ダウンロードサービス Product Download Service						
ヘルプ Help >	STEP1         STEP2         STEP3         STEP4           使用条件同意         ログイン         対象選択         ダウンロード						
ご利用手順 Operation ふご利用手順 > ろ Operation Manual >	ログイン Log in トップページに戻る Return to top page						
お問い合わせ Inquiry	納品通知メールに記載されているダウンロードIDとバスワードを入力してください。 Enter the download ID and password on the delivery notification e-mail.						
お問い合わせ先は弊社からお送 りしている納品通知メールに記 載されています。エラーが発生	ダウンロードID Download ID						
した場合は、ま9「トラフル シューティング」をご覧くださ い。	パスワード Password						
Refer to the Delivery Notification e-mail for contact information. See Troubleshooting guide for your assistance.	> ログイン Log in > クリア Clear						
▶ トラブルシューティング >							
Troubleshooting >							
	Convicible & NEC Comparison All rights reserved						

#### (2) Acquisition of the License Certificates

You will be transferred to the window to select the products from the list below. Please check the selection-boxes on the left of the products you have purchased.

• NEC Software Development Kit for Vector Engine (XX License)

Click on the "Confirm" button to download a zip file that includes the license certificates for the selected products and other related documents.

Unzip the zip file, and you will get zip files again which correspond to all the products you have selected. Unzip the zip files you have just extracted and save all the files "License Certificate.pdf", which will be extracted and are used in section 4.3 and 6.1.

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へルプ Help )		使	STEP1 用条件同意		STEP2 ログイン		STEP 3 対象選択		ģ	STEP4 グンロード
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3問い合わせ Inquiry	ダウン[ Select 1	コード: the pr	を希望する項番 oduct(s) to do	を選択し wnload	ってから対象研 and click Co	定してくださ nfirm	U1.			
6問い合わせ先は弊社からお送 りしている納品通知メールに記	[手配番	号 Shi	pping No.] 37	2-4395	9					
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### 4.3 Acquisition of the License File

This section describes how to obtain the license file from the "HPC Software License Creation" site using the license certificate files downloaded in section 4.2 and the hostname and MAC address of the VH obtained in section 3.13.

(1) Preparation of the Licensing Keys

Please note all the licensing keys described in the license certificate files for paid

software (SDK or Compat C++) downloaded in section 4.2.

(2) Access to the "HPC Software License Creation" SiteAccess the "HPC Software License Creation" site below with a web browser.

https://www.hpc-license.ne	ec.com/aurora/		
NEC HPC Software License Creation			
SX-Aurora TSUBASA Product page	Support page(NEC Group Internal Use O	nly) Contact Us	
Top Page			
			Japanese
New user registration			
Register new user for license creation	1		
	Create user		
			100
Login page			
Create licenses and change user pass	swords		
	Login		
How to create a license			
We will explain the procedure of user	registration and license creation		
	How to create a license		
FAO			
It is question and answer about licen	se creation		
	FAQ		

#### (3) User Registration

Click on the "Create user" button and you will be transferred to the "Create user" page. Enter your e-mail address and desired user ID conforming to the rules on the page, and then click on the "About a personal Data" button.

NEC HPC Software License Creation								
SX-Aurora TSUBASA Product page	Support page(NEC Group Internal Use Only)	Contact Us						
Create user								
Email address Required								
Confirm mail address Required								
User ID(8-16 characters) Required								
We will send it to your e-mail address. Please	access the URL described in e-mail and complete regist	ration.						
* User 1D must be at least 8 characters and ca	About a personal Data	•)						
	Next							

The "About a personal Data" window will pop up. Please read through while scrolling down the page and click on the "agree" button if you agree with it.

Then, click on the "Next" button on the page you will return to.



Next, access the URL in the e-mail entitled "Welcome to the NEC HPC Software license system" sent to the entered address, and register a password.

Finally, an e-mail entitled "New User created NEC HPC Software license system" will be sent to the address and the user registration is completed.

(4) Login as the Registered User

Access the "HPC Software License Creation" site again and click on the "Login" button to display the login page.

NEC HPC Software License Creation								
SX-Aurora TSUBASA Product page Support page(NEC Group Internal Use Only) Contact Us								
Login page								
User ID Required								
Password Required								
	Login							
Sorgot your user ID or password?								

Log in by entering your user ID and password, and you will see your my page.

NEC HPC Software License Creation			
SX-Aurora TSUBASA Product page	Support page(NEC Group Internal Use Only)	Contact Us	
		How to create a license	🕞 Logout
МуРаде			
Profile			
Registered license key information			
New license key registration			
Baiagus liagnas kay			
Reissue license key			
Trial license			

(5) Registration of the License Keys

Click on the "New license key registration" button on your my page to open the "License key input" page.

Enter one license key in the "License key input" field and the MAC address of the VH in the "License Server Host ID" field on the page.

SX-Autora ISOBASA Product page Support page(NEC Group Internal	Use Only) Contact Us
	🔿 MyPage 🛛 🕤 Logo
License key input	
License key input Required AEODEP-129450-CHEIKL-098760-WK070R	
License Server Host ID Required [5 21:44 cita:tait] ×	
*The letters of the alphabet B, D, I, O are not used for the license key.	
Cancel OK	xx).

The "License key input" window will be displayed by clicking on the "OK" button, and click on the "OK" button again after confirming the registered information.

The license information on the registered license key is displayed on your my page.

	ora TSUBA	SA Product page	Support pa	age(NEC	Group	Internal Use C	only)	Contact	Us	
							0	How to create a	license 💿 L	
<b>/Page</b>										
	Profile									
22 77										
egistere	d license	key information		1121-1-1-1122-2-11		1		Market 1		
oduct	Version	License key	y Registered days	days	Quantity		created	License Server MAC-ID	Note	download
				Element	Total	licenses				
K/Compat +	1.0	And A fills of a fill	2023/02/01	1	1	0	and the states	Unregistered	Download	
						Host information				
	the Press	61		1						
	the license	nie, piease register all nece	essary license	keys for	each llo	ense server or	create a trial licen:	se,		
lownload										
download nber of cr	eated licens	ies								
lownload nber of cr DK produc	eated licens t: Number	es of hosts registered								
lownload nber of cro DK produc on-SDK pr	eated licens t: Number roduct: Nur	es of hosts registered nber of licenses								

Please repeat step (5) for each license key in the license certificate files.

#### (6) Registration of the VH for Executing the Compilers

After the registration of the license keys for SDK or Compat C++, you will see the "Host information" button in the "Number of created licenses" cell in the "Registered license key information" section on your my page.

Click on the "Host information" button to register the VH where you execute the compilers.

NEC HPC Software License Creation

SX-Aurora TSUBASA Product page		ra TSUBASA Product page Support page(NEC Group Internal Use Only)						Contact Us		
							0	How to create a	license 😑 Log	
lyPage										
	Profile									
Registere	d license	key information								
roduct	Version	License key	Registered	Quantity		Number of created	License Server MAC-ID	Note	License	
				Element	Total	licenses				
DK/Compat ++	t 1.0	1.0	2023/02	2023/02/01	1	1	0	and the second	Unregistered	Download
						Host information				
download	the license	file, please register all pers	esary license	keve for	each li	rense server or	create a trial licen			
download	une noense	nie, pieuse register un nece	soury neeriae	Keys IOI	edon in	cense server or	create a charmoen.			
umber of cr	eated licens	ses								
SDK produ	t: Number	of hosts registered								
Non-SDK p	roduct: Nur	nder of licenses								
	wlicense	kev								
Ne	W IICCII3C									

#### NEC HPC Software License Creation

SX-Aurora TSUBASA Product page	Support page(NEC Group Internal Use Only)	Contact Us
		S MyPage S Logout
SDK license host information	n	
SDK license host information		
Number of concurrent executions in the host	1	
License creatable number	1	
Current license creation Number of registered	hosts 0	
		Add Host
Data Not Found		
	Cancel	

Then enter the hostname and MAC address of the VH on the "SDK license host information(Add)" page, and click on the "OK" button.

NEC HPC Software	License Creation							
SX-Aurora TSUBASA	Product page	Support page(NEC Group Internal Use Only) Contact Us						
		MyPage	C Logout					
SDK license hos	t informatio	on(Add)						
Host name (hostname command)	Required	3-6						
Host ID	Required	8618-						
Required       Required         **Please enter the host ID in the input form of (xx:xx:xx:xx:xx).         Would you like to register the above host as license host?         Cancel       OK								

You will see the host information you have registered on the "SDK license host information" window.

• -	Support	page(NEC Group Internal Use (	Only) (	Contact Us	
				S MyPage	🕒 Logou
DK license host informat	tion				
	Successful re	gistration of SDK license h	ost.		
DK license host information					
umber of concurrent executions in the ho	st 1				
ense creatable number	1				
irrent license creation Number of register	red hosts 1				
				Ade	d Host
oduct	Version	Host name	Host ID		
)K/Compat C++	1.0	and the body of the second second	NEW YORK DO		hange Ielete

Click on the "Cancel" button to finish adding the host information after confirming the contents.

	01a 1306	SA Froduct page	Support pa	age(nec	Group	Internal Ose C	, iiiy)	Contact	05
							0	How to create a	license 🕤 Lo
MyPage									
	Profile								
	1.1.								
Registere	d license	key information		1				110020-1	
Product	Version	License key	Registered days	Element	Total	created licenses	MAC-ID	Note	download
SDK/Compat	1.0	2010 1984 17 APR	2023/02/01	1	1	0	100.00	Unregistered	Download
						Host information	]		
	the license	file, please register all nece	essary license	e keys for	each li	cense server or	create a trial licens	se,	
o download									
o download lumber of cr	eated licens	ses							
o download lumber of cr SDK produc	eated licens :t: Number	ses of hosts registered							

#### (7) Download of the License File

Click on the "Download" button on the right end of the "Registered license key information" section on your my page to go to the "License create (confirm)" page.

## NEC HPC Software License Creation

TSUBASA Pr	oduct page Support page(NEC	Group Internal U	se Only)		Co	ontact Us	
						\varTheta MyPage	C Logo
eate (co	nfirm)						
Agreement	LICENSE TERMS OF ISSU	ING					
ense key i	nformation						
Version	License key	Registered	Registered Quantity		Number of	of License Server MA	
		uuys	Element	Total	licenses		
1.0	NAMES AND ADDRESS OF TAXABLE PARTY.	2023/02/01	1	1	1		
l licenses umber of hos	ts registered.						
st: Number of	licenses						
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Please download the license file license.dat onto the download directory by clicking on the "Download" button in the "License file" section.

## 4.4 Transfer of the Files Downloaded

So far, the following files are saved in the download directory.

No.	Category	File Name
[1]	Kernel Update Packages	kernel-4.18.0-372.19.1.el8_6.x86_64.rpm kernel-headers-4.18.0-372.19.1.el8_6.x86_64.rpm kernel-core-4.18.0-372.19.1.el8_6.x86_64.rpm kernel-modules-4.18.0-372.19.1.el8_6.x86_64.rpm
[2]	License File	license.dat
([3])	(Only RHEL/CentOS 8.4) Bash Update Package	bash-4.4.20-1.el8_4.x86_64.rpm

#### Table 2 The List of the Files Downloaded

Please transfer the files onto the directory /var/tmp/aurora on the VH.

## Chapter5 Installation of the SX-Aurora TSUBASA Software

This chapter explains how to install the SX-Aurora TSUBASA software. Please perform the operations in this chapter on the VH as the superuser.

#### 5.1 Update of the Kernel and bash

Apply the kernel update packages ([1] in Table 2) with the yum command.

```
# cd /var/tmp/aurora
# yum install \
kernel-4.18.0-372.19.1.el8_6.x86_64.rpm kernel-headers-4.18.0-372.19.1.el8_6.x86_64.rpm \
kernel-core-4.18.0-372.19.1.el8_6.x86_64.rpm kernel-modules-4.18.0-372.19.1.el8_6.x86_64.rpm
```

Update bash when you are using RHEL/CentOS 8.4.

# yum install bash-4.4.20-1.el8\_4.x86\_64.rpm

Reboot the VH after the update.

# reboot

You can confirm the updated kernel is running with the uname command after the reboot of the VH.

```
# uname -r
4.18.0-372.19.1.el8_6.x86_64
```

#### 5.2 Mount of the OS Installation DVD

Confirm that the OS installation DVD is in the DVD drive of the VH and mount it at the directory /media/cdrom. This DVD is read at the installation of the SX-Aurora TSUBASA software.

# mount /dev/cdrom /media/cdrom

## 5.3 Setup of the Yum Repository

Set up the yum repository to install the SX-Aurora TSUBASA software onto the VH using the yum repository NEC provide on the Internet.

Execute the following command:

```
# yum install https://sxauroratsubasa.sakura.ne.jp/repos/TSUBASA-soft-release-2.8-1.noarch.r
pm
```

The following files are installed:

File	Description
/etc/pki/rpm-gpg/RPM-GPG-KEY-TSUBASA-soft	GPG public Key
/etc/yum.repos.d/TSUBASA-restricted.repo	Configuration file for the paid software
/etc/yum.repos.d/TSUBASA-repo.repo	Configuration file for the free software
/opt/nec/ve/sbin/TSUBASA-groups-remark.sh	Script to update the group status
/opt/nec/ve/sbin/terminate-all-ve-services	Script to stop services
/opt/nec/ve/sbin/start-all-ve-services	Script to restart services
/opt/nec/ve/sbin/setup-ve-infiniband.sh	Script to configure InfiniBand

When you cannot access to the yum repository, try it again after few minutes.

The service may not be available due to server maintenance, so please check the following as well.

https://sxauroratsubasa.sakura.ne.jp/forums/

Access to the yum repository for the paid software requires the PP support contract.

Edit the yum configuration file /etc/yum.repos.d/TSUBASA-restricted.repo for the paid software based on the contract details you have: Enter the 16 digits of the serial number on the serial number card, excluding the hyphens, in the username field, the right eight digits

in the password field, and 1 in the enabled field. The serial number card is included in the file you have downloaded from the internet delivery product download service. Figure 2 shows an example of the serial number card.



Figure 2 Serial Number Card

The following example shows the description of the yum configuration file to enable the yum repository for the paid software.

### 5.4 Software Installation

Install the SX-Aurora TSUBASA software with the value of the shell variable TSUBASA\_GROUPS set to the group names to be installed according to which paid software

you have bought. Please refer to "SX-Aurora TSUBASA Installation Guide" for the available group names.

```
# TSUBASA_GROUPS="ve-devel nec-sdk-devel nec-mpi-devel"
# /opt/nec/ve/sbin/TSUBASA-groups-remark.sh $TSUBASA_GROUPS
# yum group install $TSUBASA_GROUPS
```

## 5.5 Status Check of the VE

Confirm the status of the VE is ONLINE with the vecmd command as the superuser. It can take a few minutes until it becomes ONLINE.

## ▲ NOTE

If "UNINITIALIZED" or "OFFLINE" is displayed, please wait for a short while.

### 5.6 Update of the VMC Firmware

Check whether update of the VMC firmware is required as follows:

# /opt/nec/ve/bin/vecmd fwup check

If the message "Updating VMCFW is required." is displayed, you need to update the VMC firmware. In this case, perform the following operations as the root user.

(1) Set the status of the VEs to the MAINTENANCE mode

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

(2) Execute the vecmd command to update the firmware

# /opt/nec/ve/bin/vecmd fwup vmc aurora\_MK10.bin

\* The update of the firmware will take about a few minutes.

(3) Reboot the VHs

# reboot

- (4) Log in as the root user
- (5) Check the Status of the VEs

Confirm the status of the VEs is ONLINE. It can take a few minutes until it becomes ONLINE.



#### ▲ NOTE

If "UNINITIALIZED" or "OFFLINE" is displayed, please wait for a short while.

## **Chapter6** Configuration

This chapter explains how to configure the SX-Aurora TSUBASA system. Perform the procedures in this chapter as the superuser on the VH.

#### 6.1 Configuration of the License Server

(1) Edit of the Configuration File for the License Server

Open the file /opt/nec/aur\_license/aur\_license.conf with an editor.

```
# Vector System License Server Configuration #
************
# The below variables are used for setting of the license server and the license client.
# - License_server_port
# - License_server_host
# Port number the server listens (default=7300).
#License_server_port=7300
# License server's hostname (for clients to connect to).
# This setting is for client hosts.
#License_server_host=server-host
***************
# The below variables are used for only setting of the license server.
# - Heartbeat_interval
# - Heartbeat_timeout_factor
# - Loglevel
# Heartbeat interval (set by minutes)
Heartbeat_interval=1440
# Heartbeat timeout factor
# Heartbeat will be timed out (Heartbeat interval) * (Heartbeat timeout factor)
# minutes after the expected time.
Heartbeat_timeout_factor=1
# Log level ( error, warning, info, debug )
Loglevel=info
```

Remove the leading "#" from the line "#License\_server\_host=server-host" in the file and replace the string "server-host" with the hostname of the VH as follows.

```
# License server's hostname (for clients to connect to).
# This setting is for client hosts.
(License_server_host=vh001)
```

(2) Settings for SELinux

When SELinux is enabled, settings for SELinux are needed for the license server process to access the directory writing its logs. The settings can be performed by semanage and restorecon command as follows.

```
# semanage fcontext -a -t var_log_t "/var/opt/nec/aur_license(/.*)?"
# restorecon -R -F -v -r /var/opt/nec/aur_license
```

If the SELinux is not enabled, skip these settings.

(3) Copy of the License File

Copy the license file license.dat ([2] in Table 2) onto the directory /opt/nec/aur\_license.

# cp /var/tmp/aurora/license.dat /opt/nec/aur\_license

(4) Registration of the License Keys

Execute the reg\_serialkey command for each of all the license keys in the license certificates for SDK or Compat C++ downloaded in section 4.2.

# /opt/nec/aur\_license/bin/reg\_serialkey XXXXX-XXXXX-XXXXX-XXXXX-XXXXXX-XXXXXX

(5) Registration confirmation of the License key

In order to confirm the registered contents in (4), execute the reg\_serialkey command

with the check option.

# /opt/nec/aur\_license/bin/reg\_serialkey --check

(6) Start of the License Server

Start the license server and configure it to automatically start up when the OS boots.

```
# systemctl start aurlic-server
# systemctl enable aurlic-server
```

### 6.2 Configuration of NEC MPI

If you use NEC MPI and the firewall is running on the VH, configure to open the ports specified below. If the firewall is off, this procedure is not necessary.

Firstly, check if the firewall is running with the firewall-cmd command as follows.

```
# firewall-cmd --state
running
```

If "running" is displayed, the firewall is running. In this case, open the ports from 25257 to 25266 as follows because NEC MPI uses these ports by default to listen for external connections.

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

If the firewall-cmd command displays the ports, the firewall configuration is successful.

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

#### 6.3 Configuration of HugePages

This section explains how to configure HugePages for VEOS. Please refer to "SX-Aurora TSUBASA Installation Guide" for detail.

(1) Configure HugePages

```
# /opt/nec/ve/sbin/ve-set-hugepages
```

(2) Confirm HugePages setting

Confirm nr\_hugepages nr\_overcommit\_hugepages are not 0. (The following values are an example.)

```
# /opt/nec/ve/sbin/ve-set-hugepages -s
nr_hugepages:256
nr_overcommit_hugepages:23790
```

## Chapter7 Program Execution

This chapter briefly explains how to compile and execute sample programs to verify the configuration of the SX-Aurora TSUBASA system.

## 7.1 Compilation

You can compile C/C++ programs and Fortran programs with the ncc command and nfort command, respectively.

```
(C/C++ programs)
$ /opt/nec/ve/bin/ncc a.c
(Fortran programs)
$ /opt/nec/ve/bin/nfort a.f90
```

You can compile MPI programs written in C/C++ and Fortran with the mpincc command and mpinfort command respectively, after setting the environment corresponding to the version of NEC MPI with the source command as follows.

```
(bash)
$ source /opt/nec/ve/mpi/<version>/bin/necmpivars.sh
$ mpincc a.c
(csh)
% source /opt/nec/ve/mpi/<version>/bin/necmpivars.csh
% mpincc a.c
```

Please replace <version> above with the version of NEC MPI you use.

#### 7.2 Execution

You can directly run executable files (a.out) compiled with the ncc command and nfort command.

\$ ./a.out

You can run mpi programs compiled with the mpincc command and mpinfort command using the mpirun command specifying the number of processes with the option –np. Note that the environment setting for NEC MPI described in section 7.1 must be available for execution, too.

```
$ mpirun -np 8 a.out
```

### 7.3 Sample Programs

This section shows execution examples of sample programs, which can be downloaded from the following link:

https://sxauroratsubasa.sakura.ne.jp/repos/file/SetupGuide\_examples.tgz

Download and expand the file as follows:

```
$ tar xzf SetupGuide_examples.tgz
$ cd examples
$ ls
sample.c sample.f90 sample-mpi.c
```

#### (1) C/C++ Program sample.c

```
#include <stdio.h>
#define LOOP 100000000
main()
{
    int n, sign;
    double pi;
    pi = 0.0;
    sign = -1;
    for(n = 0; n <= LOOP; n++){
        sign = (n % 2)?(-1):1;
        pi += (double)sign / (2 * n + 1);
        }
        pi *= 4;
        printf("%.8f\n", pi);
}</pre>
```

You can compile and run the program sample.c as follows.

```
$ /opt/nec/ve/bin/ncc sample.c
ncc: vec( 101): sample.c, line 13: Vectorized loop.
$ ./a.out
3.14159265
```

(2) Fortran Program sample.f90

```
program main
  implicit none
  integer :: n
  integer, parameter :: loop=1000000000
  double precision :: pi
  pi = 0.0d0
  do n = 1, loop
    pi = pi + ((-1.0d0) ** (n - 1)) / (2.0d0 * n - 1.0d0)
  end do
    pi = pi * 4.0d0
  write(*, '(f0.8)') pi
end program main
```

You can compile and run the program sample.f90 as follows.

```
$ /opt/nec/ve/bin/nfort sample.f90
nfort: vec( 101): sample.f90, line 9: vectorized loop.
$ ./a.out
3.14159265
```

#### (3) MPI Program sample-mpi.c

```
#include <stdio.h>
#include <stdlib.h>
#include <mpi.h>
int
main(int argc, char **argv)
{
   int myrank, nprocs;
   int bufsz, count, typesz;
   int sum, ans;
   int i, j;
   int *sbuf, *rbuf;
   MPI_Init(&argc, &argv);
   MPI_Comm_rank(MPI_COMM_WORLD, &myrank);
   MPI_Comm_size(MPI_COMM_WORLD, &nprocs);
   MPI_Type_size(MPI_INT, &typesz);
   bufsz = 128 * 1024 * 1024;
   count = bufsz / typesz / nprocs;
   sbuf = (int *) malloc(bufsz);
   rbuf = (int *) malloc(bufsz);
   for (i = 0; i < count * nprocs; i++)
      sbuf[i] = myrank;
   MPI_Alltoall(sbuf, count, MPI_INT, rbuf, count, MPI_INT, MPI_COMM_WORLD);
```

```
sum = ans = 0;
for (i = 0; i < nprocs; i++)
    for (j = 0; j < count; j++)
        sum += rbuf[count * i + j] - i;
MPI_Reduce(&sum, &ans, 1, MPI_INT, MPI_SUM, 0, MPI_COMM_WORLD);
if (myrank == 0) {
    if (ans == 0)
        printf("# MPI Execution: Success\n");
    else
        printf("# MPI Execution: Fail\n");
    }
MPI_Finalize();
return 0;
}
```

You can compile and run the program sample-mpi.c as follows. The version of NEC MPI is 2.2.0 in this example.

```
(bash)
$ source /opt/nec/ve/mpi/2.2.0/bin/necmpivars.sh
$ mpincc sample-mpi.c
ncc: vec( 101): sample-mpi.c, line 23: Vectorized loop.
ncc: vec( 101): sample-mpi.c, line 30: Vectorized loop.
$ mpirun -np 8 a.out
# MPI Execution: Success
(csh)
% source /opt/nec/ve/mpi/2.2.0/bin/necmpivars.csh
% mpincc sample-mpi.c
ncc: vec( 101): sample-mpi.c, line 23: Vectorized loop.
ncc: vec( 101): sample-mpi.c, line 30: Vectorized loop.
% mpirun -np 8 a.out
# MPI Execution: Success
```

#### ▲ NOTE

Once the setup of the SX-Aurora TSUBASA system is successfully completed, you can delete the files under the working directory /var/tmp/aurora, as they are not needed for operation of the SX-Aurora TSUBASA system.

SX-Aurora TSUBASA System Software

## **SX-Aurora TSUBASA**

## **Setup Guide**

March 2023 Edition

**NEC** Corporation

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