EXPRESSCLUSTER® X SingleServerSafe 4.0 *for Linux*

Installation Guide

September 14, 2018
2nd Edition

Revision History

Edition	Revised Date	Description
1st	Apr 17, 2018	New manual.
2nd	Sep 14, 2018	Corresponds to the internal version 4.0.1-1.

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Preface

Who Should Use This Guide

The *EXPRESSCLUSTER X SingleServerSafe for Linux Installation Guide* is intended for system engineers who intend to introduce a system using EXPRESSCLUSTER X SingleServerSafe and system administrators who will operate and maintain the introduced system. This guide describes how to install EXPRESSCLUSTER X SingleServerSafe.

How This Guide Is Organized

Chapter 1	"About EXPRESSCLUSTER X SingleServerSafe": Explains the functions and requirements of EXPRESSCLUSTER X SingleServerSafe.
Chapter 2	"Installing EXPRESSCLUSTER X SingleServerSafe": Describes how to install EXPRESSCLUSTER X SingleServerSafe.
Chapter 3	"Updating, uninstalling, reinstalling or ": Describes how to upgrade EXPRESSCLUSTER X SingleServerSafe, uninstall and reinstall EXPRESSCLUSTER X SingleServerSafe, and upgrade to EXPRESSCLUSTER X.
Chapter 4	"Latest version information": Provides the latest information about EXPRESSCLUSTER X SingleServerSafe.
Chapter 5	"Additional information": Provides tips on installing EXPRESSCLUSTER X SingleServerSafe.
Chapter 6	"Notes and Restrictions": Provides notes and restrictions you need to know before starting the actual operation of EXPRESSCLUSTER X SingleServerSafe.

Appendix

Appendix A	"Troubleshooting": Describes problems you might experience when installing or setting up EXPRESSCLUSTER X SingleServerSafe and how to resolve them.
Appendix B	"Index"

Terms Used in This Guide

EXPRESSCLUSTER X SingleServerSafe, which is described in this guide, uses windows and commands common to those of the clustering software EXPRESSCLUSTER X SingleServerSafe to ensure high compatibility with EXPRESSCLUSTER X SingleServerSafe in terms of operation and other aspects. Therefore, cluster-related terms are used in parts of the guide.
The terms used in this guide are defined below.

Term	Explanation
Cluster, cluster system	A single server system using EXPRESSCLUSTER X SingleServerSafe
Cluster shutdown, reboot	Shutdown or reboot of a system using EXPRESSCLUSTER X SingleServerSafe
Cluster resource	A resource used in EXPRESSCLUSTER X SingleServerSafe
Cluster object	A resource object used in EXPRESSCLUSTER X SingleServerSafe
Failover group	A group of group resources (such as applications and services) used in EXPRESSCLUSTER X SingleServerSafe

EXPRESSCLUSTER X SingleServerSafe Documentation Set

The EXPRESSCLUSTER X SingleServerSafe documentation consists of the four guides below. The title and purpose of each guide is described below:

EXPRESSCLUSTER X SingleServerSafe Installation Guide

This guide is intended for system engineers who intend to introduce a system using EXPRESSCLUSTER X SingleServerSafe and describes how to install EXPRESSCLUSTER X SingleServerSafe.

EXPRESSCLUSTER X SingleServerSafe Configuration Guide

This guide is intended for system engineers who intend to introduce a system using EXPRESSCLUSTER X SingleServerSafe and system administrators who will operate and maintain the introduced system. It describes how to set up EXPRESSCLUSTER X SingleServerSafe.

EXPRESSCLUSTER X SingleServerSafe Operation Guide

This guide is intended for system administrators who will operate and maintain an introduced system that uses EXPRESSCLUSTER X SingleServerSafe. It describes how to operate EXPRESSCLUSTER X SingleServerSafe.

EXPRESSCLUSTER X Integrated WebManager Administrator's Guide

This guide is intended for system administrators who manage a cluster system using EXPRESSCLUSTER with EXPRESSCLUSTER Integrated WebManager and for system engineers who are introducing the Integrated WebManager. Details about items required when introducing a cluster system are described in accordance with actual procedures.

Conventions

In this guide, **Note**, **Important**, **Related Information** are used as follows:

Note:

Used when the information given is important, but not related to the data loss and damage to the system and machine.

Important:

Used when the information given is necessary to avoid the data loss and damage to the system and machine.

Related Information:

Used to describe the location of the information given at the reference destination.

The following conventions are used in this guide.

Convention	Usage	Example
Bold	Indicates graphical objects, such as fields, list boxes, menu selections, buttons, labels, icons, etc.	In **User Name**, type your name. On the **File** menu, click **Open Database**.
Angled bracket within the command line	Indicates that the value specified inside of the angled bracket can be omitted.	`clpstat -s [-h host_name]`
#	Prompt to indicate that a Linux user has logged in as root user.	`# clpcl -s -a`
Monospace (courier)	Indicates path names, commands, system output (message, prompt, etc), directory, file names, functions and parameters.	`/Linux/4.0/en/server/`
Monospace bold (courier)	Indicates the value that a user actually enters from a command line.	Enter the following: **`clpcl -s -a`**
Monospace italic (courier)	Indicates that users should replace italicized part with values that they are actually working with.	`rpm -i expressclssss -<version_number>-<release_number>.x86_64.rpm`

Contacting NEC

For the latest product information, visit our website below:

https://www.nec.com/global/prod/expresscluster/

Chapter 1   About EXPRESSCLUSTER X SingleServerSafe

This chapter describes the functions and requirements of EXPRESSCLUSTER X SingleServerSafe.

This chapter covers:

What is EXPRESSCLUSTER X SingleServerSafe?

EXPRESSCLUSTER X SingleServerSafe is set up on a server. It monitors for application errors and hardware failures on the server and, upon detecting an error or failure, restarts the failed application or reboots the server so as to ensure greater server availability.
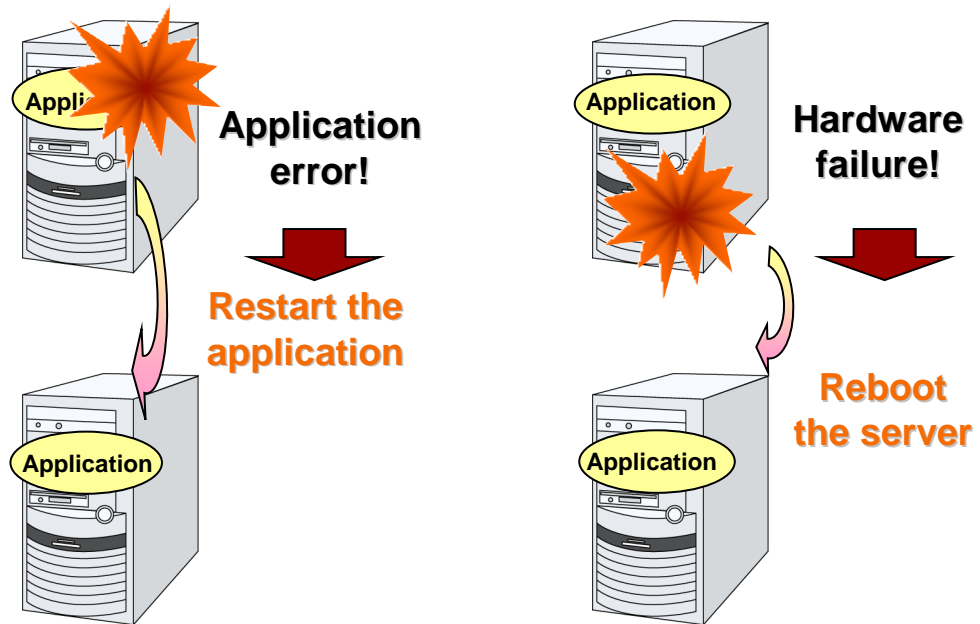
Related Information:

For details about EXPRESSCLUSTER X SingleServerSafe, refer to Section I "Overview of EXPRESSCLUSTER X SingleServerSafe" in the *EXPRESSCLUSTER X SingleServerSafe Configuration Guide*.

EXPRESSCLUSTER X SingleServerSafe software configuration

EXPRESSCLUSTER X SingleServerSafe consists of following three software applications:

◆ EXPRESSCLUSTER SingleServerSafe

The main module of EXPRESSCLUSTER X SingleServerSafe. Install it on the server.

◆ Cluster WebUI / WebManager

A tool to manage EXPRESSCLUSTER X SingleServerSafe operations.

It uses a Web browser as a user interface.

The WebManager is incorporated into the EXPRESSCLUSTER SingleServerSafe and therefore does not have to be installed.

◆ Builder

A tool for creating the configuration data of EXPRESSCLUSTER X SingleServerSafe. There are two versions. The online version of the Builder runs in the configuration mode of the WebManager, and the offline version of the Builder is installed individually in a management terminal. The online version of the Builder is incorporated in the WebManager. The Builder also uses a web browser as a user interface in the same way as the Cluster WebUI and WebManager.
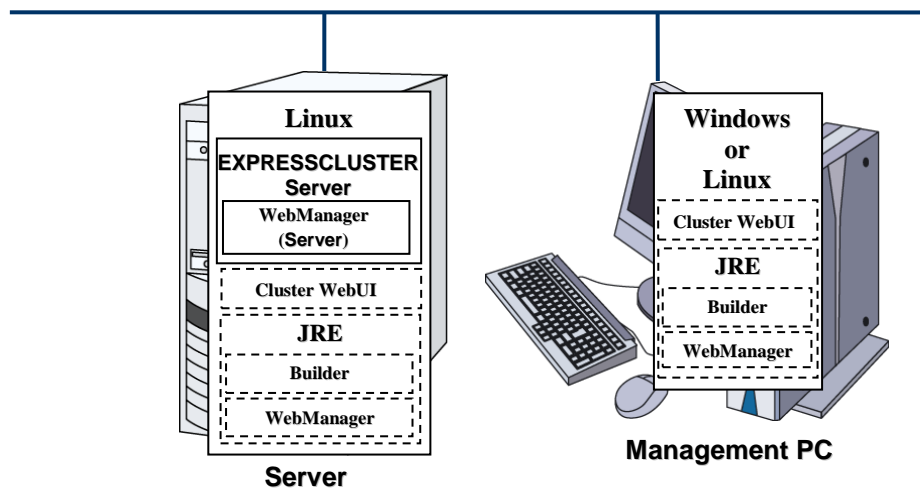
The WebManager and the Builder are Java applets that run on Java VMs. They can run on any machine in which the Java Runtime Environment (JRE) is installed. The WebManager and the Builder can run on Windows and Linux.
In other words, once you install the JRE on a server on which EXPRESSCLUSTER X SingleServerSafe is installed, you can use the WebManager and Builder on that server.

Checking system requirements for EXPRESSCLUSTER X SingleServerSafe

Hardware

EXPRESSCLUSTER X SingleServerSafe runs on a server that has either of the following architectures:

◆ x86_64

Required specifications

Required specifications for EXPRESSCLUSTER SingleServerSafe are the following:

◆ Ethernet port:

◆ CD-ROM drive

When using the off-line Builder upon constructing and changing the existing configuration, one of the following is required for communication between the off-line Builder and servers:

◆ A machine to operate the offline version of the Builder and a way to share files

Software

EXPRESSCLUSTER X SingleServerSafe consists of three modules: EXPRESSCLUSTER SingleServerSafe, WebManager, and Builder. Check configuration and operation requirements of each machine where these modules will be installed. The following describes the basic system requirements for EXPRESSCLUSTER X SingleServerSafe 4.0 for Linux.

◆ Details on operating system supporting EXPRESSCLUSTER SingleServerSafe.

The following provides the system requirements for each module:

EXPRESSCLUSTER X SingleServerSafe	
Machine on which the EXPRESSCLUSTER X SingleServerSafe can be installed	PC that supports one of the following operating systems.
Supported operating systems	Refer to "Supported distributions and kernel versions" below

Required memory size		Required disk size		Remark
User mode	**Kernel mode**	**Right after installation**	**during operation**	
200MB(*1)	When the keepalive driver is used: 8MB	300MB	2.0GB	

(*1) excepting for optional products.

Cluster WebUI	
Machine on which the WebManager and Builder can be installed	PC that supports one of the following operating systems.
Supported operating systems	Windows 7 Service Pack 1 Windows 8 Windows 8.1 Windows 10 Windows Server 2012 Windows Server 2012 R2 Windows Server 2016 Red Hat Enterprise Linux 6 update8 Red Hat Enterprise Linux 6 update9 Red Hat Enterprise Linux 7 update3 Red Hat Enterprise Linux 7 update4 Asianux Server 4 SP6 Asianux Server 4 SP7 Asianux Server 7 SP1 Asianux Server 7 SP2 Oracle Linux 6 update6 Oracle Linux 7 update3 Ubuntu 14.04 LTS Ubuntu 16.04.3 LTS
Supported browsers	Firefox 51.0 Internet Explorer 10 Internet Explorer 11
Memory size	User mode 200 MB

Note:
When accessing Cluster WebUI with Internet Explorer 11, the Internet Explorer may stop with an error. In order to avoid it, please upgrade the Internet Explorer into KB4052978 or later.

WebManager, Builder (online version)	
Machine on which the WebManager and Builder can be installed	PC that supports one of the following operating systems.
Supported operating systems	Windows 7 Service Pack 1 Windows 8 Windows 8.1 Windows 10 Windows Server 2012 Windows Server 2012 R2 Windows Server 2016 Red Hat Enterprise Linux 6 update8 Red Hat Enterprise Linux 6 update9 Red Hat Enterprise Linux 7 update3 Red Hat Enterprise Linux 7 update4 Asianux Server 4 SP6 Asianux Server 4 SP7 Asianux Server 7 SP1 Asianux Server 7 SP2 Oracle Linux 6 update6 Oracle Linux 7 update3 Ubuntu 14.04 LTS Ubuntu 16.04.3 LTS
Supported browsers	Firefox 51.0 Internet Explorer 10 Internet Explorer 11
Java Runtime Environment	Java® Runtime Environment Version 8.0 Update 162 (1.8.0_162) or later Java® Runtime Environment Version 9.0 (9.0.4) or later *Java Runtime Environment is necessary to use the WebManager.
Memory size	User mode 50 MB

Builder (offline version)	
Machine on which the Builder can be installed	PC that supports one of the following operating systems.
Supported operating systems	Windows 7 Service Pack 1 Windows 8 Windows 8.1 Windows 10 Windows Server 2012 Windows Server 2012 R2 Windows Server 2016
Supported browsers	Internet Explorer 10 Internet Explorer 11
Java Runtime Environment	Java® Runtime Environment Version 8.0 Update 162 (1.8.0_162) or later Java® Runtime Environment Version 9.0 (9.0.4) or later *Java Runtime Environment is necessary to use the Builder.
Memory size	User mode 50 MB
Disk size (excluding the size	10 MB

required for the Java runtime environment)		
Supported version	Builder version	EXPRESSCLUSTER X SingleServerSafe internal version
	4.0.0-1	4.0.0-1
		4.0.1-1

Note:

When you access to IP address, you should add the IP address to Local intranet site.

Note:

The Java applet version of WebManager does not run in Java^{TM} Runtime Environment version 9.0.

Supported distributions and kernel versions

The environments where EXPRESSCLUSTER X SingleServerSafe can run depend on the kernel module versions because there are kernel modules specific to EXPRESSCLUSTER X SingleServerSafe.

Regarding supported distributions and kernel versions, please refer to the following web site.

EXPRESSCLUSTER website
→System Requirements
→EXPRESSCLUSTER X SingleServerSafe for Linux

Note: For the kernel version of Cent OS supported by EXPRESSCLUSTER, see the supported kernel version of Red Hat Enterprise Linux.

Applications supported by the monitoring options

Version information of the applications to be monitored by the monitor resources is described below.

x86_64

Monitor resource	Application to be monitored	EXPRESSCLUSTER SingleServerSafe version	Remarks
Oracle monitor	Oracle Database 12c Release 1 (12.1)	4.0.0-1 or later	
	Oracle Database 12c Release 2 (12.2)	4.0.0-1 or later	
DB2 monitor	DB2 V10.5	4.0.0-1 or later	
	DB2 V11.1	4.0.0-1 or later	
PostgreSQL monitor	PostgreSQL 9.3	4.0.0-1 or later	
	PostgreSQL 9.4	4.0.0-1 or later	
	PostgreSQL 9.5	4.0.0-1 or later	
	PostgreSQL 9.6	4.0.0-1 or later	
	PostgreSQL 10	4.0.0-1 or later	
	PowerGres on Linux 9.1	4.0.0-1 or later	
	PowerGres on Linux 9.4	4.0.0-1 or later	
	PowerGres on Linux 9.6	4.0.0-1 or later	
MySQL monitor	MySQL 5.5	4.0.0-1 or later	
	MySQL 5.6	4.0.0-1 or later	
	MySQL 5.7	4.0.0-1 or later	
	MariaDB 5.5	4.0.0-1 or later	
	MariaDB 10.0	4.0.0-1 or later	
	MariaDB 10.1	4.0.0-1 or later	
	MariaDB 10.2	4.0.0-1 or later	
Sybase monitor	Sybase ASE 15.5	4.0.0-1 or later	
	Sybase ASE 15.7	4.0.0-1 or later	
	SAP ASE 16.0	4.0.0-1 or later	
SQL Server monitor	SQL Server2017	4.0.0-1 or later	
Samba monitor	Samba 3.3	4.0.0-1 or later	
	Samba 3.6	4.0.0-1 or later	
	Samba 4.0	4.0.0-1 or later	
	Samba 4.1	4.0.0-1 or later	
	Samba 4.2	4.0.0-1 or later	
	Samba 4.4	4.0.0-1 or later	
	Samba 4.6	4.0.0-1 or later	
nfs monitor	nfsd 2 (udp)	4.0.0-1 or later	

	nfsd 3 (udp)	4.0.0-1 or later	
	nfsd 4 (tcp)	4.0.0-1 or later	
	mountd 1 (tcp)	4.0.0-1 or later	
	mountd 2 (tcp)	4.0.0-1 or later	
	mountd 3 (tcp)	4.0.0-1 or later	
HTTP monitor	No Specified version	4.0.0-1 or later	
SMTP monitor	No Specified version	4.0.0-1 or later	
pop3 monitor	No Specified version	4.0.0-1 or later	
imap4 monitor	No Specified version	4.0.0-1 or later	
ftp monitor	No Specified version	4.0.0-1 or later	
Tuxedo monitor	Tuxedo 12c Release 2 (12.1.3)	4.0.0-1 or later	
Weblogic monitor	WebLogic Server 11g R1	4.0.0-1 or later	
	WebLogic Server 11g R2	4.0.0-1 or later	
	WebLogic Server 12c R2 (12.2.1)	4.0.0-1 or later	
Websphere monitor	WebSphere Application Server 8.5	4.0.0-1 or later	
	WebSphere Application Server 8.5.5	4.0.0-1 or later	
	WebSphere Application Server 9.0	4.0.0-1 or later	
WebOTX monitor	WebOTX Application Server V9.1	4.0.0-1 or later	
	WebOTX Application Server V9.2	4.0.0-1 or later	
	WebOTX Application Server V9.3	4.0.0-1 or later	
	WebOTX Application Server V9.4	4.0.0-1 or later	
	WebOTX Application Server V10.1	4.0.0-1 or later	
JVM monitor	WebLogic Server 11g R1	4.0.0-1 or later	
	WebLogic Server 11g R2	4.0.0-1 or later	
	WebLogic Server 12c	4.0.0-1 or later	
	WebLogic Server 12c R2 (12.2.1)	4.0.0-1 or later	
	WebOTX Application Server V9.1	4.0.0-1 or later	
	WebOTX Application Server V9.2	4.0.0-1 or later	WebOTX update is required to monitor process groups
	WebOTX Application Server V9.3	4.0.0-1 or later	
	WebOTX Application Server V9.4	4.0.0-1 or later	
	WebOTX Application Server V10.1	4.0.0-1 or later	
	WebOTX Enterprise Service Bus V8.4	4.0.0-1 or later	
	WebOTX Enterprise Service Bus V8.5	4.0.0-1 or later	
	JBoss Enterprise Application Platform 7.0	4.0.0-1 or later	

	Apache Tomcat 8.0	4.0.0-1 or later	
	Apache Tomcat 8.5	4.0.0-1 or later	
	Apache Tomcat 9.0	4.0.0-1 or later	
	WebSAM SVF for PDF 9.0	4.0.0-1 or later	
	WebSAM SVF for PDF 9.1	4.0.0-1 or later	
	WebSAM SVF for PDF 9.2	4.0.0-1 or later	
	WebSAM Report Director Enterprise 9.0	4.0.0-1 or later	
	WebSAM Report Director Enterprise 9.1	4.0.0-1 or later	
	WebSAM Report Director Enterprise 9.2	4.0.0-1 or later	
	WebSAM Universal Connect/X 9.0	4.0.0-1 or later	
	WebSAM Universal Connect/X 9.1	4.0.0-1 or later	
	WebSAM Universal Connect/X 9.2	4.0.0-1 or later	
System monitor	No specified version	4.0.0-1 or later	

Note: To use monitoring options in x86_64 environments, applications to be monitored must be x86_64 version.

Operation environment for JVM monitor resource

The use of the JVM monitor requires a Java runtime environment. Also, monitoring a domain mode of JBoss Enterprise Application Platform 6 or later requires Java® SE Development Kit.

Java® Runtime Environment
Version7.0 Update 6 (1.7.0_6) or later

Java® SE Development Kit
Version 7.0 Update 1 (1.7.0_1) or later

Java(TM) Runtime Environment

Version8.0 Update 11 (1.8.0_11) or later

Java(TM) SE Development Kit
Version 8.0 Update 11 (1.8.0_11) or later

Java(TM) Runtime Environment

Version9.0 (1.9.0) or later

Java(TM) SE Development Kit
Version 9.0 (1.9.0) or later

Open JDK

Version 7.0 Update 45 (1.7.0_45) or later

Version 8.0 (1.8.0) or later

Version 9.0 (1.9.0) or later

The tables below list the load balancers that were verified for the linkage with the JVM monitor.

x86_64

Load balancer	EXPRESSCLUSTER version	Remarks
Express5800/LB400h or later	4.0.0-1 or later	
InterSec/LB400i or later	4.0.0-1 or later	
BIG-IP v11	4.0.0-1 or later	
MIRACLE LoadBalancer	4.0.0-1 or later	
CoyotePoint Equalizer	4.0.0-1 or later	

Preparing and verifying the server environment before installation

After installing the hardware, verify the following:

1. Network settings (Required)
2. Root file system (Required)
3. Firewall settings (Required)

1. Verifying the network settings (Required)

Check the following network settings by using the `ifconfig` and `ping` commands.

◆ IP Address

◆ Host name

2. Verifying the root file system (Required)

It is recommended to use a file system which is capable of journaling for the root file system in the operating system. Linux (version 2.6 or later) supports journaling file systems such as ext3, JFS, ReiserFS, and XFS.

Important:

If a file system that is not capable of journaling is used, you must run an interactive command (`fsck` for the root file system) when rebooting the server after server or OS stop (when normal shutdown could not be done).

3. Verifying the firewall settings (Required)

By default, EXPRESSCLUSTER X SingleServerSafe uses the port numbers below. You can change these port numbers by using the Builder. Do not access any of these port numbers from a program other than EXPRESSCLUSTER X SingleServerSafe. When setting up a firewall, set up EXPRESSCLUSTER X SingleServerSafe so that it can access the port numbers below.

Internal processing in the local server					
From			**To**		**Remarks**
Server	Automatic allocation	→	Server	29001/TCP	Internal communication
Server	Automatic allocation	→	Server	29002/TCP	Data transfer
Server	Automatic allocation	→	Server	29003/UDP	Alert synchronization
Server	Automatic allocation	→	Server	XXXX/UDP	Internal communication for log

From the Cluster WebUI / WebManager to the server					
From			**To**		**Remarks**
Cluster WebUI WebManager	Automatic allocation	→	Server	29003/TCP	http communication

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From the server connected to the Integrated WebManager to the target server					
From				**To**	**Remarks**
Server connected to the Integrated WebManager	Automatic allocation	→	Server	29003/TCP	http communication
Server to be managed by the Integrated WebManager	29003	→	Client	29010/UDP	UDP communication

Others					
From				**To**	**Remarks**
Server	Automatic allocation	→	Server	Management port number set by the Builder	JVM monitor
Server	Automatic allocation	→	Monito ring target	Connection port number set by the Builder	JVM monitor
Server	Automatic allocation	→	Server	Management port number set by Builder for load balancer linkage	JVM monitor
Server	Automatic allocation	→	BIG-IP LTM	Communication port number set by the Builder	JVM monitor

Note 1:
An available port number at the time is automatically assigned.
Note 2:
On the **Port Number** tab in **Cluster Properties**, select **UDP** for log communication, and use the port number specified for **Port Number**. The default log communication method, **UNIX Domain**, does not use a communication port.

Chapter 2 Installing EXPRESSCLUSTER X SingleServerSafe

This chapter describes how to install EXPRESSCLUSTER X SingleServerSafe. To install EXPRESSCLUSTER X SingleServerSafe, install the EXPRESSCLUSTER X SingleServerSafe, which is the main module of EXPRESSCLUSTER SingleServerSafe. If you have a separate machine for setting up SingleServerSafe, install the Builder on that machine.

This chapter covers:

Steps from installing EXPRESSCLUSTER X SingleServerSafe to setting up the server

The following summarizes the steps of EXPRESSCLUSTER X SingleServerSafe installation, system creation, license registration, and confirmation of the installed system described in this chapter.

Before proceeding to the steps, make sure to read Chapter 1, "About EXPRESSCLUSTER X SingleServerSafe" to confirm the system requirements and configuration.

1. Installing the EXPRESSCLUSTER X SingleServerSafe

Install the EXPRESSCLUSTER X SingleServerSafe, which is the core EXPRESSCLUSTER X SingleServerSafe module, on each target server.

2. Registering the license

Register the license by running the clplcnsc command.

3. Creating the configuration data by using the Builder

Create the configuration data by using the Builder.
Refer to Chapter 2, "Creating configuration data" in the *EXPRESSCLUSTER X SingleServerSafe Configuration Guide*.

4. Setting up a server

Apply the configuration data created using the Builder to set up a server.
When using the online version of the EXPRESSCLUSTER Builder, Apply the configulation date by using it or clpcfctrl command.
When using the offline version of the EXPRESSCLUSTER Builder, Apply the configulation date by using clpcfctrl command.
Refer to Chapter 2, "Creating configuration data" in the *EXPRESSCLUSTER X SingleServerSafe Configuration Guide*.

5. Verifying the cluster status using the Cluster WebUI / WebManager

Check the status of the server by using the Cluster WebUI / WebManager.
Refer to Chapter 3, "Checking the cluster system" in the *EXPRESSCLUSTER X SingleServerSafe Configuration Guide*.

Related Information:
Refer to the *EXPRESSCLUSTER X SingleServerSafe Configuration Guide* as you proceed in accordance with the procedures in this guide. For the latest information on the system requirements and release information, see Chapter 1, "About EXPRESSCLUSTER X SingleServerSafe" and Chapter 4, "Latest version information" in this guide.

Installing the EXPRESSCLUSTER X SingleServerSafe

Install the EXPRESSCLUSTER X SingleServerSafe, which is the main module of EXPRESSCLUSTER X SingleServerSafe, into the target server machine.

License registration is required in installing the EXPRESSCLUSTER X SingleServerSafe. Make sure to have the required license file or license sheet.

Installing EXPRESSCLUSTER X SingleServerSafe for the first time

To install EXPRESSCLUSTER X SingleServerSafe, follow the procedure below.

Note:
Log in as a root user when installing the EXPRESSCLUSTER X SingleServerSafe RPM / deb package.

1. Mount (`mount`) the installation CD-ROM.

2. Run the rpm / dpkg command to install the package file.
   The installation RPM / deb package varies depending on the products.

   Navigate to the folder, `/Linux/4.0/en/server`, in the CD-ROM and run the following:

   `rpm -i expressclsssss-version.x86_64.rpm`

   For Ubuntu, run the following

   `dpkg -i expressclsssss-version.amd64.deb`

   The installation starts.

   Note: EXPRESSCLUSTER X SingleServerSafe will be installed in the following directory. You will not be able to uninstall the EXPRESSCLUSTER if you change this directory.
   Installation directory: `/opt/nec/clusterpro`

3. When the installation is completed, unmount (`umount`) the installation CD-ROM.

4. Remove the installation CD-ROM.

Related Information:
The use of the SNMP linkage function requires additional settings.
For how to set up the SNMP linkage function, see "Setting up the SNMP linkage function"

Setting up the SNMP linkage function

To handle information acquisition requests on SNMP, Net-SNMP must be installed separately and the SNMP linkage function must be registered separately.

Follow the procedure below to set up the SNMP linkage function.

Note 1:
To set up the SNMP linkage function, you must log in as the root user.

Note 2:
The description related to Net-SNMP in the installation procedure may vary depending on the distribution.

1. Install Net-SNMP.

2. Check the snmpd version.

   Run the following command:

   `snmpd -v`

3. Stop the snmpd daemon.

   Note: The daemon can usually be stopped by the following command:
   For an init.d environment:
   `/etc/init.d/snmpd stop`
   For a systemd environment:
   `systemctl stop snmpd`

4. Register the SNMP linkage function of EXPRESSCLUSTER in the configuration file for the snmpd daemon.

   Open the configuration file with a text editor.
   Add the following description to the end of the file according to the snmpd version.
   dlmod clusterManagementMIB /opt/nec/clusterpro/lib/libclpmgtmib2.so

   Note 1:
   The configuration file for the Net-SNMP snmpd daemon is usually located in the following directory:
   /etc/snmp/snmpd.conf
   Note 2:
   Add the OID of EXPRESSCLUSTER in the MIB view (view definition by snmpd.conf) permitted by the snmpd daemon.
   The OID of EXPRESSCLUSTER is ".1.3.6.1.4.1.119.2.3.207".

5. Create symbolic links to libraries needed by the SNMP linkage function.
The following three symbolic links are needed.
libnetsnmp.so
libnetsnmpagent.so
libnetsnmphelpers.so
Follow the procedure below to create the symbolic links.

5 - 1. Confirm the presence of the symbolic links.
Change to following directory.
If those symbolic links exist in the following directory, proceed to step 6.
/usr/lib64

5 - 2. Create symbolic links.
Run the following commands.

ln -s libnetsnmp.so.X libnetsnmp.so
ln -s libnetsnmpagent.so.X libnetsnmpagent.so
ln -s libnetsnmphelpers.so.X libnetsnmphelpers.so

Substitute a numeric value for X according to the environment.

6. Start the snmpd daemon.

Note: The daemon can usually be started by the following command:
For an init.d environment:
    /etc/init.d/snmpd start
For a systemd environment:
    systemctl start snmpd

Related Information:
You must cancel the settings of the SNMP function when uninstalling the EXPRESSCLUSTER Server. For how to cancel the settings of the SNMP linkage function, see "Canceling the SNMP linkage function settings".

Note:
The settings required for SNMP communication are to be made on the SNMP agent.

Registering the license

Registering the CPU license

You must register the CPU license to run the system you create.

Related Information: When the virtual server exists in the cluster system to be constructed, VM node license can be used not CPU license for the virtual server.
For the details about registration of VM node license, see "Registering the VM node license".

The names of the products to which the CPU license applies are listed below.

License product name	Product ID
EXPRESSCLUSTER X SingleServerSafe 4.0 for Linux	XSSS40

There are two ways of license registration; using the information on the license sheet and specifying the license file. These two ways are described for both the product and trial versions.

Product version

◆ Specify the license file as the parameter of the license management command.
(Refer to "Registering the license by specifying the license file (for both the product version and trial version)".)

◆ Register the license by running the license management command and interactively entering the license information that comes with the licensed product.
(Refer to "Registering the license interactively from the command line (product version)".)

Trial version

◆ Specify the license file as the parameter of the license management command.
(Refer to "Registering the license by specifying the license file (for both the product version and trial version)".)

Registering the license by specifying the license file (for both the product version and trial version)

The following describes how you register the license by specifying the license file when you have a license for the product version or trial version.

Check the following before executing these steps.

◆ You can log on as a root user to the server on which you are going to set up a system.

1. Log on to the server you are going to set up as a root user, and then run the following command:

   # clplcnsc -i *filepath*

   Specify the path to the license file for *filepath* specified by the -i option.

   When the command is successfully executed, the message "Command succeeded." is displayed in the console. If another message is displayed, refer to Chapter 2, "EXPRESSCLUSTER X SingleServerSafe command reference" in the *EXPRESSCLUSTER X SingleServerSafe Operation Guide*.

2. Run the following command to verify the licenses registered.

   # clplcnsc -l -a

3. When an optional product is not used, proceed to "Registering the node license".

4. When not using any optional products, restart the server by using the OS shutdown command to validate the license registration and run the server.
   After restarting, proceed to Chapter 2, "Creating configuration data" in the *EXPRESSCLUSTER X SingleServerSafe Configuration Guide*, and follow the procedure.

Registering the license interactively from the command line (product version)

The following describes how you register the license for the product version interactively from the command line.

Before you register the license, make sure that:

◆ You have the license sheet you officially obtained from the sales agent. The license sheet is sent to you when you purchase the product. The values on this license sheet are used for registration.

◆ You can log on to the server on which you are going to set up a system as a root user.

Related Information:
The `clplcnsc` command is used in the following procedures. For details about how to use the `clplcnsc` command, refer to Chapter 2, "EXPRESSCLUSTER X SingleServerSafe command reference" in the *EXPRESSCLUSTER X SingleServerSafe Operation Guide*.

1. Have the license sheet.

   The instruction here is given using the values in the following license sheet as an example. When actually entering the values, modify them according to the information on your license sheet.

Product	**EXPRESSCLUSTER X SingleServerSafe 4.0 for Linux**
License information:	
Type	Product version
License Key	A1234567- B1234567- C1234567- D1234567
Serial Number	AAAAAAAA000000
Number of Licensed CPUs	2

2. Log on to the server you are going to set up as a root user, and then run the following command:

   `# clplcnsc -i`

3. The text that prompts you to enter the license version is displayed. Enter **1** when using a product version:

   ```
   Selection of License Version.
     1   Product version
     2   Trial version
     e   Exit
   Select License Version [1, 2, e (default:1)]...1
   ```

4. The text that prompts you to enter the serial number is displayed. Enter the serial number written in your license sheet. Note this is case sensitive.

```
Enter    serial    number    [Ex.    XXXXXXXX000000]...
AAAAAAAA000000
```

5. The text that prompts you to enter the license key is displayed. Enter the license key written in your license sheet. Note this is case sensitive.

```
Enter license key
 [XXXXXXXX- XXXXXXXX- XXXXXXXX- XXXXXXXX]...
A1234567-B1234567-C1234567-D1234567
```

When the command is successfully executed, the message "Command succeeded." is displayed in the console. If another message is displayed, refer to Chapter 2, "EXPRESSCLUSTER X SingleServerSafe command reference" in the *EXPRESSCLUSTER X SingleServerSafe Operation Guide*.

6. Run the following command to verify the licenses registered.

   # clplcnsc -l -a

7. When an optional product is used, proceed to "Registering the node license" in this chapter.

8. If no optional product is used, run the OS shutdown command to reboot the server.
   After rebooting the server, proceed to Chapter 3, "Checking the cluster system" in the *EXPRESSCLUSTER X SingleServerSafe Configuration Guide*, and follow the procedure.

Registering the VM node license

When the virtual server exists in the cluster system to be constructed, VM node license can be used not CPU license for the virtual server.

There are two ways of license registration; using the information on the license sheet and specifying the license file.

The names of the products to which the VM node license applies are listed below.

License Product Name	Product ID
EXPRESSCLUSTER X SingleServerSafe 4.0 for Linux VM	XSSS40

Product version

◆ Specify the license file as the parameter of the license management command. Refer to, Page39, "Registering the VM node license by specifying the license file (Product version)."

◆ Register the license by running the license management command and interactively entering the license information that comes with the licensed product. Refer to, Page40, "Registering the VM node license interactively from the command line (Product version)."

Registering the VM node license by specifying the license file (Product version).

The following describes how you register the license by specifying the license file when you have a license for the product version.

Check the following before executing these steps.

◆ You can log on as a root user to the server on which you are going to set up a system.

1. Among the servers that you intend to use to build a cluster, log on to the virtual server as root user and run the following command.

    # **clplcnsc -i** *filepath*

    Specify the path to the license file for filepath specified by the -i option.

    When the command is successfully executed, the message "Command succeeded" is displayed on the console. When a message other than this is displayed, see Chapter 2, "EXPRESSCLUSTER X SingleServerSafe command reference" in the *EXPRESSCLUSTER X SingleServerSafe Operation Guide*.

2. Run the following command to verify the licenses registered.

    # **clplcnsc -l -a**

3. When using option products, see "Registering the node license".

4. When not using option products, run the OS shutdown command to reboot the server. By doing this, the license registration becomes effective and you can start using the cluster.
   After rebooting the server, proceed to Chapter 3, "Checking the cluster system" in the *EXPRESSCLUSTER X SingleServerSafe Configuration Guide*.

Registering the VM node license interactively from the command line (Product version)

The following describes how you register the license for the product version interactively from the command line.

Before you register the license, make sure to:

◆ Have the official license sheet that comes with the product. The license sheet is sent to you when you purchase the product. You will enter the values on the license sheet.

◆ Be allowed to logon as root user to the virtual servers of servers constituting the system.

Related Information: The clplcnsc command is used in the following procedures. For more information on how to use the clplcnsc command, see Chapter 2, "EXPRESSCLUSTER X SingleServerSafe command reference" in the *EXPRESSCLUSTER X SingleServerSafe Operation Guide*.

1. Have the license sheet.

   The instruction here is given using the values in the following license sheet as an example. When actually entering the values, modify them according to the information on your license sheet.

Product name:	**EXPRESSCLUSTER X SingleServerSafe 4.0 for Linux VM**
License information:	
Type	Product Version
License Key	A1234567- B1234567- C1234567- D1234567
Serial Number	AAAAAAAA000000
Number of License Server	1

2. A virtual server of which you intend to construct a cluster, log on to the server as root user and run the following command.

   ```
   # clplcnsc -i
   ```

3. The text that prompts you to enter the license version is displayed. Enter 1 since it is a product version:

   ```
   Selection of License Version.
     1   Product version
     2   Trial version
     e   Exit
   Select License Version. [1, 2, or e (default:1)]...1
   ```

4. The text that prompts you to enter the serial number is displayed. Enter the serial number written in your license sheet. Note this is case sensitive.

    ```
    Enter   serial   number   [Ex.   XXXXXXXX000000]...
    AAAAAAAA000000
    ```

5. The text that prompts you to enter the license key is displayed. Enter the license key written in your license sheet. Note this is case sensitive.

    ```
    Enter license key
     [XXXXXXXX- XXXXXXXX- XXXXXXXX- XXXXXXXX]...
    A1234567-B1234567-C1234567-D1234567
    ```

    When the command is successfully executed, the message "Command succeeded" is displayed on the console. When a message other than this is displayed, see Chapter 2, "EXPRESSCLUSTER X SingleServerSafe command reference" in the *EXPRESSCLUSTER X SingleServerSafe Operation Guide*.

6. Run the following command to verify the licenses registered.

    ```
    # clplcnsc -l -a
    ```

7. When using option products, see "Registering the node license".

8. When not using option products, run the OS shutdown command to reboot the server.
    After rebooting the server, proceed to next Chapter 3, "Checking the cluster system" in the *EXPRESSCLUSTER X SingleServerSafe Configuration Guide*.

Registering the node license

It is required to register a node license for X 4.0 Agent products and X 4.0 Alert Service (hereafter referred to as "optional products") to operate them on the system.

The names of the optional products to which the node license applies are listed below.

License product name	Product ID
EXPRESSCLUSTER X Database Agent 4.0 for Linux	DBAG40
EXPRESSCLUSTER X Internet Server Agent 4.0 for Linux	ISAG40
EXPRESSCLUSTER X File Server Agent 4.0 for Linux	FSAG40
EXPRESSCLUSTER X Application Server Agent 4.0 for Linux	ASAG40
EXPRESSCLUSTER X Alert Service 4.0 for Linux	ALRT40
EXPRESSCLUSTER X Java Resource Agent 4.0 for Linux	JRAG40
EXPRESSCLUSTER X System Resource Agent 4.0 for Linux	SRAG40

Register the node license for the set up server on which to use optional products. There are two ways of license registration; using the information on the license sheet and specifying the license file. These two ways are described for both the product and trial versions.

Product version

◆ Specify the license file as the parameter of the license management command.
(Refer to "Registering the license by specifying the license file (for both the product version and trial version)".)

◆ Register the license by running the license management command and interactively entering the license information that comes with the licensed product.
(Refer to "Registering the node license interactively from the command line (product version)".)

Trial version

◆ Specify the license file as the parameter of the license management command.
(Refer to "Registering the license by specifying the license file (for both the product version and trial version)".)

Registering the license by specifying the license file (for both the product version and trial version)

The following describes how you register the license by specifying the license file when you have a license for the product version or trial version.

Check the following before executing these steps.

◆ You can log on as a root user to the server on which you are going to use an optional product.

1. Of the servers you are going to set up, log on to the server on which the optional product is to be used as a root user, and then run the following command:

   # clplcnsc -i *filepath*

   Specify the path to the license file for *filepath* specified by the -i option.

   When the command is successfully executed, the message "Command succeeded." is displayed in the console. If another message is displayed, see Chapter 2, "EXPRESSCLUSTER X SingleServerSafe command reference" in the *EXPRESSCLUSTER X SingleServerSafe Operation Guide*.

2. Run the following command to verify the licenses registered.

   # clplcnsc -l -a

3. Restart the server by using the OS shutdown command to validate the license registration and run the server.
   After restarting, proceed to Chapter 2, "Creating configuration data" in the *EXPRESSCLUSTER X SingleServerSafe Configuration Guide*, and follow the procedure.

Registering the node license interactively from the command line (product version)

The following describes how you register the license for the product version interactively from the command line.

Before you register the license, make sure that:

◆ You have the license sheet you officially obtained from the sales agent. The license sheet is sent to you when you purchase the product. The number of license sheets you need is as many as the number of servers on which the option product will be used. The values on this license sheet are used for registration.

◆ Of the servers you are going to set up, you can log on to the server on which the optional product is to be used as a root user.

Related Information:

The `clplcnsc` command is used in the following procedures. For details about how to use the `clplcnsc` command, refer to Chapter 2, "EXPRESSCLUSTER X SingleServerSafe command reference" in the *EXPRESSCLUSTER X SingleServerSafe Operation Guide*.

---

1. Have the license sheet.

   The instruction here is given using the values in the following license sheet (Database Agent) as an example. When actually entering the values, modify them according to the information on your license sheet.

Product	**EXPRESSCLUSTER X Database Agent 4.0 for Linux**
License information:	
Type	Product version
License Key	A1234567- B1234567- C1234567- D1234567
Serial Number	AAAAAAAA000000
Number of nodes	1

2. Of the servers you are going to set up, log on to the server on which the optional product is to be used as the root user, and then run the following command:

   `# clplcnsc -i`

3. The text that prompts you to enter the license version is displayed. Enter **1** since it is a product version:

   ```
   Selection of License Version.
     1   Product Version
     2   Trial Version
     e   Exit
   Select License Version [1, 2, or e (default:1)]...1
   ```

4. The text that prompts you to enter the serial number is displayed. Enter the serial number written in your license sheet. Note this is case sensitive.

   ```
   Enter    serial    number    [Ex.    XXXXXXXX000000]...
   AAAAAAAA000000
   ```

5. The text that prompts you to enter the license key is displayed. Enter the license key written in your license sheet. Note this is case sensitive.

```
Enter license key
 [XXXXXXXX-XXXXXXXX-XXXXXXXX-XXXXXXXX]...
A1234567-B1234567-C1234567-D1234567
```

When the command is successfully executed, the message "Command succeeded." is displayed in the console. If another message is displayed, refer to Chapter 2, "EXPRESSCLUSTER X SingleServerSafe command reference" in the *EXPRESSCLUSTER X SingleServerSafe Operation Guide*.

6. Run the following command to verify the licenses registered.

```
# clplcnsc -l -a
```

7. Restart the server by using the OS shutdown command to validate the license registration and run the server.
After restarting, proceed to Chapter 2, "Creating configuration data" in the *EXPRESSCLUSTER X SingleServerSafe Configuration Guide*, and follow the procedure.

Registering the fixed term license

Use the fixed term license to operate the cluster system which you intend to construct for a limited period of time.

This license becomes effective on the date when the license is registered and then will be effective for a certain period of time.

In preparation for the expiration, the license for the same product can be registered multiple times. Extra licenses are saved and a new license will take effect when the current license expires.

The names of the products to which the fixed term license applies are listed below.

License product name	Product ID
Main product	
EXPRESSCLUSTER X SingleServerSafe 4.0 for Linux	XSSS40
Optional Products	
EXPRESSCLUSTER X Database Agent 4.0 for Linux	DBAG40
EXPRESSCLUSTER X Internet Server Agent 4.0 for Linux	ISAG40
EXPRESSCLUSTER X File Server Agent 4.0 for Linux	FSAG40
EXPRESSCLUSTER X Application Server Agent 4.0 for Linux	ASAG40
EXPRESSCLUSTER X Alert Service 4.0 for Linux	ALRT40
EXPRESSCLUSTER X Java Resource Agent 4.0 for Linux	JRAG40
EXPRESSCLUSTER X System Resource Agent 4.0 for Linux	SRAG40

A License is registered by specifying the license file.

Registering the fixed term license by specifying the license file

The following describes how you register a fixed term license.

Check the following before executing these steps.

◆ You can log on as a root user to the server on which you are going to set up a system.

Follow the following steps to register all the license files for the products to be used.

1. Log on to the server you are going to set up as a root user, and then run the following command:

   # clplcnsc -i *filepath*

   Specify the path to the license file for *filepath* specified by the -i option.

   When the command is successfully executed, the message "Command succeeded." is displayed in the console. If another message is displayed, refer to Chapter 2, "EXPRESSCLUSTER X SingleServerSafe command reference" in the *EXPRESSCLUSTER X SingleServerSafe Operation Guide*.

   If you have two or more license files for the same product in preparation for the expiration, execute the command to register the extra license files in the same way as above.

2. If there are other products you intend to use, repeat the step 1.

3. Run the following command to verify the licenses registered.

```
# clplcnsc -l -a
```

4. Rstart the server by using the OS shutdown command to validate the license registration and run the server.
   After restarting, proceed to Chapter 2, "Creating configuration data" in the *EXPRESSCLUSTER X SingleServerSafe Configuration Guide*, and follow the procedure.

Installing the offline version of the Builder

It is not necessary to install the offline version of the Builder on the server on which EXPRESSCLUSTER X SingleServerSafe is installed. If you will create or modify the configuration data of EXPRESSCLUSTER X SingleServerSafe by using a machine that cannot access EXPRESSCLUSTER X SingleServerSafe through a Web browser, you need to install the offline version of the EXPRESSCLUSTER Builder on that machine.

Installing the Builder into a Windows machine   (offline version)

Follow the procedures below to install the offline version of the Builder .

Note:
Install the Builder with the administrator privileges. In case the Builder has already been installed, first uninstall and install again, or install by specify another install destination.

1.   Insert the Installation CD-ROM to the CD-ROM drive.

2.   The menu screen for installation is displayed.
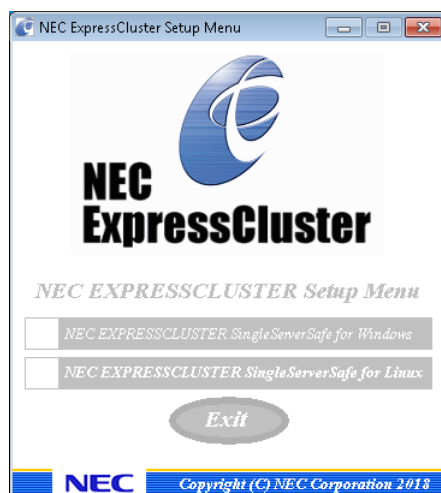
Note:
If the menu screen does not open automatically, double-click menu.exe in the root folder of the CD-ROM.

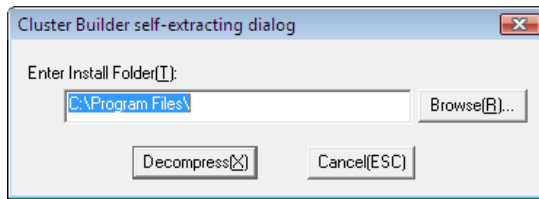**3.** Select **EXPRESSCLUSTER(R) SingleServerSafe for Linux**.

4. Select **EXPRESSCLUSTER(R) SingleServerSafe Builder**.

5. Select **EXPRESSCLUSTER(R) SingleServerSafe Builder**.

6. Select where to install in the **Cluster Builder self-extracting dialog** and click **Extract**.

Note:
The folder `\EXPRESSCLUSTER SSS \clpbuilder-l` is created in the specified installation folder, and the HTML file `clptrek.htm`, which is for Builder window display, and various configuration data files are installed in this folder.

7. Click **OK** in the **ZIP self-extract** dialog box. Installation is completed.
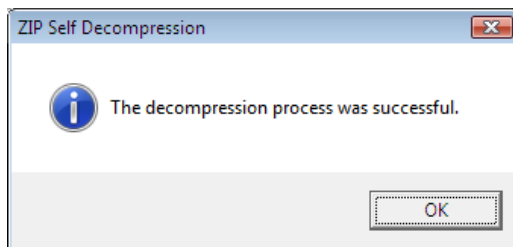
Chapter 3 Updating, uninstalling, reinstalling or upgrading

This chapter describes how to update EXPRESSCLUSTER X SingleServerSafe, uninstall and reinstall EXPRESSCLUSTER X SingleServerSafe, and upgrade to EXPRESSCLUSTER X.

This chapter covers:

Updating EXPRESSCLUSTER X SingleServerSafe

An older version of EXPRESSCLUSTER X SingleServerSafe can be updated to the latest version.

Updating the EXPRESSCLUSTER X SingleServerSafe RPM

Before starting the update, read the following notes.

◆ EXPRESSCLUSTER X SingleServerSafe 3.0 / 3.1 / 3.2 / 3.3 for Linux can be updated to EXPRESSCLUSTER X SingleServerSafe 4.0 for Linux. Updating from other versions is not possible.

◆ To update from EXPRESSCLUSTER X SingleServerSafe 3.0 / 3.1 / 3.2 / 3.3 for Linux to EXPRESSCLUSTER X SingleServerSafe 4.0 for Linux, the license for EXPRESSCLUSTER X SingleServerSafe 4.0 for Linux (including the licenses for any used optional products) is required.

◆ To update, use an account that has root privileges.

To update server rpm version 3.0.0-1 or later to 4.0.0-1 or later, perform the following procedure.

1. Make sure that the server and all the resources are in the normal status by using the WebManager or clpstat command.

2. Back up the configuration data.

3. Uninstall EXPRESSCLUSTER X SingleServerSafe from the server. For details about the uninstallation procedure, refer to "Uninstalling EXPRESSCLUSTER X SingleServerSafe" in this chapter.

4. Install the EXPRESSCLUSTER X 4.0 SingleServerSafe on the server. For details about the installation procedure, refer to "Installing the EXPRESSCLUSTER X SingleServerSafe" in Chapter 2.

5. Apply the configuration data to the server.
To apply the configuration data, load the backup data by using the Builder, and then upload it. For details, see "Applying configuration data" in Chapter 2, "Creating configuration data" in the EXPRESSCLUSTER X SingleServerSafe 4.0 for Linux Configuration Guide.

6. Start the cluster and confirm that each resource starts normally.

7. Updating completes. Check that the server is operating normally by the clpstat command or Cluster WebUI / WebManager

Uninstalling EXPRESSCLUSTER X SingleServerSafe

Uninstalling EXPRESSCLUSTER Server

Note:
You must log on as a root user to uninstall EXPRESSCLUSTER X SingleServerSafe.

To uninstall EXPRESSCLUSTER Server, follow the procedure below.

1. If the SNMP linkage function has been used, you must cancel the linkage before uninstalling EXPRESSCLUSTER Server. For how to cancel the settings of the SNMP linkage function, see "Canceling the SNMP linkage function settings".

2. Disable the services by running the following command.
For an init.d environment:
　chkconfig --del *name*
　For Ubuntu, run the update-rc.d -f *name* remove to disable the following service in this order.
For a systemd environment:
　systemctl disable *name*

For *name*, specify services in the following order:

- clusterpro_alertsync

- clusterpro_webmgr

- clusterpro

- clusterpro_trn

- clusterpro_evt

3. Shut down the server by using the Cluster WebUI / WebManager or clpstdn command, and then restart it.

4. Run the **rpm -e expressclssss** command.
For Ubuntu, run the dpkg -r **expressclssss** command.

Note:
Do not specify other options than the one stated above.

Uninstalling the offline version of the Builder

For Windows

To uninstall the Builder, follow the procedures below:

1. Close all Web browsers (and then confirm that the JavaVM icon is no longer in the task tray).

2. Delete the Builder installation folder from Windows Explorer.

Canceling the SNMP linkage function settings

You must cancel the SNMP function settings before uninstalling the EXPRESSCLUSTER Server.

Follow the procedure below to cancel the SNMP linkage function settings.

Note 1:
To cancel the SNMP linkage function settings, you must log in as the root user.

Note 2:
The description related to Net-SNMP in the uninstallation procedure may vary depending on the distribution.

1. Stop the snmpd daemon.

    Note: The daemon can usually be stopped by the following command:
    For an init.d environment:
    `/etc/init.d/snmpd stop`
    For a systemd environment:
    `systemctl stop snmpd`

2. Cancel registration of the SNMP linkage function in the configuration file for the snmpd daemon.

    Open the configuration file with a text editor.
    Delete the following line from the file.

    dlmod clusterManagementMIB /opt/nec/clusterpro/lib/libclpmgtmib.so
    dlmod clusterManagementMIB /opt/nec/clusterpro/lib/libclpmgtmib2.so

    Note 1:
    The configuration file for the snmpd daemon is usually located in the following directory:
    /etc/snmp/snmpd.conf
    Note 2:
    Delete the OID of EXPRESSCLUSTER from the MIB view (view definition by snmpd.conf) permitted by the snmpd daemon.
    The OID of EXPRESSCLUSTER is ".1.3.6.1.4.1.119.2.3.207".

3.
    If you created symbolic links at "Setting up the SNMP linkage function", delete them.

4. Start the snmpd daemon.

    Note: The daemon can usually be started by the following command:
    For an init.d environment:
    `/etc/init.d/snmpd start`
    For a systemd environment:
    `systemctl start snmpd`

Reinstalling EXPRESSCLUSTER X SingleServerSafe

Reinstalling the EXPRESSCLUSTER SingleServerSafe

To re-install the EXPRESSCLUSTER X SingleServerSafe, you have to prepare the cluster configuration data created by the Builder.

If you do not have the cluster configuration data created by the Builder at hand, you can back up the data with the clpcfctrl command. Refer to "Backing up the configuration data" in Chapter 2, "*EXPRESSCLUSTER X SingleServerSafe* Command reference" in the *EXPRESSCLUSTER X SingleServerSafe Operation Guide*.

To reinstall the EXPRESSCLUSTER X, follow the procedures below:

1. Uninstall the EXPRESSCLUSTER X SingleServerSafe.
For details about the uninstallation procedure, see "Uninstalling EXPRESSCLUSTER X SingleServerSafe" in this chapter.

2. Install the EXPRESSCLUSTER X SingleServerSafe and re-create the servers.
For details about the installation procedure, see Chapter 2, "Installing EXPRESSCLUSTER X SingleServerSafe" in this guide.

Upgrading to EXPRESSCLUSTER X

When upgrading EXPRESSCLUSTER X SingleServerSafe to EXPRESSCLUSTER X, you can migrate the configuration data created using the Builder (or the latest data if you changed the configuration).

In this case, save the latest configuration data before starting the upgrade. In addition to saving it to the Builder after creation, you can back up the configuration data by using the `clpcfctrl` command. Refer to "Backing up the configuration data" in Chapter 2, "*EXPRESSCLUSTER X SingleServerSafe* Command reference" in the *EXPRESSCLUSTER X SingleServerSafe Operation Guide*.

To upgrade EXPRESSCLUSTER X SingleServerSafe to EXPRESSCLUSTER X, follow the procedure below.

1. Back up the configuration data.

2. Uninstall EXPRESSCLUSTER X SingleServerSafe from the server for which to perform the upgrade. For details about the uninstallation procedure, see "Uninstalling EXPRESSCLUSTER X SingleServerSafe" in this chapter.

3. Shut down the OS when uninstalling the EXPRESSCLUSTER X SingleServerSafe is completed.

4. Install EXPRESSCLUSTER X, and set up its environment. You can use the backup configuration data for this process. For details about how to set up EXPRESSCLUSTER X, see the EXPRESSCLUSTER X manual.

Note:
For EXPRESSCLUSTER X, register the following licenses:
* EXPRESSCLUSTER X SingleServerSafe (two-CPU license)
* EXPRESSCLUSTER X SingleServerSafe upgrade license
These licenses can be used for EXPRESSCLUSTER X (two-CPU license).

Chapter 4   Latest version information

The latest information on the upgraded and improved functions is described in details. The latest information on the upgraded and improved functions is described in details.

This chapter covers:

EXPRESSCLUSTER X SingleServerSafe version and corresponding manual editions

This guide assumes the version of EXPRESSCLUSTER X SingleServerSafe below for its descriptions. Note the version of EXPRESSCLUSTER X SingleServerSafe and corresponding manual edition.

EXPRESSCLUSTER X SingleServerSafe Internal Version	Manual	Edition	Remarks
4.0.1-1	Installation Guide	2nd Edition	
	Configuration Guide	2nd Edition	
	Operation Guide	2nd Edition	
	Integrated WebManager Administrator's Guide	13th Edition	

New features and improvements

The following features and improvements have been released.

No.	Internal Version	Contents
1	4.0.0-1	Management GUI has been upgraded to Cluster WebUI.
2	4.0.0-1	HTTPS is supported for Cluster WebUI and WebManager.
3	4.0.0-1	The fixed term license is released.
4	4.0.0-1	The supported operating systems have been expanded.
5	4.0.0-1	"systemd" is supported.
6	4.0.0-1	Oracle monitor resource supports Oracle Database 12c R2.
7	4.0.0-1	MySQL monitor resource supports MariaDB 10.2.
8	4.0.0-1	PostgreSQL monitor resource supports PowerGres on Linux 9.6.
9	4.0.0-1	SQL Server monitor resource has been added.
10	4.0.0-1	ODBC monitor resource has been added.
11	4.0.0-1	WebOTX monitor resource now supports WebOTX V10.1.
12	4.0.0-1	JVM monitor resource now supports Apache Tomcat 9.0.
13	4.0.0-1	JVM monitor resource now supports WebOTX V10.1.
14	4.0.0-1	The following monitor targets have been added to JVM monitor resource. - CodeHeap non-nmethods - CodeHeap profiled nmethods - CodeHeap non-profiled nmethods - Compressed Class Space
15	4.0.0-1	Monitoring behavior to detect error or timeout has been improved.
16	4.0.0-1	The function to execute a script before or after group resource activation or deactivation has been added.
17	4.0.0-1	Internal communication has been improved to save TCP port usage.
18	4.0.0-1	The list of files for log collection has been revised.
19	4.0.1-1	The newly released kernel is now supported.
20	4.0.1-1	When HTTPS is unavailable in WebManager due to incorrect settings, messages are output to syslog and alert log.

Corrected information

Modification has been performed on the following minor versions.

Critical level:
L: Operation may stop. Data destruction or mirror inconsistency may occur.
Setup may not be executable.
M: Operation stop should be planned for recovery.
The system may stop if duplicated with another fault.
S: A matter of displaying messages.
Recovery can be made without stopping the system.

No.	Version in which the problem has been solved / Version in which the problem occurred	Phenomenon	Level	Occurrence condition/ Occurrence frequency	Cause
1	4.0.1-1 / 4.0.0-1	Two fixed-term licenses of the same product may be enabled.	S	This problem occurs on rare occasions if the following two operations are performed simultaneously. ● An unused license in stock is automatically enabled when the license expires. ● A new license is registered by the command for registering a license.	There was a flaw in performing exclusive control when operating license information.
2	4.0.1-1 / 4.0.0-1	When using the JVM monitor resources, memory leak may occur in the Java VM to be monitored.	M	This problem may occur under the following condition: ● [Monitor the number of Active Threads] on [Thread] tab in [Tuning] properties on [Monitor (special)] tab is set to on.	When extending Java API being used, classes which are not released in Scavenge GC may be accumulated.
3	4.0.1-1 / 4.0.0-1	Memory leak may occur In Java process of JVM monitor resources.	M	If all the following conditions are met, this problem may occur: ● All the settings in the [Tuning] properties on the [Monitor (special)] tab are set to OFF. ● More than one JVM monitor resource are created.	There was a flaw in disconnecting Java VM to be monitored.

No.	Version in which the problem has been solved / Version in which the problem occurred	Phenomenon	Level	Occurrence condition/ Occurrence frequency	Cause
4	4.0.1-1 / 4.0.0-1	The JVM statistics log (jramemory.stat) is output, even if the following parameters are set to OFF in JVM monitor resources. ● [Monitor (special)] tab – [Tuning] properties – [Memory] tab – [Memory Heap Memory Rate] ● [Memory (special)] tab – [Tuning] properties – [Memory] tab – [Monitor Non-Heap Memory Rate]	S	If all the following conditions are met, this problem inevitably occurs: ● [Oracle Java (usage monitoring)] is selected for [JVM type] on the [Monitor (special)] tab. ● [Monitor Heap Memory Rate] on the [Memory] tab in the [Tuning] properties on the [Monitor (special)] tab is set to OFF. ● [Monitor Non-Heap Memory Rate] on the [Memory] tab in the [Tuning] properties on the [Monitor (special)] tab is set to OFF.	There was a flaw in deciding whether or not to output the JVM statistics log.

Chapter 5   Additional information

This chapter provides tips on installing EXPRESSCLUSTER X SingleServerSafe.

This chapter covers:

EXPRESSCLUSTER X SingleServerSafe services

EXPRESSCLUSTER X SingleServerSafe consists of the system services listed below.

System Service Name	Explanation
clusterpro	EXPRESSCLUSTER daemon: Main EXPRESSCLUSTER service
clusterpro_evt	EXPRESSCLUSTER event: Service for controlling syslog and logs output by EXPRESSCLUSTER
clusterpro_trn	EXPRESSCLUSTER data transfer: Service for controlling license synchronization and configuration data transfers
clusterpro_alertsync	EXPRESSCLUSTER alert synchronization: Service for alert synchronization
clusterpro_webmgr	EXPRESSCLUSTER WebManager: WebManager service

Migration from the trial license to the official license

When registering the official license to a server running with the trial license, you can add the official license without deleting the trial license. When you list the registered licenses, both the official and trial licenses are shown, but there is no problem.

For details about adding a license, see Chapter 2, "Installing EXPRESSCLUSTER X SingleServerSafe" in this guide.

Chapter 6   Notes and Restrictions

This chapter provides information on known problems and how to troubleshoot the problems.

This chapter covers:

Before and at the time of installing operating system

Notes on parameters to be determined when installing an operating system, allocating resources, and naming rules are described in this section.

/opt/nec/clusterpro file system

It is recommended to use a file system that is capable of journaling to avoid system failure. Linux (kernel version 2.6 or later) supports file systems such as ext3, ext4, JFS, ReiserFS, and XFS as a journaling file system. If a file system that is not capable of journaling is used, you must run an interactive command (`fsck` for the root file system) when rebooting the server after server or OS stop (when normal shutdown could not be done).

Dependent library

`libxml2`

Install `libxml2` when installing the operating system.

Dependent driver

`softdog`

◆ This driver is necessary when `softdog` is used to monitor user mode monitor resource.

◆ Configure a loadable module. Static driver cannot be used.

SELinux settings

◆ Configure **permissive** or **disabled** for the SELinux settings.

◆ If you set `enforcing`, communication required in EXPRESSCLUSTER X SingleServerSafe may not be achieved.

EXPRESSCLUSTER X Alert Service

The license for the EXPRESSCLUSTER X Alert Service allows you to use the mail report function, but not the warning light function.

Before installing EXPRESSCLUSTER X SingleServerSafe

Notes after installing an operating system, when configuring OS and disks are described in this section.

Directories and files in the location pointed to by the EXPRESSCLUSTER X SingleServerSafe installation path

The directories and files in the location pointed to by the EXPRESSCLUSTER X SingleServerSafe installation path must not be handled (edited, created, added, or deleted) by using any application or tool other than EXPRESSCLUSTER X SingleServerSafe.
Any effect on the operation of a directory or file caused by using an application or tool other than EXPRESSCLUSTER X SingleServerSafe will be outside the scope of NEC technical support.

Communication port number

EXPRESSCLUSTER X SingleServerSafe employs the following port numbers by default. You can change the port number by using the Builder.

Do not allow other programs to access any port with the following port numbers.

Configure to be able to access the port number below when setting a firewall on a server.

Server

From			To		Remarks
Server	Automatic allocation [1]	→	Server	29001/TCP	Internal communication
Server	Automatic allocation	→	Server	29002/TCP	Data transfer
Server	Automatic allocation	→	Server	29002/UDP	Heartbeat
Server	Automatic allocation	→	Server	29003/UDP	Alert synchronization
Server	Automatic allocation	→	Server	XXXX [2]/UDP	Internal communication for log

Server - Cluster WebUI / WebManager

From			To		Remarks
Cluster WebUI WebManager	Automatic allocation	→	Server	29003/TCP	http communication

Integrated WebManager connected server - Server to be managed

From			To		Remarks
Integrated WebManager connected server	Automatic allocation	→	Server	29003/TCP	http communication

Others

From		To		Remarks

Server	snmp trap	→	Monitoring target	162/UDP	Monitoring target of the external linkage monitor configured for BMC linkage
Server	icmp	→	Monitoring target	icmp	IP monitor
Server	Automatic allocation	→	Server	Management port number set by the Builder[3]	JVM monitor
Server	Automatic allocation	→	Monitoring target	Connection port number set by the Builder[3]	JVM monitor
Server	Automatic allocation	→	Server	Management port number set by Builder for load balancer linkage[3]	JVM monitor
Server	Automatic allocation	→	BIG-IP LTM	Communication port number set by the Builder[3]	JVM monitor

1. An available port number at the time is automatically assigned.

2. In the **Port Number** (log) tab in **Cluster Properties**, select **UDP** for log communication, and use the port number configured at **Port Number**. The default log communication method, **UNIX Domain**, does not use a communication port.

3. The JVM monitor resource uses the following four port numbers.

- A management port number is a port number that the JVM monitor resource internally uses. To set this number, use the **Connection Setting** dialog box opened from the **JVM monitor** tab in **Cluster Properties** of the Builder. For details, refer to Chapter 7, "Details of other settings" in the *Configuration Guide*.

- A connection port number is used to establish a connection to the target Java VM (WebLogic Server or WebOTX). To set this number, use the **Monitor (special)** tab in **Properties** of the Builder for the corresponding JVM monitor resource. For details, refer to Chapter 5 "Monitor resource details" in the *Configuration Guide*.

- A load balancer linkage management port number is used for load balancer linkage. When load balancer linkage is not used, this number does not need to be set. To set the number, use opened from the **JVM monitor** tab in **Cluster Properties** of the Builder. For details, refer to Chapter 7, "Details of other settings" in the *Configuration Guide*.

- A communication port number is used to accomplish load balancer linkage with BIG-IP LTM. When load balancer linkage is not used, this number does not need to be set. To set the number, use the **Load Balancer Linkage Settings** dialog box opened from the **JVM monitor** tab in **Cluster Properties** of the Builder. For details, refer to Chapter 7, "Details of other settings" in the *Configuration Guide*.

Changing the range of automatic allocation for the communication port numbers

◆ The range of automatic allocation for the communication port numbers managed by the OS might overlap the communication port numbers used by EXPRESSCLUSTER X SingleServerSafe.

◆ Change the OS settings to avoid duplication when the range of automatic allocation for the communication numbers managed by OS and the communication numbers used by EXPRESSCLUSTER X SingleServerSafe are duplicated.

Examples of checking and displaying OS setting conditions.

The range of automatic allocation for the communication port numbers depends on the distribution.

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

1024   65000

This is the condition to be assigned for the range from 1024 to 65000 when the application requests automatic allocation for the communication port numbers to the OS.

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

32768   61000

This is the condition to be assigned for the range from 32768 to 61000 when the application requests automatic allocation for the communication port numbers to the OS.

Examples of OS settings change

Add the line below to /etc/sysctl.conf. (When changing to the range from 30000 to 65000)

net.ipv4.ip_local_port_range = 30000   65000

Checking the network settings

◆ Check the network settings by using the ifconfig and ping commands.

- Public LAN (used for communication with all the other machines)

- Host name

OpenIPMI

◆ The following functions use OpenIPMI:

- Final Action at Activation Failure / Deactivation Failure

- Monitor resource action upon failure

- User mode monitor resource

- Shutdown monitoring

◆ When the monitor method is ipmi, OpenIPMI is used.

◆ EXPRESSCLUSTER X SingleServerSafe does not come with ipmiutil. The user is required to install the rpm file for OpenIPMI separately.

◆ Check whether your servers (hardware) support OpenIPMI in advance.

◆ Note that hardware conforming to the IPMI specifications might not be able to run OpenIPMI.

◆ When server monitoring software provided by another server vendor is used, do not select IPMI for the monitoring method of user-mode monitor resources and shutdown monitoring. Such server monitoring software and OpenIPMI both use BMC (Baseboard Management Controller) on the server, which causes a conflict and makes monitoring impossible.

User mode monitor resource, shutdown monitoring (monitoring method: softdog)

◆ When softdog is selected as a monitoring method, use the soft dog driver.
Make sure not to start the features that use the softdog driver except EXPRESSCLUSTER. Examples of such features are as follows:

- Heartbeat feature that comes with OS

- i8xx_tco driver

- iTCO_WDT driver

- watchdog feature and shutdown monitoring feature of systemd

◆ When softdog is set up as the monitoring method, disable the heartbeat function of the operating system.

◆ For SUSE LINUX 11, the softdog monitoring method cannot be set up when the i8xx_tco driver is in use. If you do not intend to use the i8xx_tco driver, set up the system so that the driver is not loaded.

Collecting logs

◆ For SUSE LINUX 11, when the log collection function of EXPRESSCLUSTER X SingleServerSafe is used for OS syslog acquisition, the suffixes of syslog (message) files are rotated and changed, so the function for specifying syslog generation does not operate.
To make the syslog generation specifiable for the log collection function, change the syslog rotation setting as described below.

- Comment out compress and dateext in the /etc/logrotate.d/syslog file

nsupdate and nslookup

◆ The following functions use `nsupdate` and `nslookup`.

   - Dynamic DNS monitor resource of monitor resource (ddnsw)

◆ EXPRESSCLUSTER X SingleServerSafe does not include `nsupdate` and `nslookup`. Therefore, install the rmp files of `nsupdate` and `nslookup`, in addition to the EXPRESSCLUSTER X SingleServerSafe installation.

◆ NEC does not support the items below regarding `nsupdate` and `nslookup`. Use `nsupdate` and `nslookup` at your own risk.

   - Inquiries about `nsupdate` and `nslookup`

   - Guaranteed operations of `nsupdate` and `nslookup`

   - Malfunction of `nsupdate` or `nslookup` or failure caused by such a malfunction

   - Inquiries about support of `nsupdate` and `nslookup` on each server

FTP monitor resources

◆ If a banner message to be registered to the FTP server or a message to be displayed at connection is long or consists of multiple lines, a monitor error may occur. When monitoring by the FTP monitor resource, do not register a banner message or connection message.

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Notes on using Red Hat Enterprise Linux 7

◆ The shutdown monitor function cannot be used.

◆ In mail reporting function takes advantage of the [mail] command of OS provides. Because the minimum composition is [mail] command is not installed, please execute one of the following.

  - Select the [**SMTP**] by the **Mail Method** on the **Alert Service** tab of **Cluster Properties**.

  - Installing mailx.

Notes on using Ubuntu

◆ To execute EXPRESSCLUSTER X SingleServerSafe -related commands, execute them as the root user.

◆ Only a Websphere monitor resource is supported in Application Server Agent. This is because other Application Server isn't supporting Ubuntu.

◆ In mail reporting function takes advantage of the [mail] command of OS provides. Because the minimum composition is [mail] command is not installed, please execute one of the following.

  - Select the [**SMTP**] by the **Mail Method** on the **Alert Service** tab of **Cluster Properties**.

  - Installing mailutils.

◆ Information acquisition by SNMP cannot be used.

Samba monitor resources

◆ Samba monitor resources use SMB protocol version 1.0 for monitoring. If the SMB protocol version accepted by a Samba server is limited to SMB2.0 or later (for example, when 'server min protocol' is set to 'SMB2' in smb.conf), a monitoring error will occur. Therefore, enable SMB protocol version 1.0 when using the Samba monitor resource.

◆ When the SMB signature is enabled in the Samba server (for example, when 'client signing' is set to 'mandatory' in smb.conf), a monitoring error will occur. Therefore, disable the SMB signature.

◆ The Samba monitor resource uses NTLMv1 authentication for monitoring. Therefore, a monitoring error occurs if NTLMv1 authentication is disabled on the Samba server (for example, lanman auth = no and ntlm auth = no are set in smb.conf). To use the Samba monitor resource, enable NTLMv1 authentication. Note that NTLMv1 authentication is disabled by default for Samba 4.5.0 or later.

Appendix A Troubleshooting

Error messages when installing the EXPRESSCLUSTER X SingleServerSafe

	Error Message	Cause	Solution
1	`failed to open //var/lib/rpm/packages.rpm error: cannot open //var/lib/rpm/packages.rpm`	The user logged on is not a root user.	Log on as a root user.
2	`error: package expressclssss-* is already installed`	The EXPRESSCLUSTER X SingleServerSafe is already installed.	Uninstall the EXPRESSCLUSTER X SingleServerSafe and reinstall it.

Error messages when uninstalling the EXPRESSCLUSTER X SingleServerSafe

	Error Message	Cause	Solution

1	`failed to open //var/lib/rpm/packages.rpm`
	
	`error: cannot open //var/lib/rpm/packages.rpm`
		The user logged on is not a root user.	Log on as a root user.

2	`error: expressclssss is running`	The EXPRESSCLUSTER X SingleServerSafe is active.	Disable Auto Startup of services, restart the server, and uninstall the EXPRESSCLUSTER SingleServerSafe again.

Troubleshooting for licensing

Behavior and Message	Cause	Solution
When the command was executed, the following message appeared in the console: `Log in as root.`	The command was executed by a general user.	Log on as root user or log on again after changing to root user with `su -`.

When the configuration data created by the Builder was distributed to all servers and then the server was shut down and rebooted, the WebManager showed the following message on the alert view and the server stopped:
 	
`The license is not registered.`
`(Product name:%1)`
 	
%1: Product name
	The server was shut down and rebooted without registering a license.	Register the license from the server.

After the configuration data created by the Builder was distributed to all servers and the server is shut down and rebooted, the Web Manager showed the following message on the alert view but the server is operating normally:
 	
`The number of licenses is`
`insufficient. The number of`
`insufficient licenses is %1.`
`(Product name:%2)`
 	
%1: The number of licenses in short of supply
 	
%2: Product name
	Licenses are insufficient.	Obtain a license and register it.

While the servers were operated using the trial license, the following message was displayed and the servers stopped:
 	
`The trial license has expired`
`in %1. (Product name:%2)`
 	
%1: Trial end date
%2: Product name
	The license has already expired.	Ask your sales agent for extension of the trial version license, or obtain and register the product version license.

While the cluster was operated on the fixed term license, the following message appeared.
 	
`The fixed term license has`
`expired in %1. (Product`
`name:%2)`
 	
%1: Fixed term end date
%2: Product name
	The license has already expired.	Obtain the license for the product version from the vendor, and then register the license.

Appendix B Index