Element Controller
Installation Manual

Version 0.9

October, 2017

Revision History

Date	Ver. No.	Editor	Section	Change Description
October, 2017	0.9	–	–	Initial Version Registered

Table of Contents

Table of Figures

1. Introduction

1.1. Objective

This document is the installation manual for the EC Main Module included in the Element Controller (hereafter referred to as "EC"). Please read this manual carefully before using the software.

1.2. Scope of Application

The scope of this document is for the operation of the components of EC Main Module.

The subjects other than that are not covered in this document.

1.3. Expressional Conventions

There are certain expressions and text styles conventionally used in this document. Please make yourself clear about the items below before going on through the document.

<Execution Server: XXX> - bold letters surrounded by angle brackets

This means the server which commands are executed on.

[XX XX] - bold letters surrounded by square brackets

This means the command to be entered in Linux.

X [Enter] - bold letter and "[Enter]"

In this case, you need to enter the letters within brackets and press the Enter key in the console screen.

1.4. Trademark Notice

All company names and product names mentioned in this document are registered trademarks or trademarks of their respective companies.

Linux®:

The registered trademark or the trademark of Linus Torvalds in the U.S. and other countries

PostgreSQL@:

The trademark of PostgreSQL in the U.S. and other countries

1.5. Configuration of the Included Accessories

The table below illustrates the required items to follow the installation instructions in this document.

For the items described as "in-advance DL", you must download and prepare them prior to implementing the installation in this document.

Table 1-1 Included Accessories

#	Folder Structure	File Name	Description	Remarks
1.	ec_main	-	-	-
2.	bin	boot.sh	Inter-devices I/F Control Functional Part Device Start-up Notification Script	
3.		ec_ctl.sh	EC Start-up Script	
4.		linkdown.sh	SNMPTrap Functional Part Link-down Notification Script	
5.		linkup.sh	SNMPTrap Functional Part Link-up Notification Script	
6.	lib	EcMainModule.jar	EC Main Module	
7.		NetConf.jar	NetConf Library	
8.		antlr-2.7.7.jar	Using Library	In-Advance DL
9.		c3p0-0.9.2.1.jar	Using Library	In-Advance DL
10.		commons-io-2.5.jar	Using Library	In-Advance DL
11.		dom4j-1.6.1.jar	Using Library	In-Advance DL
12.		ganymed-ssh2-build210.jar	Using Library	In-Advance DL
13.		geronimo-jta_1.1_spec-1.1.1.jar	Using Library	In-Advance DL
14.		gson-2.7.jar	Using Library	In-Advance DL
15.		hibernate-c3p0-5.0.10.Final.jar	Using Library	In-Advance DL
16.		hibernate-commons-annotations-5.0.1.Final.jar	Using Library	In-Advance DL
17.		hibernate-core-5.0.10.Final.jar	Using Library	In-Advance DL
18.		hibernate-jpa-2.1-api-1.0.0.Final.jar	Using Library	In-Advance DL
19.		hk2-api-2.5.0-b05.jar	Using Library	In-Advance DL
20.		hk2-locator-2.5.0-b05.jar	Using Library	In-Advance DL
21.		hk2-utils-2.5.0-b05.jar	Using Library	In-Advance DL
22.		javassist-3.18.1-GA.jar	Using Library	In-Advance DL
23.		javax.annotation-api-1.2.jar	Using Library	In-Advance DL
24.		javax.inject-2.5.0-b05.jar	Using Library	In-Advance DL
25.		javax.ws.rs-api-2.0.1.jar	Using Library	In-Advance DL
26.		jboss-logging-3.3.0.Final.jar	Using Library	In-Advance DL
27.		jersey-client.jar	Using Library	In-Advance DL
28.		jersey-common.jar	Using Library	In-Advance DL
29.		jersey-container-servlet-core.jar	Using Library	In-Advance DL
30.		jersey-guava-2.23.2.jar	Using Library	In-Advance DL
31.		jersey-server.jar	Using Library	In-Advance DL
32.		jetty-http-9.3.11.v20160721.jar	Using Library	In-Advance DL
33.		jetty-io-9.3.11.v20160721.jar	Using Library	In-Advance DL
34.		jetty-security-9.3.11.v20160721.jar	Using Library	In-Advance DL
35.		jetty-server-9.3.11.v20160721.jar	Using Library	In-Advance DL
36.		jetty-servlet-9.3.11.v20160721.jar	Using Library	In-Advance DL
37.		jetty-util-9.3.11.v20160721.jar	Using Library	In-Advance DL

38.			jsch-0.1.53.jar	Using Library	In-Advance DL
39.			log4j-api-2.6.2.jar	Using Library	In-Advance DL
40.			log4j-core-2.6.2.jar	Using Library	In-Advance DL
41.			log4j-slf4j-impl-2.6.2.jar	Using Library	In-Advance DL
42.			mchange-commons-java-0.2.3.4.jar	Using Library	In-Advance DL
43.			org.eclipse.persistence.core.jar	Using Library	In-Advance DL
44.			postgresql-9.4.1209.jre7.jar	Using Library	In-Advance DL
45.			quartz-2.2.3.jar	Using Library	In-Advance DL
46.			servlet-api-3.1.jar	Using Library	In-Advance DL
47.			slf4j-api-1.7.21.jar	Using Library	In-Advance DL
48.			slf4j-simple-1.7.21.jar	Using Library	In-Advance DL
49.			snmp4j-2.5.0.jar	Using Library	In-Advance DL
50.			validation-api-1.1.0.Final.jar	Using Library	In-Advance DL
51.	conf		ec_main.conf	EC Main Module Configuration File	
52.			hibernate.cfg.xml	Hibernate Configuration File	
53.			log4j2.xml	log4j2 Configuration File	
54.	installer		-	-	-
55.		dhcp.v4.2.5	dhcp-4.2.5-42.el7.centos.x86_64.rpm	DHCP Installation Package	In-Advance DL
56.		ntp.v4.2	autogen-libopts-5.18-5.el7.x86_64.rpm	NTP Installation Package	In-Advance DL
57.			ntpdate-4.2.6p5-22.el7.centos.x86_64.rpm	NTP Installation Package	In-Advance DL
58.			ntp-4.2.6p5-22.el7.centos.x86_64.rpm	NTP Installation Package	In-Advance DL
59.		postgresql.v9.3.13	postgresql93-9.3.13-1PGDG.rhel7.x86_64.rpm	PostgreSQL Installation Package	In-Advance DL
60.			postgresql93-contrib-9.3.13-1PGDG.rhel7.x86_64.rpm	PostgreSQL Installation Package	In-Advance DL
61.			postgresql93-devel-9.3.13-1PGDG.rhel7.x86_64.rpm	PostgreSQL Installation Package	In-Advance DL
62.			postgresql93-libs-9.3.13-1PGDG.rhel7.x86_64.rpm	PostgreSQL Installation Package	In-Advance DL
63.			postgresql93-server-9.3.13-1PGDG.rhel7.x86_64.rpm	PostgreSQL Installation Package	In-Advance DL
64.			uuid-1.6.2-26.el7.x86_64.rpm	PostgreSQL Installation Package	In-Advance DL
65.			libxslt-1.1.28-5.el7.x86_64.rpm	PostgreSQL Installation Package	In-Advance DL
66.		snmptrapd.v5.7.2	net-snmp-5.7.2-24.el7.x86_64.rpm	Net-SNMP Installation Package	In-Advance DL
67.			perl-HTTP-Tiny-0.033-3.el7.noarch.rpm	Net-SNMP Installation Package	In-Advance DL
68.			perl-Pod-Perldoc-3.20-4.el7.noarch.rpm	Net-SNMP Installation Package	In-Advance DL
69.			perl-podlators-2.5.1-3.el7.noarch.rpm	Net-SNMP Installation Package	In-Advance DL
70.			perl-Encode-2.51-7.el7.x86_64.rpm	Net-SNMP Installation Package	In-Advance DL
71.			perl-Text-ParseWords-3.29-4.el7.noarch.rpm	Net-SNMP Installation Package	In-Advance DL
72.			perl-Pod-Usage-1.63-3.el7.noarch.rpm	Net-SNMP Installation Package	In-Advance DL
73.			perl-constant-1.27-2.el7.noarch.rpm	Net-SNMP Installation Package	In-Advance DL
74.			perl-Time-Local-1.2300-2.el7.noarch.rpm	Net-SNMP Installation Package	In-Advance DL
75.			perl-Storable-2.45-3.el7.x86_64.rpm	Net-SNMP Installation Package	In-Advance DL
76.			perl-Socket-2.010-3.el7.x86_64.rpm	Net-SNMP Installation	In-Advance DL

					Package	
77.				perl-Scalar-List-Utils-1.27-248.el7.x86_64.rpm	Net-SNMP Installation Package	In-Advance DL
78.				perl-File-Temp-0.23.01-3.el7.noarch.rpm	Net-SNMP Installation Package	In-Advance DL
79.				perl-Getopt-Long-2.40-2.el7.noarch.rpm	Net-SNMP Installation Package	In-Advance DL
80.				perl-File-Path-2.09-2.el7.noarch.rpm	Net-SNMP Installation Package	In-Advance DL
81.				perl-Exporter-5.68-3.el7.noarch.rpm	Net-SNMP Installation Package	In-Advance DL
82.				perl-Carp-1.26-244.el7.noarch.rpm	Net-SNMP Installation Package	In-Advance DL
83.				perl-PathTools-3.40-5.el7.x86_64.rpm	Net-SNMP Installation Package	In-Advance DL
84.				perl-Pod-Escapes-1.04-286.el7.noarch.rpm	Net-SNMP Installation Package	In-Advance DL
85.				perl-macros-5.16.3-286.el7.x86_64.rpm	Net-SNMP Installation Package	In-Advance DL
86.				perl-threads-shared-1.43-6.el7.x86_64.rpm	Net-SNMP Installation Package	In-Advance DL
87.				perl-threads-1.87-4.el7.x86_64.rpm	Net-SNMP Installation Package	In-Advance DL
88.				perl-Time-HiRes-1.9725-3.el7.x86_64.rpm	Net-SNMP Installation Package	In-Advance DL
89.				perl-Pod-Simple-3.28-4.el7.noarch.rpm	Net-SNMP Installation Package	In-Advance DL
90.				perl-Filter-1.49-3.el7.x86_64.rpm	Net-SNMP Installation Package	In-Advance DL
91.				perl-parent-0.225-244.el7.noarch.rpm	Net-SNMP Installation Package	In-Advance DL
92.				net-snmp-agent-libs-5.7.2-24.el7_2.1.x86_64.rpm	Net-SNMP Installation Package	In-Advance DL
93.				net-snmp-libs-5.7.2-24.el7_2.1.x86_64.rpm	Net-SNMP Installation Package	In-Advance DL
94.				perl-5.16.3-286.el7.x86_64.rpm	Net-SNMP Installation Package	In-Advance DL
95.				perl-libs-5.16.3-286.el7.x86_64.rpm	Net-SNMP Installation Package	In-Advance DL
96.				perl-Data-Dumper-2.145-3.el7.x86_64.rpm	Net-SNMP Installation Package	In-Advance DL
97.				net-snmp-5.7.2-24.el7_2.1.x86_64.rpm	Net-SNMP Installation Package	In-Advance DL
98.				openssl098e-0.9.8e-29.el7.centos.3.x86_64.rpm	Net-SNMP Installation Package	In-Advance DL
99.				glibc-2.17-105.el7.x86_64.rpm	Net-SNMP Installation Package	In-Advance DL
100.				glibc-common-2.17-105.el7.x86_64.rpm	Net-SNMP Installation Package	In-Advance DL
101.				lm_sensors-libs-3.3.4-11.el7.x86_64.rpm	Net-SNMP Installation Package	In-Advance DL
102.			java.v8u92	jdk-8u92-linux-x64.rpm	Java Installation Package	In-Advance DL
103.			pacemaker.v1.1.14-1.1	pacemaker-1.1.14-1.el7.x86_64.rpm	Pacemaker Installation Package	In-Advance DL
104.				corosync-2.3.5-1.el7.x86_64.rpm	Corosync Installation Package	In-Advance DL
105.				crmsh-2.1.5-1.el7.x86_64.rpm	Crm Command Installation Package	In-Advance DL
106.				pcs-0.9.143-15.el7.x86_64.rpm	Pcs Command Installation Package	Although the latest package is 0.9.149-1, the package one version earlier is used since the

					latest one is a trial version.
107.			cluster-glue-1.0.12-2.el7.x86_64.rpm	Pacemaker Dependent Package	In-Advance DL
108.			cluster-glue-libs-1.0.12-2.el7.x86_64.rpm	Pacemaker Dependent Package	In-Advance DL
109.			corosynclib-2.3.5-1.el7.x86_64.rpm	Corosync Dependent Package	In-Advance DL
110.			ipmitool-1.8.13-9.el7_2.x86_64.rpm	Pacemaker Dependent Package	In-Advance DL
111.			libqb-1.0-1.el7.x86_64.rpm	Pacemaker Dependent Package	In-Advance DL
112.			libtool-ltdl-2.4.2-21.el7_2.x86_64.rpm	Pacemaker Dependent Package	In-Advance DL
113.			libxslt-1.1.28-5.el7.x86_64.rpm	Pacemaker Dependent Package	In-Advance DL
114.			libyaml-0.1.4-11.el7_0.x86_64.rpm	Pacemaker Dependent Package	In-Advance DL
115.			lm_sensors-libs-3.3.4-11.el7.x86_64.rpm	Pacemaker Dependent Package	In-Advance DL
116.			nano-2.3.1-10.el7.x86_64.rpm	crm Dependent Package	In-Advance DL
117.			net-snmp-agent-libs-5.7.2-24.el7_2.1.x86_64.rpm	Corosync Dependent Package	In-Advance DL
118.			net-snmp-libs-5.7.2-24.el7_2.1.x86_64.rpm	Corosync Dependent Package	In-Advance DL
119.			openhpi-libs-3.4.0-2.el7.x86_64.rpm	Pacemaker Dependent Package	In-Advance DL
120.			OpenIPMI-libs-2.0.19-11.el7.x86_64.rpm	Pacemaker Dependent Package	In-Advance DL
121.			OpenIPMI-modalias-2.0.19-11.el7.x86_64.rpm	Pacemaker Dependent Package	In-Advance DL
122.			pacemaker-cli-1.1.14-1.el7.x86_64.rpm	Pacemaker Dependent Package	In-Advance DL
123.			pacemaker-cluster-libs-1.1.14-1.el7.x86_64.rpm	Pacemaker Dependent Package	In-Advance DL
124.			pacemaker-libs-1.1.14-1.el7.x86_64.rpm	Pacemaker Dependent Package	In-Advance DL
125.			pacemaker-all-1.1.14-1.1.el7.noarch.rpm	Pacemaker Dependent Package	In-Advance DL
126.			perl-5.16.3-286.el7.x86_64.rpm	Pacemaker Dependent Package	In-Advance DL
127.			perl-Carp-1.26-244.el7.noarch.rpm	Pacemaker Dependent Package	In-Advance DL
128.			perl-constant-1.27-2.el7.noarch.rpm	Pacemaker Dependent Package	In-Advance DL
129.			perl-Encode-2.51-7.el7.x86_64.rpm	Pacemaker Dependent Package	In-Advance DL
130.			perl-Exporter-5.68-3.el7.noarch.rpm	Pacemaker Dependent Package	In-Advance DL
131.			perl-File-Path-2.09-2.el7.noarch.rpm	Pacemaker Dependent Package	In-Advance DL
132.			perl-File-Temp-0.23.01-3.el7.noarch.rpm	Pacemaker Dependent Package	In-Advance DL
133.			perl-Filter-1.49-3.el7.x86_64.rpm	Pacemaker Dependent Package	In-Advance DL
134.			perl-Getopt-Long-2.40-2.el7.noarch.rpm	Pacemaker Dependent Package	In-Advance DL
135.			perl-HTTP-Tiny-0.033-3.el7.noarch.rpm	Pacemaker Dependent Package	In-Advance DL
136.			perl-libs-5.16.3-286.el7.x86_64.rpm	Pacemaker Dependent Package	In-Advance DL
137.			perl-macros-5.16.3-286.el7.x86_64.rpm	Pacemaker Dependent Package	In-Advance DL
138.			perl-parent-0.225-244.el7.noarch.rpm	Pacemaker Dependent Package	In-Advance DL
139.			perl-PathTools-3.40-5.el7.x86_64.rpm	Pacemaker Dependent Package	In-Advance DL
140.			perl-Pod-Escapes-1.04-286.el7.noarch.rpm	Pacemaker Dependent Package	In-Advance DL
141.			perl-podlators-2.5.1-3.el7.noarch.rpm	Pacemaker Dependent Package	In-Advance DL
142.			perl-Pod-Perldoc-3.20-4.el7.noarch.rpm	Pacemaker Dependent Package	In-Advance DL
143.			perl-Pod-Simple-3.28-4.el7.noarch.rpm	Pacemaker Dependent Package	In-Advance DL
144.			perl-Pod-Usage-1.63-3.el7.noarch.rpm	Pacemaker Dependent Package	In-Advance DL

145.				perl-Scalar-List-Utils-1.27-248.el7.x86_64.rpm	Pacemaker Dependent Package	In-Advance DL
146.				perl-Socket-2.010-3.el7.x86_64.rpm	Pacemaker Dependent Package	In-Advance DL
147.				perl-Storable-2.45-3.el7.x86_64.rpm	Pacemaker Dependent Package	In-Advance DL
148.				perl-Text-ParseWords-3.29-4.el7.noarch.rpm	Pacemaker Dependent Package	In-Advance DL
149.				perl-threads-1.87-4.el7.x86_64.rpm	Pacemaker Dependent Package	In-Advance DL
150.				perl-threads-shared-1.43-6.el7.x86_64.rpm	Pacemaker Dependent Package	In-Advance DL
151.				perl-TimeDate-2.30-2.el7.noarch.rpm	Pacemaker Dependent Package	In-Advance DL
152.				perl-Time-HiRes-1.9725-3.el7.x86_64.rpm	Pacemaker Dependent Package	In-Advance DL
153.				perl-Time-Local-1.2300-2.el7.noarch.rpm	Pacemaker Dependent Package	In-Advance DL
154.				pm_crmgen-2.1-1.el7.noarch.rpm	Pacemaker Dependent Package	In-Advance DL
155.				pm_diskd-2.2-1.el7.x86_64.rpm	Diskd RA Package	In-Advance DL
156.				pm_extras-2.2-1.el7.x86_64.rpm	VIPCheck RA Packge	In-Advance DL
157.				pm_logconv-cs-2.2-1.el7.noarch.rpm	Pacemaker Dependent Package	In-Advance DL
158.				psmisc-22.20-9.el7.x86_64.rpm	Pacemaker Dependent Package	In-Advance DL
159.				pssh-2.3.1-5.el7.noarch.rpm	crm Dependent Package	In-Advance DL
160.				python-clufter-0.50.4-1.el7.x86_64.rpm	pcs Dependent Package	In-Advance DL
161.				python-dateutil-1.5-7.el7.noarch.rpm	pcs Dependent Package	In-Advance DL
162.				python-lxml-3.2.1-4.el7.x86_64.rpm	pcs Dependent Package	In-Advance DL
163.				resource-agents-3.9.7-1.2.6f56.el7.x86_64.rpm	Standard RA Package Including Virtual IPRA	In-Advance DL
164.				ruby-2.0.0.598-25.el7_1.x86_64.rpm	pcs Dependent Package	In-Advance DL
165.				rubygem-bigdecimal-1.2.0-25.el7_1.x86_64.rpm	pcs Dependent Package	In-Advance DL
166.				rubygem-io-console-0.4.2-25.el7_1.x86_64.rpm	pcs Dependent Package	In-Advance DL
167.				rubygem-json-1.7.7-25.el7_1.x86_64.rpm	pcs Dependent Package	In-Advance DL
168.				rubygem-psych-2.0.0-25.el7_1.x86_64.rpm	pcs Dependent Package	In-Advance DL
169.				rubygem-rdoc-4.0.0-25.el7_1.noarch.rpm	pcs Dependent Package	In-Advance DL
170.				rubygems-2.0.14-25.el7_1.noarch.rpm	pcs Dependent Package	In-Advance DL
171.				ruby-irb-2.0.0.598-25.el7_1.noarch.rpm	pcs Dependent Package	In-Advance DL
172.				ruby-libs-2.0.0.598-25.el7_1.x86_64.rpm	pcs Dependent Package	In-Advance DL
173.				pacemaker_install.sh	Package Installer	
174.			httpd.v2.4.6	apr-1.4.8-3.el7.x86_64.rpm	httpd Installation Package	In-Advance DL
175.				apr-util-1.5.2-6.el7.x86_64.rpm	httpd Installation Package	In-Advance DL
176.				mailcap-2.1.41-2.el7.noarch.rpm	httpd Installation Package	In-Advance DL
177.				httpd-tools-2.4.6-40.el7.centos.4.x86_64.rpm	httpd Installation Package	In-Advance DL
178.				httpd-2.4.6-40.el7.centos.4.x86_64.rpm	httpd Installation Package	In-Advance DL
179.				httpd-manual-2.4.6-40.el7.centos.4.noarch.rpm	httpd Installation Package	In-Advance DL
180.				mod_ssl-2.4.6-40.el7.centos.4.x86_64.rpm	httpd Installation Package	In-Advance DL
181.			tftp.v5.2	xinetd-2.3.15-12.el7.x86_64.rpm	tftpd Installation Package	In-Advance DL
182.				tftp-5.2-12.el7.x86_64.rpm	tftpd Installation Package	In-Advance DL
183.				tftp-server-5.2-12.el7.x86_64.rpm	tftpd Installation Package	In-Advance DL
184.		database		-	-	-

185.			create_table.sql	Table Creation Script	
		RA	-	-	-
186.			ra_config.csv	Release Agent Configuration File	
187.			ra_config.xlsx	Release Agent Configuration File	
188.			ec	Release Agent	
189.			snmptrapd	Release Agent	

2. Operational Environment

2.1. EC Main Module Start-up Server of Controller

It is recommended to operate the software on the following Linux computer environment.

Table 2-1 Recommended Hardware Configuration

No.	Computer	Minimum Configuration
1.	OS	CentOS7.2 x86_64
2.	CPU	Intel® Xeon® CPU E5-2420 v2 @2.20GHz 6 Core/12 Thread or greater
3.	Memory	32GB or larger
4.	HD Free Space	500G or larger
5.	NIC	More than 1 port

3. Preparation for installing the Controller Server

3.1. OS Installation

Please refer to "Fabric_Controller_Installation_Manual" for the way of Installing OS.

4. Installation of Controller Server

The instructions described in this section must be performed by the root user unless any specific user is specified.

<Execution Host: ACT/SBY/DB>

Create a working folder where the files generated in the process of installation are located.

(It will be deleted when the installation of Controller Server is completed.)

[mkdir ~/setup] [Enter]

Locate the ec_main folder which is configured as described in "1.5 Configuration of the Included Accessories " above in the working folder.

4.1. Environmental Installation

4.1.1. Firewall Configuration

4.1.1.1. Firewall Confirmation

<Execution Host: ACT/SBY/DB>

Check if the firewall has been already configured.

[firewall-cmd –state] [Enter]

If the firewall has already been configured, the following message will be displayed in the screen.

running

In this case, keep following the instructions from 4.1.1.2 to 4.1.1.8.

If the firewall is not installed or is not started, the following message will be displayed in the screen.

(In case the firewall is not started) not running

(In case the firewall is not installed) bash: firewall-cmd: command not found

In these cases, the instructions from 4.1.1.2 to 4.1.1.8 can be ignored.

4.1.1.2. Permit the Connection of REST Request (FC, Start-up Notification, Trap Notification)

<Execution Host: ACT/SBY>

Execute the following command to permit the connection from the port used in REST Request.

(The specified port numbers in this document are default values. You can change the numbers in accordance with your configuration.)

[firewall-cmd --permanent --add-port=18080/tcp] [Enter]

4.1.1.3. Permit the Connection of PostgreSQL

<Execution Host: DB>

Execute the following command to permit the connection from the port used in PostgreSQL.

[firewall-cmd --permanent --add-port=5432/tcp] [Enter]

4.1.1.4. Permit the Connection of SNMPTrap

<Execution Host: ACT/SBY>

Execute the following command to permit the connection from the port used in SNMPTrap.

[firewall-cmd --permanent --add-port=162/udp] [Enter]

4.1.1.5. Permit syslog Transmission Reception

<Execution Host: ACT/SBY>

Execute the following command to permit the connection from the port used in syslog Transmission Reception.

[firewall-cmd --permanent --add-port=514/tcp] [Enter]

[firewall-cmd --permanent --add-port=514/udp] [Enter]

4.1.1.6. Permit the Connection of Pacemaker/Corosync

<Execution Host: ACT/SBY>

Execute the following command to permit the connection from the port used in Pacemaker/Corosync.

[firewall-cmd --permanent --add-service=high-availability] [Enter]

[cp -p /usr/lib/firewalld/services/high-availability.xml /etc/firewalld/services/] [Enter]

4.1.1.7. Permit the Connection of tftpd

<Execution Host: ACT/SBY>

Execute the following command to permit the connection from the port used in tftpd.

[firewall-cmd --permanent --add-service=tftp] [Enter]

[cp -p /usr/lib/firewalld/services/tftp.xml /etc/firewalld/services/] [Enter]

4.1.1.8. Permit the Connection of httpd

<Execution Host: ACT/SBY>

Execute the following command to permit the connection from the port used in httpd.

[firewall-cmd --permanent --add-service=http] [Enter]

[cp -p /usr/lib/firewalld/services/http.xml /etc/firewalld/services/] [Enter]

Once having completed the 4.1.1 Firewall Configuration above, execute the following command to reflect the configuration.

<Execution Host: ACT/SBY/DB>

[firewall-cmd --reload] [Enter]

[systemctl restart firewalld] [Enter]

Confirm the current configuration by executing the following command (especially for the

highlighted section).

[firewall-cmd --list-all] [Enter]

<Execution Host: ACT/SBY>

public (default, active)
interfaces:
sources:
services: dhcpv6-client high-availability http ssh tftp
ports: 514/tcp 162/udp 514/udp 18080/tcp
masquerade: no
forward-ports:
icmp-blocks:
rich rules:

<Execution Host: DB>

public (default, active)
interfaces:
sources:
services: dhcpv6-client ssh
ports: 5432/tcp
masquerade: no
forward-ports:
icmp-blocks:
rich rules:

4.1.1.9. Configuration of SELinux

<Execution Host: ACT/SBY>

Confirm the current configuration with the following command.

[getenforce] [Enter]

If the result of execution of above command is “Enfoing”, execute the following command to change the SELinux configuration.

[setenforce 0] [Enter]

[vi /etc/selinux/config] [Enter] (set the highlighted value as shown below)

```
…
# This file controls the state of SELinux on the system.
# SELINUX= can take one of these three values:
#       enforcing - SELinux security policy is enforced.
#       permissive - SELinux prints warnings instead of enforcing.
#       disabled - No SELinux policy is loaded.
SELINUX=disabled
…
```

4.1.2. Installation and Configuration of Java

4.1.2.1. Installation

<Execution Host: ACT/SBY>

Execute the following command to install jdk.

[cd ~/setup/ec_main/installer/java.v8u92] [Enter]

[rpm -ivh jdk-8u92-linux-x64.rpm] [Enter]

4.1.2.2. Confirmation of the version of Java

<Execution Host: ACT/SBY>

Execute the following command to confirm the version.

[java -version] [Enter]

If it has been installed successfully, the following message will be displayed.

```
java version "1.8.0_92"
Java(TM) SE Runtime Environment (build 1.8.0_92-b14)
Java HotSpot(TM) 64-Bit Server VM (build 25.92-b14, mixed mode)
```

4.1.2.3. Change of the profile

<Execution Host: ACT/SBY>

Add JRE_HOME environment variable to the following file (append the highlighted section).

[vi /etc/profile] [Enter]

```
…
JRE_HOME=/usr/java/jdk1.8.0_92/
export JRE_HOME
```

4.1.3. Installation and Configuration of Net-SNMP

4.1.3.1. Installation

<Execution Host: ACT/SBY>

Execute the following command to install Net-SNMP.

[cd ~/setup/ec_main/installer/snmptrapd.v5.7.2] [Enter]

[rpm -ivh glibc-common-2.17-105.el7.x86_64.rpm] [Enter]

[rpm -ivh glibc-2.17-105.el7.x86_64.rpm] [Enter]

[rpm -ivh perl-*] [Enter]

[rpm -ivh openssl098e-0.9.8e-29.el7.centos.3.x86_64.rpm] [Enter]

[rpm -ivh net-snmp-libs-5.7.2-24.el7_2.1.x86_64.rpm] [Enter]

[rpm -ivh lm_sensors-libs-3.3.4-11.el7.x86_64.rpm] [Enter]

[rpm -ivh net-snmp-agent-libs-5.7.2-24.el7_2.1.x86_64.rpm] [Enter]

[rpm -ivh net-snmp-5.7.2-24.el7_2.1.x86_64.rpm] [Enter]

*The output result saying that it has already been installed should be taken as no problem

4.1.3.2. Change of SNMPTrap Configuration File

<Execution Host: ACT/SBY>

Add the following lines to the SNMPTrap configuration file (/etc/snmp/snmptrapd.conf) (append the highlighted section).

The "$EC_HOME/" below must be replaced with the same path as "4.2.3Locating the Script".

[vi /etc/snmp/snmptrapd.conf] [Enter]

```
…
authCommunity log,execute public
#trap reception of Linkdown
traphandle .1.3.6.1.6.3.1.1.5.3 $EC_HOME/ec_main/bin/linkdown.sh
#trap reception of Linkup
traphandle .1.3.6.1.6.3.1.1.5.4 $EC_HOME/ec_main/bin/linkup.sh
```

Add the following lines to SNMPTrap service file (/usr/lib/systemd/system/snmptrapd.service).

[vi /usr/lib/systemd/system/snmptrapd.service] [Enter] (Add the highlighted section.)

```
…
[Service]
Type=notify
Environment=OPTIONS="-Lsd"
EnvironmentFile=-/etc/sysconfig/snmptrapd
ExecStart=/usr/sbin/snmptrapd -On $OPTIONS -f
ExecReload=/bin/kill -HUP $MAINPID
…
```

4.1.4. Configuration of rsyslog

4.1.4.1. Change of rsyslog Configuration File

<Execution Host: ACT/SBY>

Change the contents of rsyslog configuration file (/etc/rsyslog.conf) as below (change the highlighted section as specified below).

The "Device CIDR" below will be replaced with the CIDR expression of the device's segment.

[vi /etc/rsyslog.conf] [Enter]

Before Change

```
…
 # Provides UDP syslog reception
 #$ModLoad imudp
 #$UDPServerRun 514

 # Provides TCP syslog reception
 #$ModLoad imtcp
 #$InputTCPServerRun 514
```

After Change

```
…
 # Provides UDP syslog reception
 $ModLoad imudp
 $UDPServerRun 514
 $AllowedSender UDP, 127.0.0.1, Device CIDR

 # Provides TCP syslog reception
 $ModLoad imtcp
 $InputTCPServerRun 514
 $AllowedSender TCP, 127.0.0.1, Device CIDR
…
```

Append the following line to the end of the file.

```
 $template hostip, "%fromhost-ip%"
```

4.1.5. Installation and Configuration of NTP

4.1.5.1. Installation

<Execution Host: ACT/SBY>

Execute the following command to install ntp.

[cd ~/setup/ec_main/installer/ntp.v4.2/] [Enter]

[rpm -ivh autogen-libopts-5.18-5.el7.x86_64.rpm] [Enter]

[rpm -ivh ntpdate-4.2.6p5-22.el7.centos.x86_64.rpm] [Enter]

[rpm -ivh ntp-4.2.6p5-22.el7.centos.x86_64.rpm] [Enter]

4.1.5.2. Making of drift File

<Execution Host: ACT/SBY>

Execute the following command to make a blank drift file.

[touch /var/lib/ntp/drift] [Enter]

4.1.5.3. Change of NTP Configuration File

<Execution Host: ACT/SBY>

Add the following lines (the highlighted section) to the NTP configuration file (/etc/ntp.conf).

[vi /etc/ntp.conf] [Enter]

```
…
 restrict default nomodify notrap nopeer noquery

 restrict default ignore

…
 #restrict 192.168.1.0 mask 255.255.255.0 nomodify notrap

 restrict xxx.xxx.xxx.xxx noquery nomodify
 server xxx.xxx.xxx.xxx iburst

…
```

4.1.5.4. Synchronization with the NTP Server

<Execution Host: ACT/SBY>

Execute the following command to confirm that NTP is not running.

[systemctl status ntpd.service] [Enter]

<The output when NTP is not running >

```
…
Active: inactive (dead)
…
```

<The output when NTP is running >

```
…
Active: active (running)
…
```

In case NTP is running, execute the following command to stop NTP.

[systemctl stop ntpd.service] [Enter]

Then synchronize the time with NTP server (IP address: xxx.xxx.xxx.xxx).

[ntpdate xxx.xxx.xxx.xxx] [Enter]

4.1.5.5. Rebooting the NTP

<Execution Host: ACT/SBY>

Execute the following command to reboot the NTP.

[systemctl restart ntpd.service] [Enter]

[systemctl enable ntpd.service] [Enter]

Execute the following command to confirm the synchronization with the NTP server.

[ntpq -p] [Enter]

<The output example of successful synchronization>

```
     remote           refid      st t when poll reach   delay   offset  jitter
==============================================================================
*xxx.xxx.xxx.xxx LOCAL(0)        11 u   55   64  377    0.130   -0.017   0.017
```

4.1.6. Installation and Configuration of PostgreSQL

4.1.6.1. Installation

<Execution Host: DB>

Execute the following command to install postgresql.

[cd ~/setup/ec_main/installer/postgresql.v9.3.13] [Enter]

[rpm -ivh libxslt-1.1.28-5.el7.x86_64.rpm] [Enter]

[rpm -ivh uuid-1.6.2-26.el7.x86_64.rpm] [Enter]

[rpm -ivh postgresql93-libs-9.3.13-1PGDG.rhel7.x86_64.rpm] [Enter]

[rpm -ivh postgresql93-9.3.13-1PGDG.rhel7.x86_64.rpm] [Enter]

[rpm -ivh postgresql93-server-9.3.13-1PGDG.rhel7.x86_64.rpm] [Enter]

[rpm -ivh postgresql93-devel-9.3.13-1PGDG.rhel7.x86_64.rpm] [Enter]

[rpm -ivh postgresql93-contrib-9.3.13-1PGDG.rhel7.x86_64.rpm] [Enter]

4.1.6.2. Change of the PostgreSQL Configuration

<Execution Host: DB>

Change the configuration as follows.

[vi /var/lib/pgsql/.bash_profile] [Enter] (Change or add the highlighted section.)

PGDATA=/usr/local/pgsql/9.3/data

export PGDATA

export PATH=$PATH:/usr/pgsql-9.3/bin

[source /var/lib/pgsql/.bash_profile] [Enter]

4.1.6.3. Making of Data Base and Granting Permissions

<Execution Host: DB>

Execute the following command to make the folder where the data base will be installed.

[cd /usr/local/] [Enter]

[mkdir -pm 777 /usr/local/pgsql/9.3] [Enter]

[chown -R postgres:postgres pgsql] [Enter]

Execute the following command as a postgres user to make the data base.

[su - postgres] [Enter]

[cd /usr/local/pgsql/9.3/] [Enter]

[mkdir -m 700 data] [Enter]

[initdb --encoding=UTF8 --no-locale --pgdata=/usr/local/pgsql/9.3/data --auth=ident] [Enter]

[pg_ctl -D /usr/local/pgsql/9.3/data -l logfile start] [Enter]

[psql -c "alter user postgres with password ""] [Enter]

[psql] [Enter]

[create role root login createdb password '';] [Enter]

[¥q] [Enter]

[pg_ctl -D /usr/local/pgsql/9.3/data -l logfile stop] [Enter]

[exit] [Enter]

Execute the following command as the root user.

[systemctl enable postgresql-9.3] [Enter]

[systemctl daemon-reload] [Enter]

4.1.6.4. Change of the Data Base Configuration

<Execution Host: DB>

Change the configuration as follows.

[vi /usr/local/pgsql/9.3/data/postgresql.conf] [Enter]

Before Change

```
…
#listen_addresses = 'localhost'
#port = 5432
…
```

After Change

```
…
listen_addresses = '*'
port = 5432
…
```

Change the configuration as follows (the highlighted section should be replaced with the segment of the permitting server).

[vi /usr/local/pgsql/9.3/data/pg_hba.conf] [Enter]

Before Change

```
...
# TYPE  DATABASE        USER            ADDRESS                 METHOD

# "local" is for Unix domain socket connections only
local   all             all                                     peer
# IPv4 local connections:
host    all             all             127.0.0.1/32            ident
# IPv6 local connections:
host    all             all             ::1/128                 ident
# Allow replication connections from localhost, by a user with the
# replication privilege.
#local   replication     postgres                                peer
#host    replication     postgres        127.0.0.1/32            ident
#host    replication     postgres        ::1/128                 ident
```

After Change

```
…
```

```
# TYPE  DATABASE        USER            ADDRESS                 METHOD

# "local" is for Unix domain socket connections only
#local   all             all                                     peer
# IPv4 local connections:
#host    all             all             127.0.0.1/32            ident
# IPv6 local connections:
#host    all             all             ::1/128                 ident
# Allow replication connections from localhost, by a user with the
# replication privilege.
#local   replication     postgres                                peer
#host    replication     postgres        127.0.0.1/32            ident
#host    replication     postgres        ::1/128                 ident

local   all             postgres                                peer
local   all             all                                     trust
host    all             all             CIDR of EC              trust
host    all             all             127.0.0.1/32            trust
```

Change the configuration as follows (modify the highlighted section).

[vi /usr/lib/systemd/system/postgresql-9.3.service] [Enter]

```
…
# Location of database directory
Environment=PGDATA=/usr/local/pgsql/9.3/data/
…
```

4.1.6.5. Rebooting the Data Base

<Execution Host: DB>

Execute the following command as a postgres user.

[systemctl daemon-reload] [Enter]

[systemctl start postgresql-9.3] [Enter]

4.1.7. Installation and Configuration of DHCP

4.1.7.1. Installation

<Execution Host: ACT/SBY>

Execute the following command to install DHCP.

[cd ~/setup/ec_main/installer/dhcp.v4.2.5] [Enter]

[rpm -ihv dhcp-4.2.5-42.el7.centos.x86_64.rpm] [Enter]

4.1.7.2. Making of the systemctl Unit File

<Execution Host: ACT/SBY>

Execute the following command to make the systemctl unit file.

[cp -p /usr/lib/systemd/system/dhcpd.service /etc/systemd/system/] [Enter]

[vi /etc/systemd/system/dhcpd.service] [Enter] (Add the highlighted section.)

```
…
Type=notify
ExecStart=/usr/sbin/dhcpd -f -cf /etc/dhcp/dhcpd.conf -user dhcpd -group dhcpd
--no-pid ”Interface Name”
…
```

Add the following lines to the DHCP configuration file.

[vi /etc/sysconfig/dhcpd] [Enter] (Add the highlighted section.)

```
…
DHCPDARGS=”Interface Name”
```

[vi /etc/dhcp/dhcpd.conf.template.NCS5001] [Enter] (Add the highlighted section.)

```
# DHCP server general settings
subnet $$MANAGEMENTNETWORKADDRESS$$ netmask $$MANAGEMENTSUBNETMASK$$ {
  range $$MANAGEMENTRANGESTART$$ $$MANAGEMENTRANGEEND$$;
  option subnet-mask $$MANAGEMENTSUBNETMASK$$;
  default-lease-time 600;
  deny unknown-clients;
  max-lease-time 7200;
}
############
# host
############
# NCS5001
group {
  filename "$$INITIALCONFIG$$";
  host ncs5k {
    hardware ethernet $$MACADDRESS$$;
    fixed-address $$MANAGEMENTADDRESS$$;
  }
}
```

[vi /etc/dhcp/dhcpd.conf.template.QFX5100] [Enter] (Add the highlighted section.)

```
# For QFX zero touch provisioning
option space QFX;
```

```
option QFX.config-file-name code 1 = text;
option QFX.image-file-type code 2 = text;
option QFX.transfer-mode code 3 = text;
option QFX.alt-image-file-name code 4= text;
option QFX-encapsulation code 43 = encapsulate QFX;

# DHCP server general settings
subnet                  $$MANAGEMENTNETWORKADDRESS$$                  netmask
$$MANAGEMENTSUBNETMASK$$ {
  range $$MANAGEMENTRANGESTART$$ $$MANAGEMENTRANGEEND$$;
  option subnet-mask $$MANAGEMENTSUBNETMASK$$;
  default-lease-time 600;
  deny unknown-clients;
  max-lease-time 7200;
}
###########
# host
###########
# QFX5100
host QFX5100 {
  hardware ethernet $$MACADDRESS$$;
  fixed-address $$MANAGEMENTADDRESS$$;
  option tftp-server-name "$$TFTPHOSTNAME$$";
  option host-name "$$HOSTNAME$$";
  option log-servers $$LOGSERVERADDRESS$$;
  option QFX.transfer-mode "tftp";
  option QFX.config-file-name "$$INITIALCONFIG$$";
}
```

[vi /etc/dhcp/dhcpd.conf.template.QFX5200] [Enter] (Add the highlighted section.)

```
# For QFX zero touch provisioning
option space QFX;
option QFX.config-file-name code 1 = text;
option QFX.image-file-type code 2 = text;
option QFX.transfer-mode code 3 = text;
option QFX.alt-image-file-name code 4= text;
option QFX-encapsulation code 43 = encapsulate QFX;

# DHCP server general settings
subnet                  $$MANAGEMENTNETWORKADDRESS$$                  netmask
$$MANAGEMENTSUBNETMASK$$ {
  range $$MANAGEMENTRANGESTART$$ $$MANAGEMENTRANGEEND$$;
  option subnet-mask $$MANAGEMENTSUBNETMASK$$;
  default-lease-time 600;
  deny unknown-clients;
  max-lease-time 7200;
}
###########
# host
###########
# QFX5200
host QFX5200-3 {
  hardware ethernet $$MACADDRESS$$;
  fixed-address $$MANAGEMENTADDRESS$$;
  option tftp-server-name "$$TFTPHOSTNAME$$";
  option host-name "$$HOSTNAME$$";
  option log-servers $$LOGSERVERADDRESS$$;
```

```
    option QFX.transfer-mode "http";
    option QFX.config-file-name "$$INITIALCONFIG$$";
}
```

4.1.8. Installation and Configuration of tftpd

4.1.8.1. Installation of tftpd

<Execution Host: ACT/SBY>

Execute the following command to install tftpd.

[cd ~/setup/ec_main/installer/tftp.v5.2] [Enter]

[rpm -ihv xinetd-2.3.15-12.el7.x86_64.rpm] [Enter]

[rpm -ihv tftp-5.2-12.el7.x86_64.rpm] [Enter]

[rpm -ihv tftp-server-5.2-12.el7.x86_64.rpm] [Enter]

4.1.8.2. Configuration of tftpd

<Execution Host: ACT/SBY>

Change the tftp configuration file (/etc/xinet.d/tftp) as follows (the highlighted section).

[vi /etc/xinetd.d/tftp] [Enter]

Before Change

```
...
  disabled = yes
...
```

After Change

```
...
  disabled = no
...
```

Launch xinted.

[systemctl start xinetd] [Enter]

4.1.9. Installation of httpd

4.1.9.1. Installation of httpd

<Execution Host: ACT/SBY>

Execute the following command to install httpd.

[cd ~/setup/ec_main/installer/httpd.v2.4.6] [Enter]

[rpm -ihv apr-1.4.8-3.el7.x86_64.rpm] [Enter]

[rpm -ihv apr-util-1.5.2-6.el7.x86_64.rpm] [Enter]

[rpm -ihv mailcap-2.1.41-2.el7.noarch.rpm] [Enter]

[rpm -ihv httpd-tools-2.4.6-40.el7.centos.4.x86_64.rpm] [Enter]

[rpm -ihv httpd-2.4.6-40.el7.centos.4.x86_64.rpm] [Enter]

[rpm -ihv httpd-manual-2.4.6-40.el7.centos.4.noarch.rpm] [Enter]

[rpm -ihv mod_ssl-2.4.6-40.el7.centos.4.x86_64.rpm] [Enter]

Launch httpd.

[systemctl start httpd] [Enter]

[systemctl enable httpd] [Enter]

4.1.10. Installation and Configuration of Pacemaker

4.1.10.1. Installation of Pacemaker

<Execution Host: ACT/SBY>

Execute the following command to launch the installer and install.

[cd ~/setup/ec_main/installer/pacemaker.v1.1.14-1.1/] [Enter]

[sh pacemaker_install.sh] [Enter]

Note: Although you will be warned that there is no key with the message "Warning: pssh-2.3.1-5.el7.noarch.rpm: header V3 RSA/SHA256 Signature, Key ID 352c64e5: NOKEY" displayed in the screen during the installation, the installation process keeps going on and you can ignore it.

4.1.10.2. Confirmation of Installation of Pacemaker

<Execution Host: ACT/SBY>

Execute the following command to confirm the version of Corosync.

[corosync -version] [Enter]

If the installation has been completed successfully, the following message will be displayed.

Corosync Cluster Engine, version '2.3.5'

Copyright (c) 2006-2009 Red Hat, Inc.

Execute the following command to confirm the version of pcs.

[pcs --version] [Enter]

If the installation has been completed successfully, the following message will be displayed.

0.9.143

Execute the following command to confirm the version of Pacemaker.

[crmadmin --version] [Enter]

If the installation has been completed successfully, the following message will be displayed.

Pacemaker 1.1.14-1.el7

Written by Andrew Beekhof

Execute the following command to confirm the version of crm.

[crm --version] [Enter]

If the installation has been completed successfully, the following message will be displayed.

2.1.5-1.el7 (Build unknown)

Execute the following command to confirm the resource agent which is going to be used is actually installed.

[ls /lib/ocf/resource.d/pacemaker/] [Enter]

If the installation has been completed successfully, the following message will be displayed.

diskd

Execute the following command to confirm the resource agent which is going to be used is actually installed.

[ls /lib/ocf/resource.d/heartbeat/] [Enter]

If the installation has been completed successfully, the following message will be displayed.

VIPcheck、IPaddr2

4.1.10.3. Configuration of the Host

<Execution Host: ACT/SBY>

Register the node's hosts used in the active system and the stand-by system.

Perform this task both at the active node and the stand-by node.

Execute the following command to open the hosts file.

[vi /etc/hosts] [Enter]

Add the following lines to the end of the file.

(IP Address for the Stand-by Interconnection) (Stand-by Host Name)

(IP Address for the Active Interconnecction) (Active Host Name)

Then save it as:

[esc][:wq] [Enter]

Confirm the configuration of the hosts

[ping "Stand-by Host Name"] [Enter]

PING "Stand-by Host Name" (IP address for the stand-by interconnection) 56(84) bytes of data.

64 bytes from "Stand-by Host Name" (IP address for the stand-by interconnection): icmp_seq=1 ttl=64 time=0.166 ms

[ping "Active Host Name"] [Enter]

PING "Active Host Name" (IP address for the active interconnection) 56(84) bytes of data.

64 bytes from "Active Host Name" (IP address for the active interconnection): icmp_seq=1 ttl=64 time=0.166 ms

In case the IP address and the Host Name are not displayed like this, review the configuration at /etc/hosts.

4.1.10.4. Configuration of the password

<Execution Host: ACT/SBY>

After rebooting the system, set the password for the "hacluster" user who will be used in the certification of inter-server communication via corosync. All you have to do is just change the password since the user must have been automatically created at the time of the package

installation. The passwords should be identical within all the servers which compose a same cluster.

This task should be performed both at the active and the stand-by nodes.

Execute the following command to change the password.

[passwd hacluster] [Enter]

When the following prompt is displayed after the command, enter the new password.

Changing password for user hacluster.

New password:

[(New Password)] [Enter]

After pressing the [Enter] key, you will be prompted to enter the same password again for the confirmation.

Retype new password:

Enter the same password.

[(New Password] [Enter]

If the entered password is exactly the same as the one entered before, the following message will be displayed and the password change is successfully completed.

passwd: all authentication tokens updated successfully.

4.1.10.5. Configuration of pscd Service

<Execution Host: ACT/SBY>

Launch and enable the pcsd service. Being independent of pacemaker or corosync, pcsd is a service required to be running in order to use the pcs commands which is used to configure clusters.

This task must be performed both at the active and the stand-by nodes.

Execute the following command to enable the pscd service.

[systemctl start pcsd] [Enter]

[systemctl enable pcsd] [Enter]

The following message will be displayed after the enablement.

Created symlink from /etc/systemd/system/multi-user.target.wants/pcsd.service to /usr/lib/systemd/system/pcsd.service.

4.1.10.6. Confirmation of the pscd Service

<Execution Host: ACT/SBY>

Execute the following command to confirm the status of pcsd service.

This task must be performed both at the active and the stand-by nodes.

[systemctl status pcsd] [Enter]

If the service has been successfully started, the following message will be displayed in the screen.

```
   Loaded: loaded (/usr/lib/systemd/system/pcsd.service; disabled; vendor preset: disabled)
   Active: active (running) since *** 2016-**-** **:**:** UTC; **s ago
 Main PID: **** (pcsd)
   CGroup: /system.slice/pcsd.service
           ├**** /bin/sh /usr/lib/pcsd/pcsd start
           ├**** /bin/bash -c ulimit -S -c 0 >/dev/null 2>&1 ; /usr/bin/ruby -I/usr/lib/...
           └**** /usr/bin/ruby -I/usr/lib/pcsd /usr/lib/pcsd/ssl.rb
```

4.1.10.7. Node Certification

<Execution Host: ACT/SBY>

Execute the following command to certificate the nodes between each other by use of "pcs cluster auth" command.

By doing this, the inter-server communication via corosync will be enabled.

This task must be performed both at the active and the stand-by nodes.

[pcs cluster auth (Active Node Name) (Stand-by Node Name) -u hacluster -p (password for hacluster) --force] [Enter]

If it is certificated successfully, the following message will be displayed in the screen.

(Stand-by Host Name or Active Host Name): Authorized

(Stand-by Host Name or Active Host Name): Authorized

4.1.10.8. Making of Initial Cluster

<Execution Host: ACT>

Execute the following command to make the initial cluster by use of "pcs cluster setup" command.

This task must be performed on the Active nodes only.

[pcs cluster setup --name (Cluster Name to be set) (Active Node Name) (Stand-by Node Name)]

If the cluster is created successfully, the following message will be displayed in the screen.

Shutting down pacemaker/corosync services...

Redirecting to /bin/systemctl stop pacemaker.service

Redirecting to /bin/systemctl stop corosync.service

Killing any remaining services...

Removing all cluster configuration files...

(Active Node Name): Succeeded

(Stand-by Node Name): Succeeded

Synchronizing pcsd certificates on nodes (Active Node Name), (Stand-by Node Name)...
(Active Node Name): Succeeded
(Stand-by Node Name): Succeeded
Restarting pcsd on the nodes in order to reload the certificates...
(Active Node Name): Succeeded
(Stand-by Node Name): Succeeded

4.1.10.9. Synchronization between Nodes

<Execution Host: ACT>

Execute the following command to start synchronization between nodes and establish as a cluster.

This task must be performed on the Active nodes only.

[pcs cluster start --all] [Enter]

If the cluster is started successfully, the following message will be displayed in the screen.

(Active Node Name): Starting Cluster...
(Stand-by Node Name): Starting Cluster...

4.1.10.10. Confirmation of the Inter-node Communication Status

<Execution Host: ACT/SBY>

Execute the following command to confirm the status of inter-node communication by use of "corosync-cfgtool -s" command.

This task must be performed both at the active and the stand-by nodes.

[corosync-cfgtool -s] [Enter]

If the cluster is started successfully, the following message will be displayed in the screen.

When the "status" is "active" and "no faults", the communication is working properly.

Printing ring status.
Local node ID (1 or 0)
RING ID 0
id = (IP address of the Active or Stand-by system)
status = ring 0 active with no faults

4.1.10.11. Confirmation of Cluster Status

<Execution Host: ACT or SBY>

Execute the following command to confirm the status of the cluster by use of "pcs status" command.

This task can be performed at either the Active or the Stand-by system.

[pcs status] [Enter]

After entering the command, the cluster status will be displayed in the screen. A warning message about STONITH, which looks like below will be also displayed on top of the screen.

Cluster name: (Cluster Name having been set)

WARNING: no stonith devices and stonith-enabled is not false

Last updated: Thu Oct 13 02:06:57 2016 Last change: Thu Oct 13 02:06:49 2016

Since STONITH is not available in the environment this time, set "false" for the enablement of STONITH.

[pcs property set stonith-enabled=false] [Enter]

Confirm the cluster status for one last time.

[pcs status] [Enter]

After entering the command, the cluster status will be displayed in the screen. If it is configured properly, the screen message will be looked like below.

Cluster name: eccluster

Last updated: WDW MMM DD HH:MM:DD YYYY Last change: WDW MMM DD HH:MM:DD YYYY by root via cibadmin on (Active Node Name)

Stack: corosync

Current DC: (Stand-by Node Name) (version 1.1.14-1.el7-70404b0) - partition with quorum

2 nodes and 0 resources configured

Online: [(Active Node Name) (Stand-by Node Name)]

Full list of resources:

PCSD Status:

(Active Node Name): Online

(Stand-by Node Name): Online

Daemon Status:

corosync: active/disabled

pacemaker: active/disabled

pcsd: active/enabled

4.1.10.12. Enablement of pacemaker/corosync Services

<Execution Host: ACT/SBY>

Execute the following command to enable corosync and pacemaker services for enabling the auto start of both services after the reboot.

This task must be performed both at the active and the stand-by nodes.

[systemctl enable pacemaker] [Enter]

[systemctl enable corosync] [Enter]

4.2. Installation of EC Main Module

Hereafter, the written expression "$EC_HOME" represents any location path specified by the user.

In the following example, "/usr" is specified for the installation directory.

[export EC_HOME=/usr] [Enter]

4.2.1. Locating the Library

<Execution Host: ACT/SBY>

Execute the following command to locate the library file which is in the included accessories.

[mkdir -p $EC_HOME/ec_main/lib] [Enter]

[cp ~/setup/ec_main/lib/* $EC_HOME/ec_main/lib/] [Enter]

4.2.2. Locating the Configuration File

<Execution Host: ACT/SBY>

Execute the following command to locate the configuration file which is in the included accessories.

[mkdir -p $EC_HOME/ec_main/conf] [Enter]

[cp ~/setup/ec_main/conf/* $EC_HOME/ec_main/conf/] [Enter]

Change the EC Main Module configuration file by use of the following command.

[vi $EC_HOME/ec_main/conf/ec_main.conf] [Enter]

*Please modify configuration values based on your installed server.

Please refer to “EC_Configuration Specifications.xlsx” for the details of the change.

Change the Hibernate configuration file by use of the following command.

[vi $EC_HOME/ec_main/conf/hibernate.cfg.xml] [Enter] (Change the highlighted section.)

```
...
<property name="connection.url">jdbc:postgresql://「”Destination URL (IP address xxx.xxx.xxx.xxx):(Port Number XXXX)”/msf_ec</property>
...
```

Change the log4j configuration file by use of the following command.

[mkdir -p ”Log Output Location”] [Enter]

[vi $EC_HOME/ec_main/conf/log4j2.xml] [Enter] (Change the highlighted section.)

```
...
<Properties>
    <Property name="log-path">”Log Output Location”</Property>
</Properties>
...
```

4.2.3. Locating the Script

<Execution Host: ACT/SBY>

Execute the following command to locate the script file in the included accessories.

[mkdir -p $EC_HOME/ec_main/bin] [Enter]

[cp ~/setup/ec_main/bin/* $EC_HOME/ec_main/bin/] [Enter]

[chmod 755 $EC_HOME/ec_main/bin/*] [Enter]

[cd $EC_HOME/ec_main/bin/] [Enter]

[ln -s boot.sh boot_fail.sh] [Enter]

[ln -s boot.sh boot_success.sh] [Enter]

Add the PATH environment variable to the following file.

[vi /etc/profile] [Enter]

```
...
export PATH=$PATH:$EC_HOME/ec_main/bin
```

Make the environment variable read by use of the following command.

[source /etc/profile] [Enter]

Change the environment definition by use of the following command.

[vi $EC_HOME/ec_main/bin/ec_ctl.sh] [Enter] (Change the highlighted section.)

```
...
## Environment Definition
HOST="xxx.xxx.xxx.xxx"
PORT="yyyyy"
...
```

[vi $EC_HOME/ec_main/bin/boot.sh] [Enter] (Change the highlighted section.)

```
...
## Environment Definition
HOST="xxx.xxx.xxx.xxx"
PORT="yyyyy"
...
```

[vi $EC_HOME/ec_main/bin/linkup.sh] [Enter] (Change the highlighted section.)

```
...
## Environment Definition
HOST="xxx.xxx.xxx.xxx"
PORT="yyyyy"
...
```

[vi $EC_HOME/ec_main/bin/linkdown.sh] [Enter] (Change the highlighted section.)

```
...
## Environment Definition
HOST="xxx.xxx.xxx.xxx"
PORT="yyyyy"
...
```

The “xxx.xxx.xxx.xxx” above must be replaced with the VIP address of the destination server for the installation.
The “yyyyy” above must be replaced with the same value as the rest_server_port of $EC_HOME/ec_main/conf/ec_main.conf.

4.2.4. Making of Schema

<Execution Host: DB>

Make the schema by use of the following command.

[createdb msf_ec] [Enter]

Make a table in the schema by use of the following command.

[psql msf_ec < ~/setup/ec_main/database/create_table.sql] [Enter]

4.3. Registration and Configuration of the Resource Agent

4.3.1. Locating the Resource Agent

<Execution Host: ACT/SBY>

Copy the resource agent of EC to the default resource agent folder.

[mkdir -p $EC_HOME/ec_main/RA] [Enter]

[cp ~/setup/ec_main/RA/* $EC_HOME/ec_main/RA/] [Enter]

[cp $EC_HOME/ec_main/RA/ec /lib/ocf/resource.d/heartbeat/] [Enter]

[cp $EC_HOME/ec_main/RA/snmptrapd /lib/ocf/resource.d/heartbeat/] [Enter]

Then grant executional privilege to the resource agent of EC copied above.

[cd /lib/ocf/resource.d/heartbeat/] [Enter]

[chmod 755 ec] [Enter]

[chmod 755 snmptrapd] [Enter]

4.3.2. Making of crm File

<Execution Host: ACT>

Edit the ra_config.xlsx file, which has the configuration of resource agent in the included accessories, for updating the necessary information, then convert it to a csv file and locate in the home folder of the active system.

Execute the following command at the folder where you locate the csv file to convert it into a crm file that is used for registering it to the resource agent.

[pm_crmgen -o $EC_HOME/ec_main/conf/crm_conf.crm (located csv file name).csv] [Enter]

If the conversion completes successfully, nothing will be displayed in the screen but in case anything went wrong with the csv file, the location to be amended would be displayed.

4.3.3. Injection of crm File

<Execution Host: ACT>

With the following commend, register the resource agent.

[crm configure load update $EC_HOME/ec_main/conf/crm_conf.crm] [Enter]

If the injection completes successfully, nothing will be displayed in the screen. So you need to check the result by following the next instruction. (*Although a message which says the configured number of seconds for VIPcheck is shorter than the default, you can ignore it and keep on going.)

If there is any critical error in the configuration, a warning with the location of the error will be displayed and you will be prompted to answer with Y/N whether you want to keep the injection going or not. When this warning is displayed, there must be errors in the configuration, and you should answer it by entering [N] [Enter].

4.3.4. Confirmation of the Result of Injection

<Execution Host: ACT or SBY>

Confirm the operational status of resource agent with the following command.

[pcs status] [Enter]

If it injected successfully, a message will be displayed as follows.

Cluster name: eccluster
Last updated: WDW MMM DD HH:MM:SS YYYY Last change: WDW MMM DD HH:MM:SS YYYY by root via cibadmin on (Active Node Name or Stand-by Node Name)
Stack: corosync
Current DC: (Active Node Name or Stand-by Node Name) (version 1.1.14-1.el7-70404b0) - partition with quorum
2 nodes and 5 resources configured

Online: [(Active Node Name) (Stand-by Node Name)]

Full list of resources:

Resource Group: grpEC
vipCheck (ocf::heartbeat:VIPcheck): Started (Active Node Name))
prmEC (ocf::heartbeat:ec): Started (Active Node Name)
prmIP (ocf::heartbeat:IPaddr2): Started (Active Node Name)
Clone Set: clnDiskd [prmDiskd]
Started: [(Active Node Name) (Stand-by Node Name)]

PCSD Status:
(Active Node Name): Online
(Stand-by Node Name): Online

Daemon Status:
corosync: active/enabled
pacemaker: active/enabled
pcsd: active/enabled