FUJITSU

FUJITSU Software
Symfoware Server V12.0.0

Installation and Setup Guide
for Server

Linux

Preface

Purpose of this document

The Symfoware Server database system extends the PostgreSQL features and runs on the Linux platform.

This document describes how to install and setup "Symfoware Server".

Intended readers

This document is intended for those who install and operate Symfoware Server.

Readers of this document are assumed to have general knowledge of:

- PostgreSQL

- SQL

- Linux

Structure of this document

This document is structured as follows:

- ii -

```
First Edition: November, 2013
```

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Contents

Chapter 1 Overview of Installation

This chapter provides an overview of Symfoware Server installation.

1.1 Installation Types

The following three installation types are available for Symfoware Server:

- Initial installation

- Reinstallation

- Multi-version installation

1.1.1 Initial Installation

In initial installation, Symfoware Server is installed for the first time.

Refer to "Chapter 3 Initial Installation" for details.

1.1.2 Reinstallation

Perform reinstallation to repair installed program files that have become unusable for any reason.

Refer to "Chapter 5 Reinstallation" for details.

1.1.3 Multi-Version Installation

Perform multi-version installation when installing a version different from the one currently running on the same OS.

Refer to "Appendix B Multi-Version Installation" for details.

1.2 Installation Procedure

The following installation procedures are available for Symfoware Server:

- Installation in interactive mode

- Installation in silent mode

Select the installation procedure that corresponds to your environment.

1.2.1 Installation in Interactive Mode

Interactive mode enables installation to be performed while the required information is entered interactively.

In interactive mode installation, the Symfoware Server installer automatically determines the installation state of Symfoware Server. Install Symfoware Server using one of the following installation types, in accordance with the installation state:

- Initial installation

- Reinstallation

- Multi-version installation

1.2.2 Installation in Silent Mode

Silent mode enables installation to be performed without the need to enter any information interactively.

Initial installations and multi-version installations can be performed in silent mode.

1.3 Uninstallation

Uninstallation removes the system files of the installed Symfoware Server.

Refer to "Chapter 6 Uninstallation" for details.

Chapter 2 Operating Environment

This chapter describes the operating environment required to use Symfoware Server.

See

Refer to "Operating Environment" in the Symfoware Server Installation and Setup Guide for Client when installing the Symfoware Server client feature at the same time.

2.1 Required Operating System

One of the operating systems shown in the table below is required to use Symfoware Server.

Table 2.1 Operating systems

Operating system name	64-bit product	32-bit product
- RHEL5 (Intel 64) - RHEL6 (Intel 64)	Y	Y
- RHEL5 (x86) - RHEL6 (x86)	N	Y

Y: Can be used

N: Cannot be used

Note

The SELinux (Security-Enhanced Linux) feature is not supported.

Information

Select the x86_64 architecture package when installing the 64-bit product.

Select the i386 to i686 architecture packages when installing the 32-bit product.

- The following packages are required for operations on RHEL5 (x86).

Package name	Remarks
alsa-lib	-
audit-libs	-
glibc	-
libgcc	-
libstdc++	-
libtermcap	-
libxml2	Required when using XPath queries and the XSLT feature
libxslt	Required when using XPath queries and the XSLT feature
pam	Required when using PAM authentication
python	Required when using PL/Python
tcl	Required when using PL/Tcl

Package name	Remarks
zlib	-

- The following packages are required for operations on RHEL5(Intel64)

Package name	Remarks
alsa-lib	-
audit-libs	-
glibc	-
libgcc	-
libstdc++	-
libtermcap	-
libxml2	Required when using XPath queries and the XSLT feature
libxslt	Required when using XPath queries and the XSLT feature
pam	Required when using PAM authentication
python	Required when using PL/Python
tcl	Required when using PL/Tcl
zlib	-

- The following packages are required for operations on RHEL6 (x86).

Package name	Remarks
alsa-lib	-
audit-libs	-
glibc	-
libgcc	-
libstdc++	-
libtool-ltdl	Required when using ODBC drivers
ncurses-libs	-
nss-softokn-freebl	-
pam	Required when using PAM authentication
python-libs	Required when using PL/Python
tcl	Required when using PL/Tcl
xz-libs	-
zlib	-

- The following packages are required for operations on RHEL6 (Intel64).

Package name	Remarks
alsa-lib	-
audit-libs	-
glibc	-
libgcc	-
libstdc++	-

Package name	Remarks
libtool-ltdl	Required when using ODBC drivers
ncurses-libs	-
nss-softokn-freebl	-
pam	Required when using PAM authentication
python-libs	Required when using PL/Python
tcl	Required when using PL/Tcl
xz-libs	-
zlib	-

2.2 Related Software

The following table lists the software required to use Symfoware Server.

Table 2.2 Related software

No.	Software name	Package name	Version	Remarks
1	Linkexpress Enterprise Edition	FJSVlnkexp FJSVhscnv	V5.0L14	[When using data linkage] Replication must be performed using Linkexpress Replication option. (Either product No. 1 or product No. 2 is required.)
2	Linkexpress Standard Edition			
3	Linkexpress Replication option	FJSVlnkre	V5.0L16	[When using data linkage] Replication must be performed using Linkexpress Replication option.
4	C compiler (*1)	gcc Other related packages	-	-
5	JDK or JRE	(*2)	Java SE 6/7 or later	-
6	NetCOBOL	-	(*3)	-
7	PRIMECLUSTER (*4)	(*2)	4.3A20	[Standby feature] Required when performing failover operation. Symfoware Server must be installed following the initial setup of the cluster system.

*1: Only operations using the C compiler provided with the operating system are guaranteed.

*2: The package name varies across products.

See

Refer to the installation guide of each product for information on package names.

*3: NetCOBOL is available in the following editions:

- NetCOBOL Standard Edition V7.0L10 or later

*4: Compatible PRIMECLUSTER products are as follows:

- PRIMECLUSTER Enterprise Edition

- PRIMECLUSTER HA Server

The following table lists servers that can be connected to the Symfoware Server client feature.

Table 2.3 Connectable servers

OS	Product name
Linux	Symfoware Server Standard Edition (Open Interface) V12.0.0 or later

2.3 Excluded Software

Symfoware Server cannot be used if any of the following software is already installed on the same machine.

Software name	Package name	Version	Remarks
Symfoware Server Enterprise Extended Edition	All packages (*1)	V11.1.0 or earlier	Simultaneous installation is not possible on cluster systems.
Symfoware Server Enterprise Edition	All packages (*1)	V11.1.0 or earlier	
Symfoware Server Standard Edition	All packages (*1)	V11.1.0 or earlier	
Symfoware Server Standard Edition (Native Interface)	All packages (*1)	V12.0.0	

*1: The package name varies across products.

See
....
Refer to the installation guide of each product for information on package names.
....

2.4 Required Patches

There are no required patches.

2.5 Hardware Environment

The following hardware is required to use Symfoware Server.

Memory

At least 512 MB of memory is required.

Hardware

If performing failover operation

The hardware listed in the PRIMECLUSTER Installation and Administration Guide is required.

2.6 Disk Space Required for Installation

The following table shows the disk space requirements for new installation of Symfoware Server. If necessary, increase the size of the file system.

Table 2.4 Disk space required for installation

Directory	Required disk space (Unit: MB)
/etc	1
/var	1
Installation destination of the server	210
Installation destination of the client (32-bit)	65
Installation destination of the client (64-bit)	65

2.7 Supported System Environment

This section describes the supported system environment.

2.7.1 TCP/IP Protocol

Symfoware Server supports version 4 and 6 (IPv4 and IPv6) of TCP/IP protocols.

Note

Do not use link-local addresses if TCP/IP protocol version 6 addresses are used.

2.7.2 File System

All file systems with a POSIX-compliant interface are supported.

However, for stable system operation, the disk where the database is deployed must use a highly reliable file system. Consider this aspect when selecting the file system to be used.

The recommended file system is "ext3".

Note

In terms of software reliability, ext3 is preferable to ext4 on RHEL 6.4 and earlier.

Chapter 3 Initial Installation

This chapter describes the procedures for the initial installation of Symfoware Server.

Note that the product can be installed in any directory. The default folder is as follows:

32-bit products

```
/opt/symfoserver32
```

64-bit products

```
/opt/symfoserver64
```

Note

If performing replication using the Linkexpress Replication option, install the relevant product from the "Linkexpress" or "Linkexpress Replication option" DVD.
Refer to the relevant Software Release Notes for information on how to install a product.

Information

Refer to "Appendix D Checking the Version of the Installed Product" for information on how to check the versions of installed products.

3.1 Installation in Interactive Mode

Install according to the following procedure:

1. Change to the superuser.

2. Mount the DVD drive.

3. Install.

Note

- Configure the LANG environment variable in the console window where the silent.sh command is executed in accordance with the display environment. If the LANG environment variable is not set correctly, the displayed characters may appear garbled.

- Do not enter the following halfwidth characters, otherwise silent.sh may not work properly:
  " # $ & ' ( ) ^ ~ \ | @ ` [ ] { } ; : < > tab

1) Change to the superuser

Run the following command to switch to the superuser on the system.

```
$ su -
Password:******
```

2) Mount the DVD drive

Insert the server program DVD in the DVD drive, and run the command given below.

Note

If the automatic mount daemon (autofs) is used to mount DVDs automatically, the installer fails to start because "noexec" is set in the mount options. In this case, use the mount command to remount the DVD correctly, and then run the installation. Note that the mount options of a mounted DVD can be checked by executing the mount command without any arguments.

Example

```
# mount -t iso9660 -r -o loop /dev/dvd /media/dvd
```

3) Install

Follow the installation procedure described below.

The example illustrates initial installation of Symfoware Server Standard Edition 64-bit V12.0.0.

1. Start installation

   Run the install.sh command to start installation.

   Example

   ```
   # LANG=en_US.UTF-8;export LANG
   # cd /media/dvd
   # ./install.sh
   ```

2. Select the product for installation

   The list of products to be installed is shown below.

   At least one server product must be selected.

   Steps 4 to 11 are repeated if multiple products are selected.

   Note that no WebAdmin setup information is displayed or processed during the client installation.

   ```
   The following products can be installed:
   1: Symfoware Server Standard Edition 64bit V12.0.0
   2: Symfoware Server Client 32bit V12.0.0
   3: Symfoware Server Client 64bit V12.0.0

   Select the product to be installed.
   To select multiple products, separate using commas (,). (Example: 1,2)
   [1,2,3,all,q](The default value is all): 1
   ```

Information

To create a 32-bit application in a 64-bit environment, Symfoware Server Client 32-bit is required. It is therefore recommended that you use the default value "all" to install all products.

3. Confirm the product for installation

   The window for checking which product(s) will be installed is displayed as follows:

   ```
   Selected product
     Symfoware Server Standard Edition 64bit V12.0.0

   Do you want to install the above product?
   y: Proceed to the next step
   n: Select the product again
   q: Quit without installing
   [y,n,q](The default value is y): y
   ```

4. Check the product name and installation environment

The message for the product name and installation environment check is displayed as follows:

```
===============================================================================
Symfoware Server Standard Edition 64bit V12.0.0
===============================================================================


Installation environment check will start.
Installation environment check has completed.
```

5. Display the start message

The start message is displayed as follows:

```
Initial installation will start.
```

6. Change the installation information

The window for checking the installation information is displayed as follows:

```
Installation directory information
  Installation directory: /opt/symfoserver64

WebAdmin setup information
  WebAdmin setup: Execute
  Web server port number: 26515
  WebAdmin internal port number: 26516

Start installation using the above information?
y: Start the installation
c: Change the information
q: Quit without installing

[y,c,q](The default value is y): y
```

Proceed to "10. Display the installation status" when "y: Start the installation" is selected.

The window below is displayed when "c: Change the information" is selected.

7. Enter the installation destination

The window to enter the installation destination is displayed as follows:

```
Specify the installation directory.
[directory name, q](The default value is /opt/symfoserver64):
```

8. Enter the WebAdmin setup information

The window to enter the WebAdmin setup information is displayed as follows:

```
Do you want to execute WebAdmin setup?
y: Execute
n: Do not execute
[y,n,q](The default value is y):

Specify the Web server port number.
Web server port number [1024-32767,q](The default value is 26515):

Specify the WebAdmin internal port number.
WebAdmin internal port number [1024-32767,q](The default value is 26516):
```

If you have not set up WebAdmin, refer to "Appendix C Setting Up and Removing WebAdmin" for details.

9. Confirm the installation information

The installation information is displayed as shown below. The actual window will display the information that has been entered and selected.

Enter "y" to start installation using the displayed installation information.

```
Installation directory information
  Installation directory: /opt/symfoserver64

WebAdmin setup information
  WebAdmin setup: Execute
  Web server port number: 26515
  WebAdmin internal port number: 26516



Start installation using the above information?
y: Start the installation
c: Change the information
q: Quit without installing
[y,c,q](The default value is y): y
```

10. Display the installation status

The installation status is displayed as follows:

```
Starting installation.
Installation is complete.

Starting setup.      (*1)
Setup is complete.   (*1)
```

*1: Displayed only when "Execute" is selected for WebAdmin setup.

Even if WebAdmin setup fails, the process will still continue.

If the following message is displayed, manually execute WebAdmin setup after installation is completed.

Refer to "C.1 Setting Up WebAdmin" for information on the WebAdmin setup procedure.

```
Starting setup.

ERROR: WebAdmin setup failed.
```

11. Display and check completion messages

When installation completes, a message is displayed showing the installation results.

When the process completes successfully

The following message is displayed when installation completes successfully.

```
Initial installation has completed successfully.
```

When the process ends in an error

The following message is displayed when an error occurs during installation.

```
error: ./SERVER/packages/r60x64/FJSVsymdb12006-12006E.6-2.x86_64.rpm: not an rpm package (or
package manifest):

ERROR: An error occurred in FJSVsymdb12006 installation.


Initial installation has terminated abnormally.
```

📖 Note

· ·

If an error occurs during installation, take the following corrective actions:

1. Eliminate the cause by referring to the error message.

2. Execute the install.sh command again.

· ·

3.2 Installation in Silent Mode

Install according to the following procedure:

1. Create an installation parameters CSV file.

2. Change to the superuser.

3. Mount the DVD drive.

4. Run the installation.

🛑 **Note**

. . . .

Configure the LANG environment variable in the console window where the silent.sh command is executed in accordance with the display environment. If the LANG environment variable is not set correctly, the displayed characters may appear garbled.

. . . .

1) Create an installation parameters CSV file

Consider the features that will be required for system operations, and then create an installation parameters CSV file that uses the following specification format.

```
sectionName, parameterName, value
sectionName, parameterName, value
      :
```

Refer to "Appendix A Installation in Silent Mode" for information on installation parameters CSV files.

📖 **Information**

. . . .

The template for the installation parameters CSV file is "mountpoint/sample/sample.csv".

. . . .

2) Change to the superuser

Run the following command to switch to the superuser on the system.

```
$ su -
Password:******
```

3) Mount the DVD drive

Insert the server program DVD in the DVD drive, and run the command given below.

🛑 **Note**

. . . .

If the automatic mount daemon (autofs) is used to mount DVDs automatically, the installer fails to start because "noexec" is set in the mount options. In this case, use the mount command to remount the DVD correctly, and then run the installation. Note that the mount options of a mounted DVD can be checked by executing the mount command without any arguments.

. . . .

Example

```
# mount -t iso9660 -r -o loop /dev/dvd /media/dvd
```

4) Run the installation

Execute the silent.sh command to start installation.

The example illustrates the installation parameters CSV file saved as "inspara.csv".

Note that the installation parameters CSV file can be stored in any location. In the example below, this location is "/home/work".

Example

```
# LANG=en_US.UTF-8;export LANG
# cd /media/dvd
# ./silent.sh /home/work/inspara.csv
```

If the installer ends in an error, a message is output to the log file and return values are returned. Refer to "Appendix A Installation in Silent Mode" for details.

Chapter 4 Setup

This chapter describes the setup procedures to be performed after installation completes.

4.1 Operating Method Types and Selection

This section describes how to operate Symfoware Server.

There are two methods of managing Symfoware Server operations - select one that suits your purposes:

- Simple operation management using a web-based GUI tool (WebAdmin)

  Suitable when using frequently used basic settings and operations for operation management.

  This method allows you to perform simple daily tasks such as starting the system before beginning business, and stopping the system when business is over, using an intuitive operation.

- Advanced operation management using server commands

  When operating in a system that is automated by operation management middleware (Systemwalker Centric Manager, for example), this method allows you to use more detailed settings and operations and perform higher level operation management.

Note that it is not possible to combine WebAdmin and server commands in the following ways:

- Using WebAdmin to operate instances created with the initdb command

- Using commands to operate instances created with WebAdmin

- Using commands to recover databases backed up with WebAdmin

For instances created with WebAdmin, however, backup can be obtained with the pgx_dmpall command. Also, WebAdmin can perform recovery by using the backup obtained with the pgx_dmpall command.

The following table shows the GUI and command operations used at different phases of operation:

Operation		Operation with the GUI	Operation with commands
Setup	Creating an instance	WebAdmin	initdb command
	Changing the configuration files	WebAdmin	Direct editing of the configuration file
Start an instance		WebAdmin	pg_ctl command
Creating a database		pgAdmin	Specify with a DDL statement and define with psql and applications
Backing up the database		WebAdmin pgx_dmpall command	pgx_dmpall command
Monitoring	Database errors	WebAdmin (*1)	Messages output to the system log (*1)
	Disk space	WebAdmin (*1) (*2)	OS df command (*1)
	Connection status	pgAdmin	psql command (*3)
Database recovery		WebAdmin	pgx_rcvall command

*1: It is possible to monitor with operation management middleware (Systemwalker Centric Manager, for example).

*2: A warning is displayed when disk usage exceeds 80%

*3: Status is monitored by retrieving data from the pg_stat_activity standard statistics information view.

Refer to "Periodic Operations" and "Actions when an Error Occurs" in the Operation Guide for information on monitoring and database recovery.

....

4.2 Preparations for Setup

This section describes the preparation required before setting up Symfoware Server.

4.2.1 Creating an Instance Administrator

Decide which OS user account will be assigned the instance administrator role. You can assign it to a new user or to an existing one, but you cannot assign it to the OS superuser (root).

The following example shows an OS user account with the name "symfo" being assigned the instance administrator role.

Example

```
# useradd symfo
# passwd symfo
```

4.2.2 Preparing Directories to Deploy Resources

Prepare the directories required when creating instances.

Considerations when deploying resources

Consider the following when deploying the data storage destination and backup data storage destination:

- Deploy the data storage destination to a disk other than the system disk.

- Deploy the backup data storage destination to a disk other than the data storage destination, to take into account disk failures.

- The backup data storage destination requires at least double the capacity of the data storage destination, so deploy it to the disk with the most space available.

- If the transaction log storage destination and the data storage destination are deployed to different locations, then ensure that it is deployed to a disk other than that of the backup data storage destination.
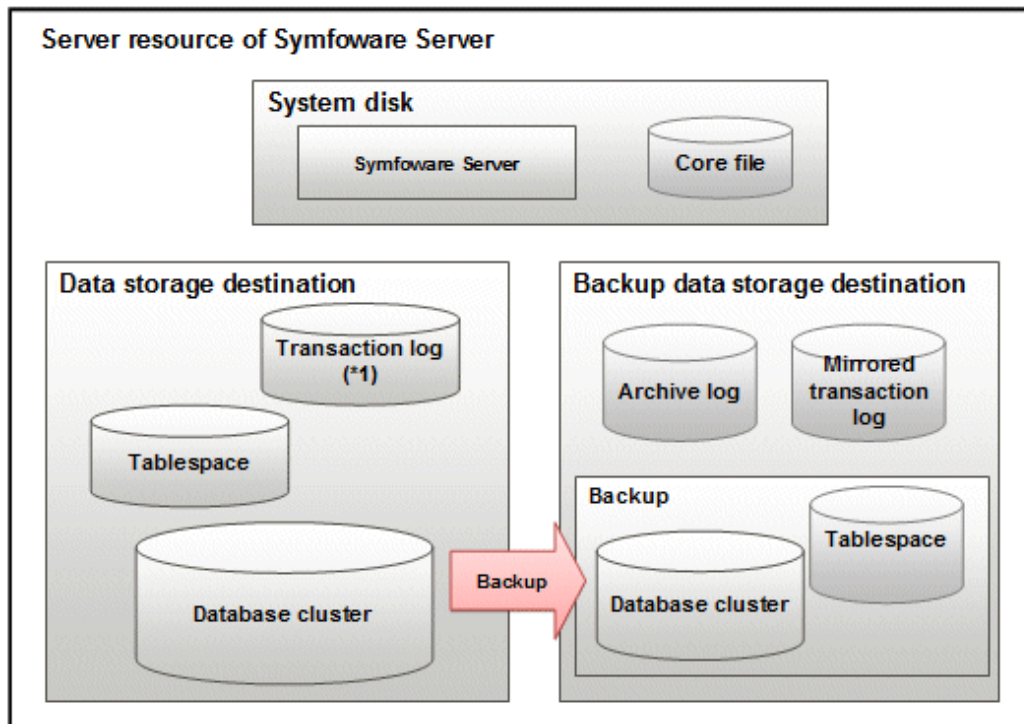
*1: To distribute the I/O load, place the transaction log on a different disk from the data storage destination.

Resource	Role
Database cluster	The area where the database is stored. It is a collection of databases managed by an instance.
Tablespace	Stores table files and index files in a separate area from the database cluster.
Transaction log	Stores log information in preparation for a crash recovery or rollback.
Archive log	Stores log information for recovery
Corefile	Symfoware Server process corefile output when an error occurs with a Symfoware Server process.

Examples of disk deployment

The following are examples of disk deployment:

Number of disks	Disk	Deployment
3	System disk	Symfoware Server program
		Corefile
	Connected physical disk	Data storage destination, transaction log storage destination
	Connected physical disk	Backup data storage destination
2	System disk	Symfoware Server program
		Corefile
		Data storage destination, transaction log storage destination
	Connected physical disk	Backup data storage destination

If instances are created with WebAdmin, it automatically determines the disks connected to the system and sets the locations for directories.

Disks that are candidates for the deployment of directories must meet the following conditions:

- They must be physical disks

- The mount point must not include national characters

- The instance administrator must have read and write permissions on the mount point

The backup data storage destination is deployed to the disk with the greatest available capacity, and the data storage destination is deployed to the next greatest.

Note

- When using a file system created with LVM (Logical Volume Manager), ensure that the logical volumes are created on a different physical disk. Even if you create the backup data storage destination, data storage destination, and transaction log storage destination on different logical volumes, if they are on the same physical disk, then recovery may not be possible if there is a disk failure.

- WebAdmin allocates different physical disks as the locations for file systems created with LVM. If you are using LVM, change the locations so that the file systems are deployed to separate physical disks.

Preparing directories

The directories to be prepared depend on the way that you create the instances.

The following shows the directories that need to be prepared:

Directory to be prepared	Using WebAdmin	Using the initdb command
Data storage destination	Y (*1)	Y
Backup data storage destination	Y (*1)	O
Transaction log storage destination	O (*1) (*2)	O
Corefile output destination	N (*3)	O

Y: Required
O: Optional
N: Not required

*1: WebAdmin automatically creates a directory
*2: The default is to create in a directory in the data storage destination. When it is necessary to distribute the I/O load for the database data and the transaction log, consider putting the transaction log storage destination on a different disk from the data storage destination
3: The default is to output to /var/tmp/symfo_*Version/*instanceAdmin_instanceName*/core - to change it, configure the core_directory and the core_contents parameters in postgresql.conf (refer to "Parameters" in the Operation Guide for details)

Note

- The directories must meet the following conditions:

    - The directory owner must be the OS user account that you want to be the instance administrator

    - The directory must have write permission

    - The directory must be empty

- It is not possible to use a directory mounted by NFS (Network File System) when using WebAdmin.

Example

The following example shows the OS superuser creating /database/inst1 as the directory for storing the database data and changing the owner of the directory to the OS user account "symfo".

```
# mkdir /database/inst1
# chown symfo:symfo /database/inst1
# chmod 700 /database/inst1
```

4.2.3 Estimating Resources

Estimate the resources to be used on the Symfoware Server.

Refer to "Appendix G Estimating Database Disk Space Requirements" for information on estimating database disk space requirements.

Refer to "Parameters automatically set by WebAdmin according to the amount of memory" when creating multiple instances with WebAdmin.

Refer to "Appendix H Estimating Memory Requirements" when creating instances with the initdb command, to estimate memory usage.

4.2.4 Editing Kernel Parameters

Edit the kernel parameters.

See
. . . .
Refer to "Managing Kernel Resources" in "Server Administration" in the PostgreSQL Documentation for information on kernel parameters.
. . . .

4.3 Creating an Instance

Instances can be created using the following:

- 4.3.1 Using WebAdmin

- 4.3.2 Using the initdb Command

Multiple instances can be created.

The memory allocated needs to be adjusted when multiple instances are created with WebAdmin (refer to "Parameters automatically set by WebAdmin according to the amount of memory" for details).

Note
. . . .
- Instances created using the initdb command cannot be managed using WebAdmin.

- Databases with the names 'template0' and 'template1' are automatically created when an instance is created.
  These databases are used as the templates for databases created later. Furthermore, a default database with the name 'postgres' is automatically created, which will be used with Symfoware Server commands. It is important that you do not delete these databases created by default.
. . . .

4.3.1 Using WebAdmin

This section describes how to create an instance using WebAdmin.

Note
. . . .
Always use WebAdmin to delete an instance if it was created using WebAdmin.
. . . .

4.3.1.1 Notes on Using WebAdmin

This section describes points to take into account when using WebAdmin.

Notes on using browsers

This section describes notes on using browsers.

Supported browsers

Windows(R) Internet Explorer 8.0, 9.0, and 10.0 are supported.

For the display, use 1024x768 or higher and 256 or more colors.

[Back] feature

The browser's [Back] feature cannot be used. In some browsers, the backspace key has the same functionality as the [Back] feature. Operations cannot be guaranteed when either of these techniques is used.

Browser timeout

If the browser remains idle for a certain period of time (approximately 15 minutes), a timeout may occur, or the login window may appear when the user performs the next operation.

Activating multiple WebAdmin windows

Operations may not be performed correctly if you start multiple WebAdmin windows and operate the same instance.

Single-user mode

WebAdmin cannot be used in single-user mode. To use WebAdmin, restart the OS using a mode other than single-user mode.

Encryption

WebAdmin does not allow encryption environments to be build.

See
....
Refer to "Protecting Storage Data Using Transparent Data Encryption" in the Operation Guide for information on building encrypted environments.
....

4.3.1.2 Browser Settings

Confirm the browser settings given below prior to using WebAdmin. If any settings are different, change them.

The required browser settings are described below.

Accepting cookies

WebAdmin uses cookies for communication between the browser and WebAdmin. Confirm that the setting to accept cookies has been selected.

- If WebAdmin exists in the intranet zone

  No particular browser settings are required.

- If WebAdmin exists in the Internet zone

  Click [Tools], click [Internet Options], and then select the [Privacy] tab. In the [Settings] pane, click [Advanced], and then configure the following items:

  - Select the [Override automatic cookie handling] check box in the [Cookies] pane.

  - Select the [Accept] option button under [First-party Cookies] in the [Cookies] pane.

  - Select the [Always allow session cookies] check box in the [Cookies] pane.

Selecting the character set

WebAdmin outputs results to the browser in UNICODE (UTF-8).

Ensure the character set and font for the browser are set to UNICODE.

- Select [View] >> [Encoding] >> [Auto-Select].

Selecting the font

Confirm that the browser font is set to the default for optimal display of the WebAdmin window.

- Select [View] >> [Text Size] >> [Medium].

- Click [Tools] >> [Internet Options] >> [Fonts], and then configure the following items:

    - Select [MS PGothic] as the [Webpage font].

    - Select [MS Gothic] as the [Plain text font].

Installing the font

Text may not display correctly in the browser unless fonts that correspond to the character set returned to the browser are installed.

In this case, install the fonts using the following procedure:

1. Click [View] >> [Encoding] >> [More], and then select the font to be displayed.

2. Install the font in accordance with the instructions in the [Language pack installation] dialog box.

4.3.1.3 WebAdmin Setup

If execution of WebAdmin setup was selected during installation, WebAdmin will be set up. WebAdmin can be used immediately after installation, and starts automatically when the machine is restarted. When the machine is restarted, the Web server feature of WebAdmin is started automatically.

Refer to "C.1 Setting Up WebAdmin" if WebAdmin has not yet been set up.

4.3.1.4 Logging into WebAdmin

This section describes how to log in to WebAdmin.

Activation URL for WebAdmin

In the browser address bar, type the activation URL of the WebAdmin window in the following format:

```
http://hostNameOrIpAddress:portNumber/
```

- *hostNameOrIpAddress*: Host name or IP address of the server where Symfoware Server is installed

- *portNumber*: Port number of WebAdmin. The default port number is 26515.

Example

For a server with IP address "192.0.2.0" and port number "26515":

```
http://192.0.2.0:26515/
```

The activation URL window shown below is displayed.
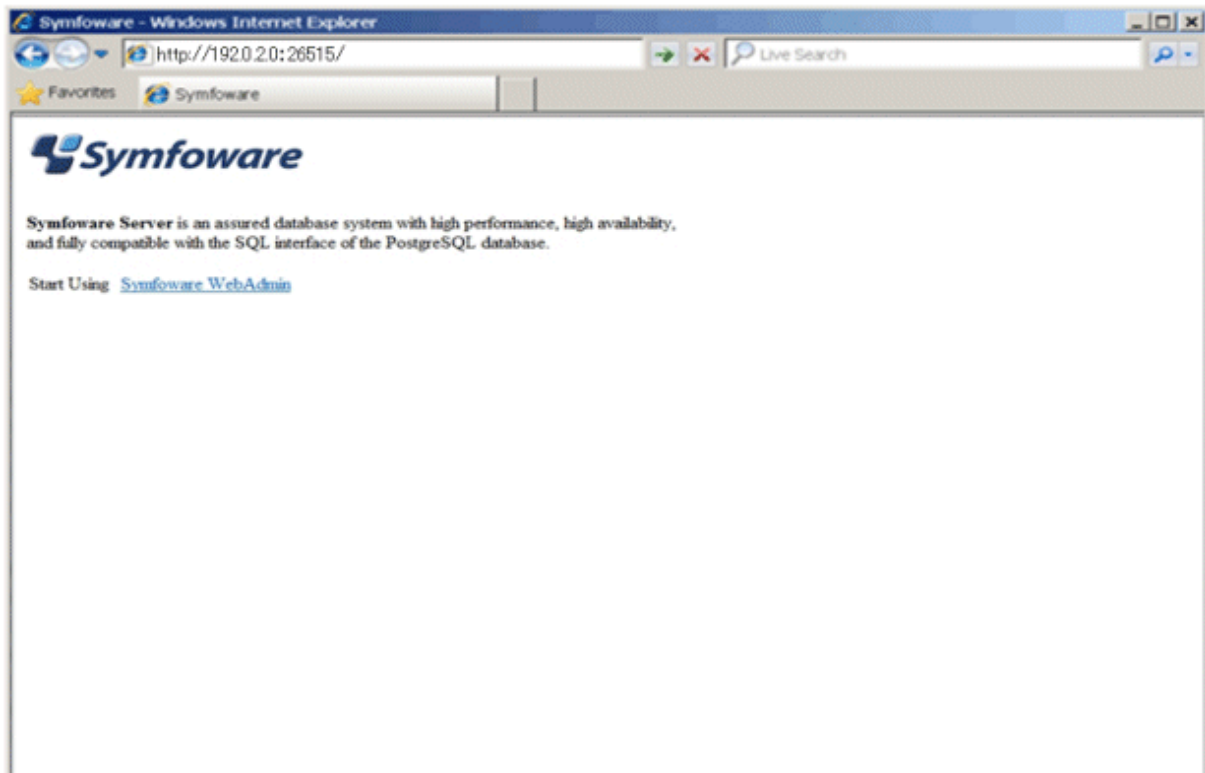
Logging in to the database server

Click [Symfoware WebAdmin] on the activation window to activate WebAdmin and display the [LogIn] window. You can log in to Symfoware Server from the [LogIn] window.

Specify the following values when logging in:

- [User ID]: User ID (OS user account) of the instance administrator

- [Password]: Password corresponding to the user ID

📝 Note

General users of the OS can also log in to WebAdmin.

4.3.1.5 Creating an Instance

This section describes how to create an instance.
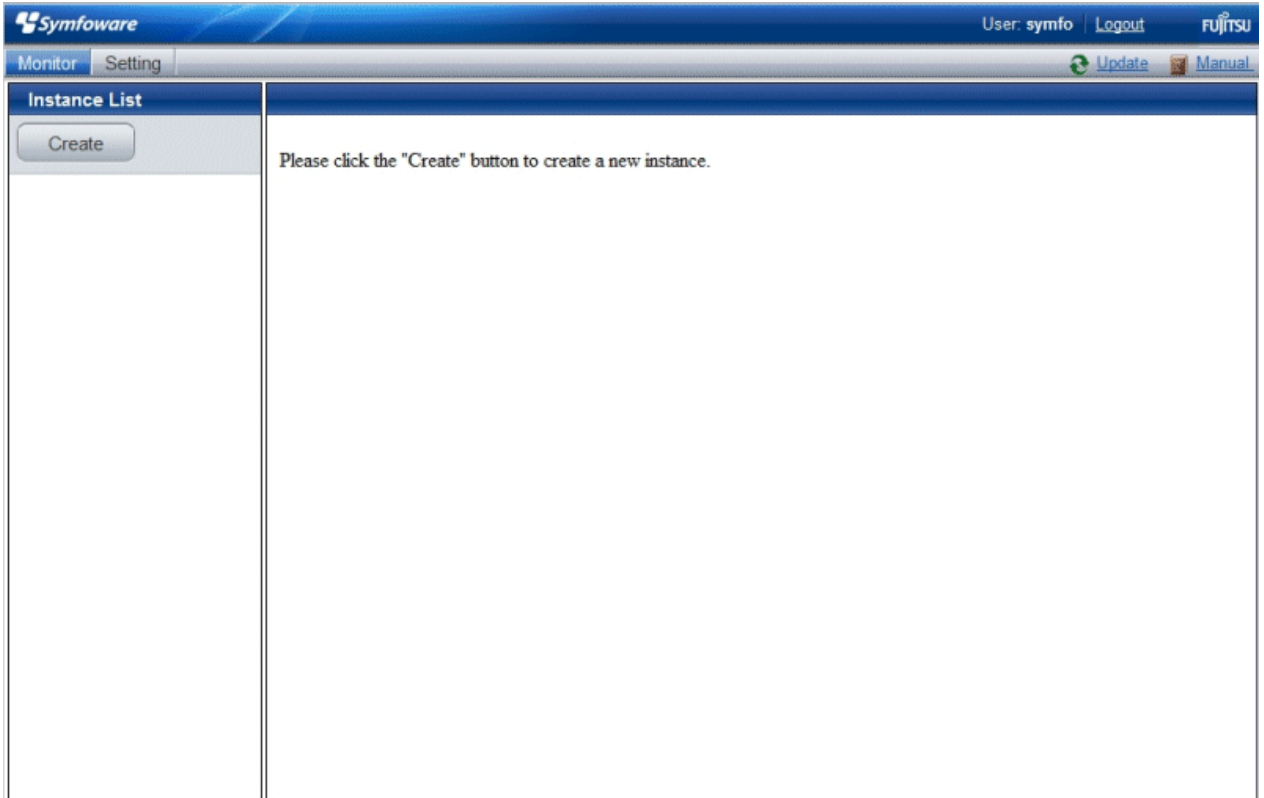
1. Activate WebAdmin, and log in to the database server.

2. Click [Create] in the [Instance List] window of the [Monitor] menu.

3. Enter the information for the instance to be created.

Enter the following items:

- [Instance Name]: Name of the database instance to manage

- [Data storage destination]: Directory where the database data will be stored

- [Backup data storage destination]: Directory where the database backup will be stored

- [Port]: Port number of the database server

📙 Note

....

- Store in a separate file the data storage destination and backup data storage destination path names specified in this window.
  Also, obtain a backup of the following file.
  These will be required to recover the directories if there is a disk failure.

  installationDirectory/gui/data/gui-instances

- Do not specify symbolic link files when specifying the data storage destination or backup data storage destination.

- Do not specify directories that include multibyte characters when specifying the data storage destination or backup data storage destination.

- Deploy the backup data storage destination, data storage destination, and transaction log storage destination on different disks, to take into account disk failures

....

4. Click [Advanced] to change the transaction log storage destination and database encoding.

Enter the following items:

- [Transaction log storage destination]: Directory where the transaction log will be stored

- [encoding]: Encoding of the database

🖙 **Note**
. . . .

- In a file, record the path names of the data storage destination, the backup data storage destination, and the transaction log storage destination specified in this window.
  This information will be required in the event that the directory needs to be recovered, such as if a fault occurs in the disk device.

- Do not specify symbolic link files when specifying the transaction log storage destination.

- Do not specify directories that include multibyte characters when specifying the transaction log storage destination.

- The default locale for instances created with WebAdmin is C.

. . . .

5. Click [Create] to create an instance.

[The instance is being made.]

Create Instance

    Instance inst1 is being created. Please wait...
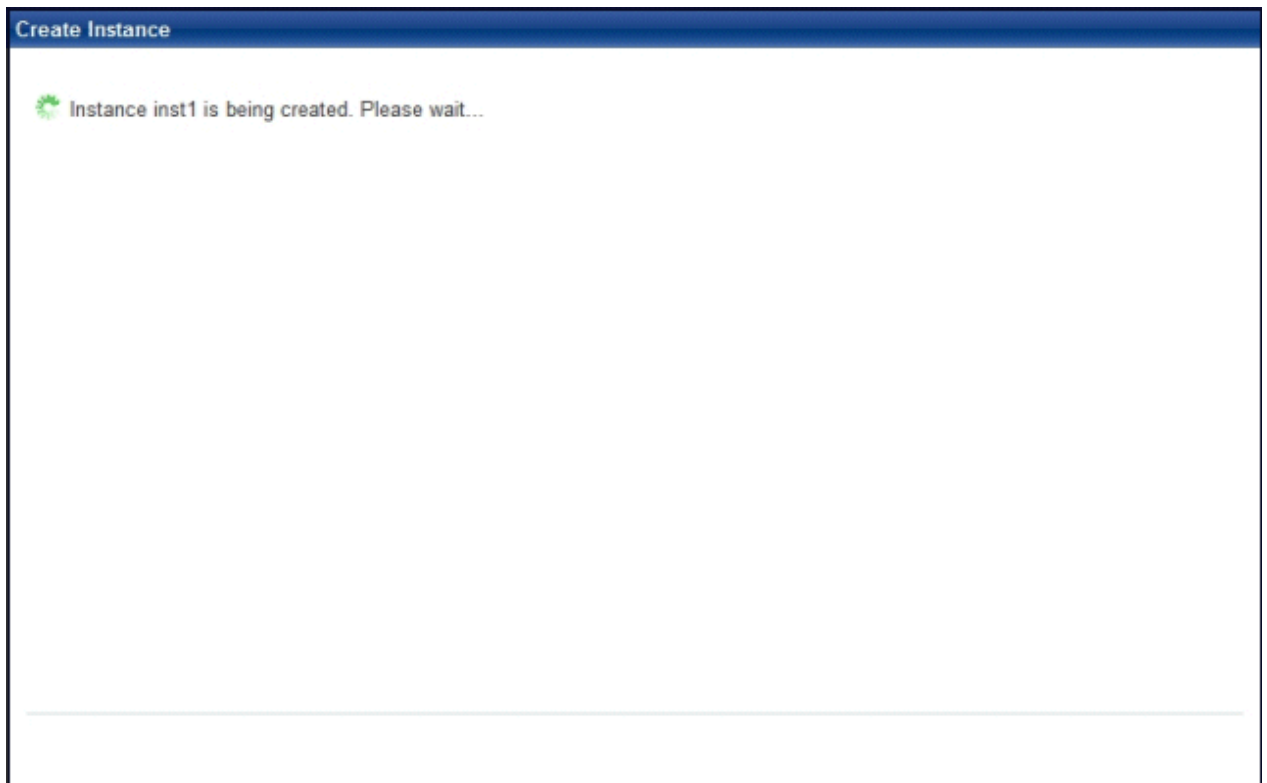
[Making the instance is completed.]

Create Instance

    Instance inst1 has been created successfully.

Close

5. Click [Create] to create an instance.

[The instance is being made.]
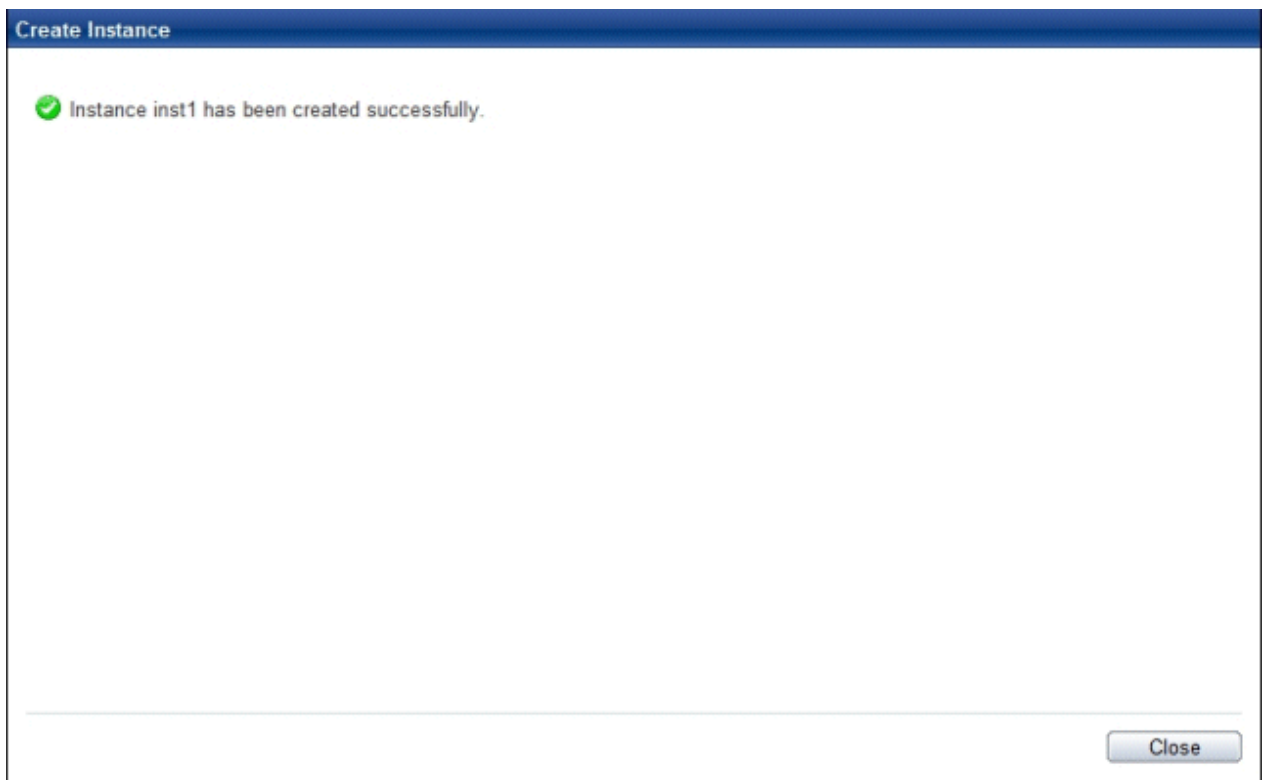
6. The instance will be started when it is created successfully.
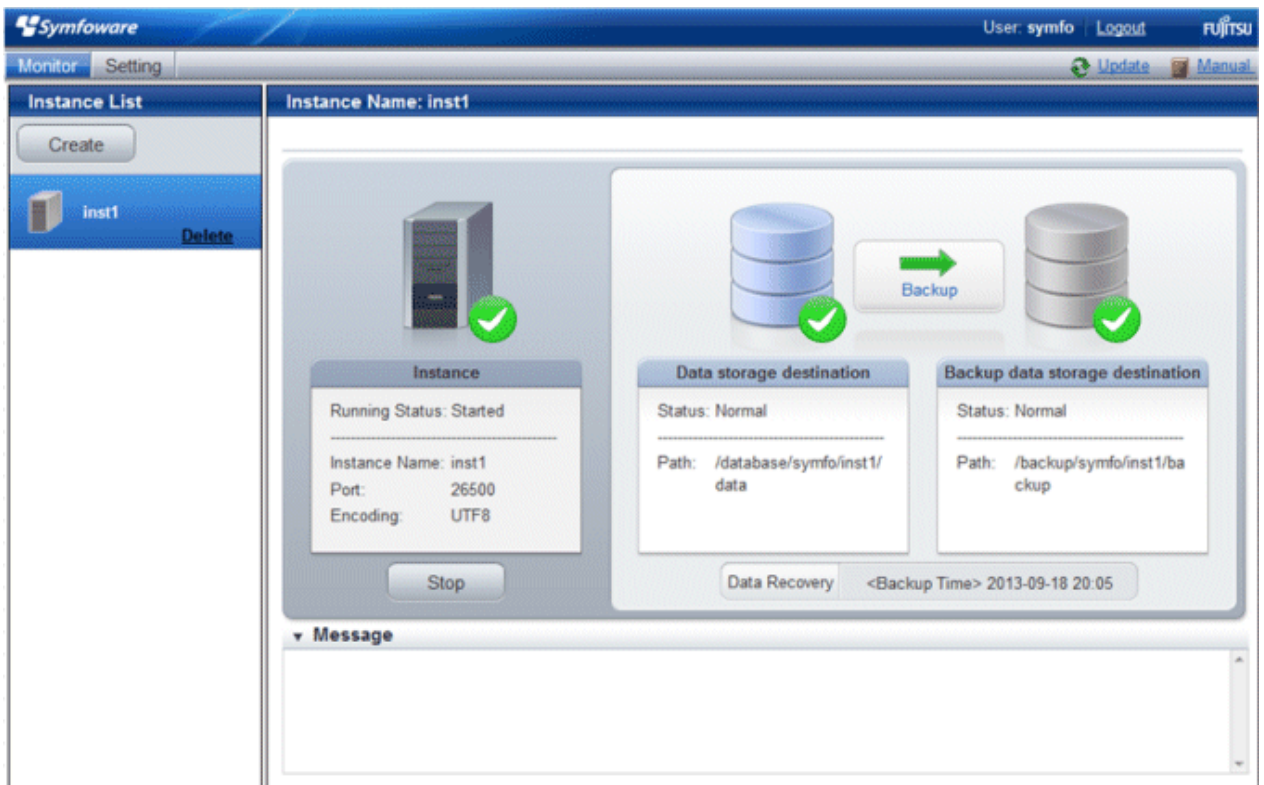
4.3.1.6 Changing the settings

You can change the following information that is set when instances are created.

You can change the character set and maximum number of connections, for example, to suit the operating and management environment for Symfoware Server.

- Character set

- Client authentication

- Communication

- SQL option

- Used memory

Information

....

These settings are stored in the files below - you can edit them directly, but WebAdmin may not work properly if you make a mistake (refer to "Appendix E Configuring Parameters" for details):

- postgresql.conf

- pg_hba.conf

....

Changing the character set

1. Start WebAdmin and log in to the database server.

2. Select [Character Code] from the [Setting] menu.

3. Click [Edit].
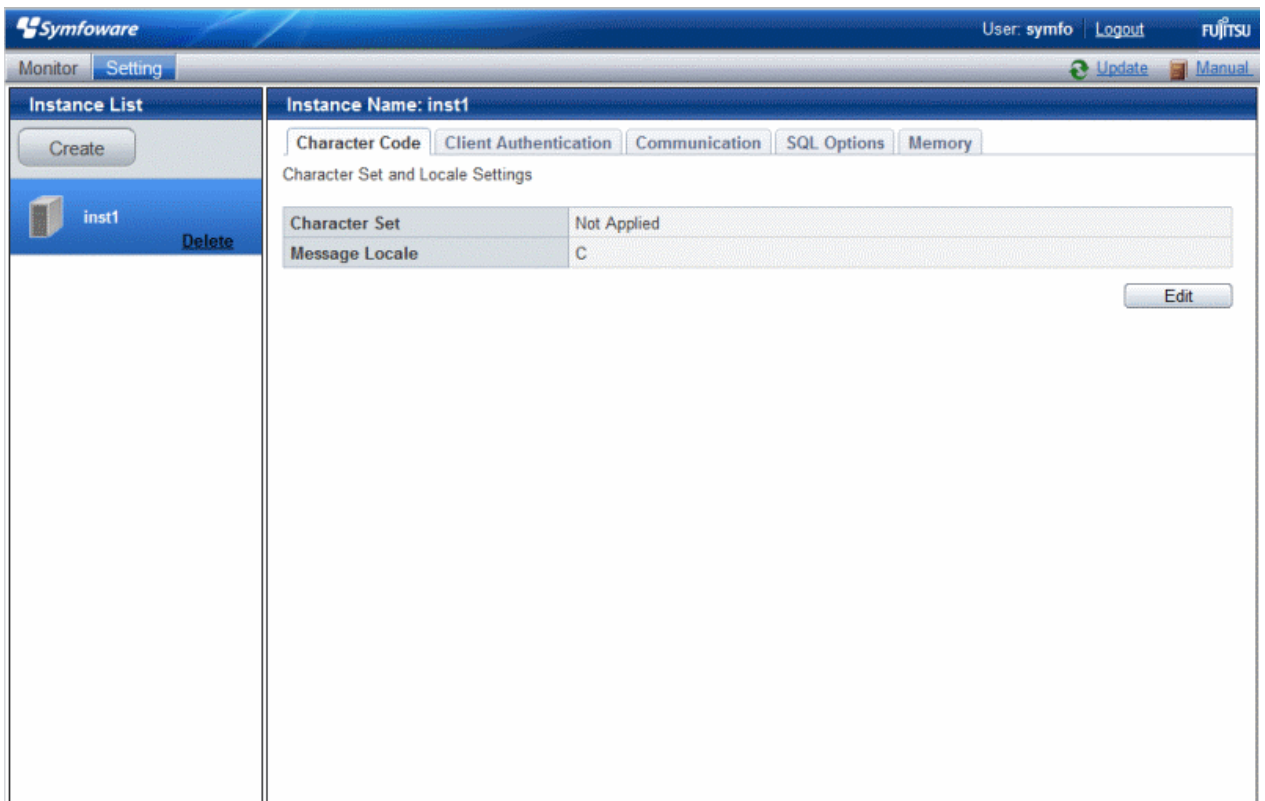
4. Edit [Character Set] and [Message Locale], and then click [Modify].

📖 **See**

. . . .
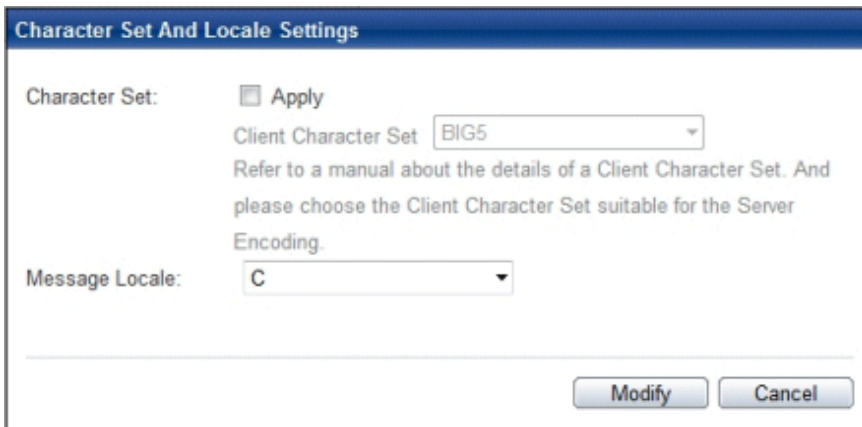
Select a character set compatible with the server's one (refer to "Automatic Character Set Conversion Between Server and Client" in "Server Administration" in the PostgreSQL Documentation for details).

. . . .

Changing client authentication

1. Start WebAdmin and log in to the database server.

2. Select [Client Authentication] from the [Setting] menu.

   Click [Add] to register new authentication information.

   To change authentication information, select the information, and then click [Edit].

To delete authentication information, select the information, and then click [Delete].

Click [Add] - the following window will be displayed.

Note

Configure the "local" connection format setting to give permission to the instance administrator, otherwise WebAdmin may not work properly.

Changing communication

1. Start WebAdmin and log into the database server.

2. Select [Communication] from the [Setting] menu.

Note

Before changing communication information, stop the instance.

3. Click [Edit].

4. Edit [Port Number] and [Max Connection], and then click [Modify].

Note

- Calculate the maximum number of connections using the formula below:

```
maximumNumberOfConnections = maximumNumberOfConnectionsFromApplications + 3 (*1)
```

*1: 3 is the default number of connections required by the system
Calculate the maximum number of connections using the following formula when changing either max_wal_senders (using streaming replication) or superuser_reserved_connections (connections reserved for use by the superuser) in postgresql.conf.

```
maximumNumberOfConnections = maximumNumberOfConnectionsFromApplications +
superuser_reserved_connections + max_wal_senders
```

Refer to "Appendix E Configuring Parameters" for more information on postgresql.conf.

- Kernel parameters need to be tuned to change the maximum number of connections (refer to "Managing Kernel Resources" in "Server Administration" in the PostgreSQL Documentation for details).
  Also check if the memory used exceeds the memory installed (refer to "Parameters automatically set by WebAdmin according to the amount of memory" for information on how to check).

··

Changing the SQL option

1. Start WebAdmin and log in to the database server.

2. Select [SQL Options] from the [Setting] menu.

3. Click [Edit].
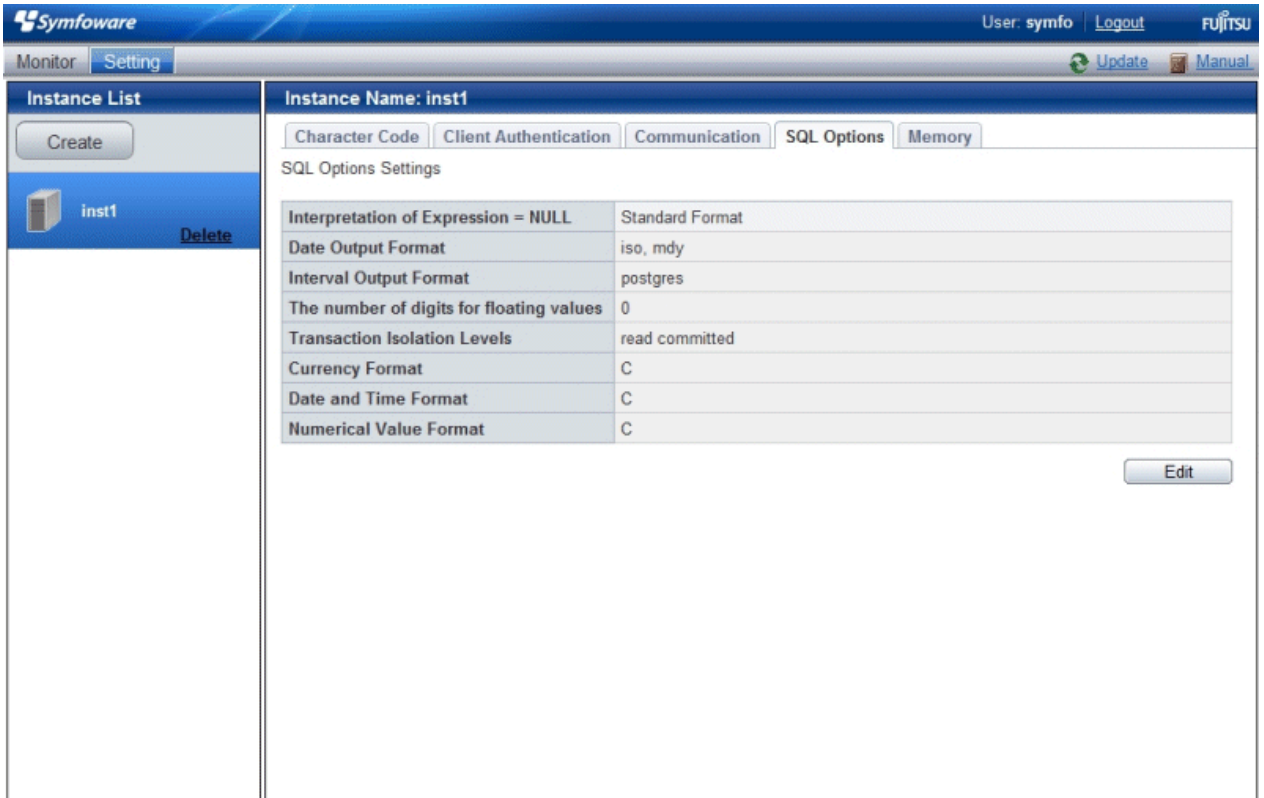
4. Edit [Interpretation of Expression = NULL], [Date Output Format], [Interval Oputput Format], [The number of digits for floating values], [Transaction Isolation Levels], [Currency Format], [Date and Time Format], and [Numerical Value Format], and then click [Modify].
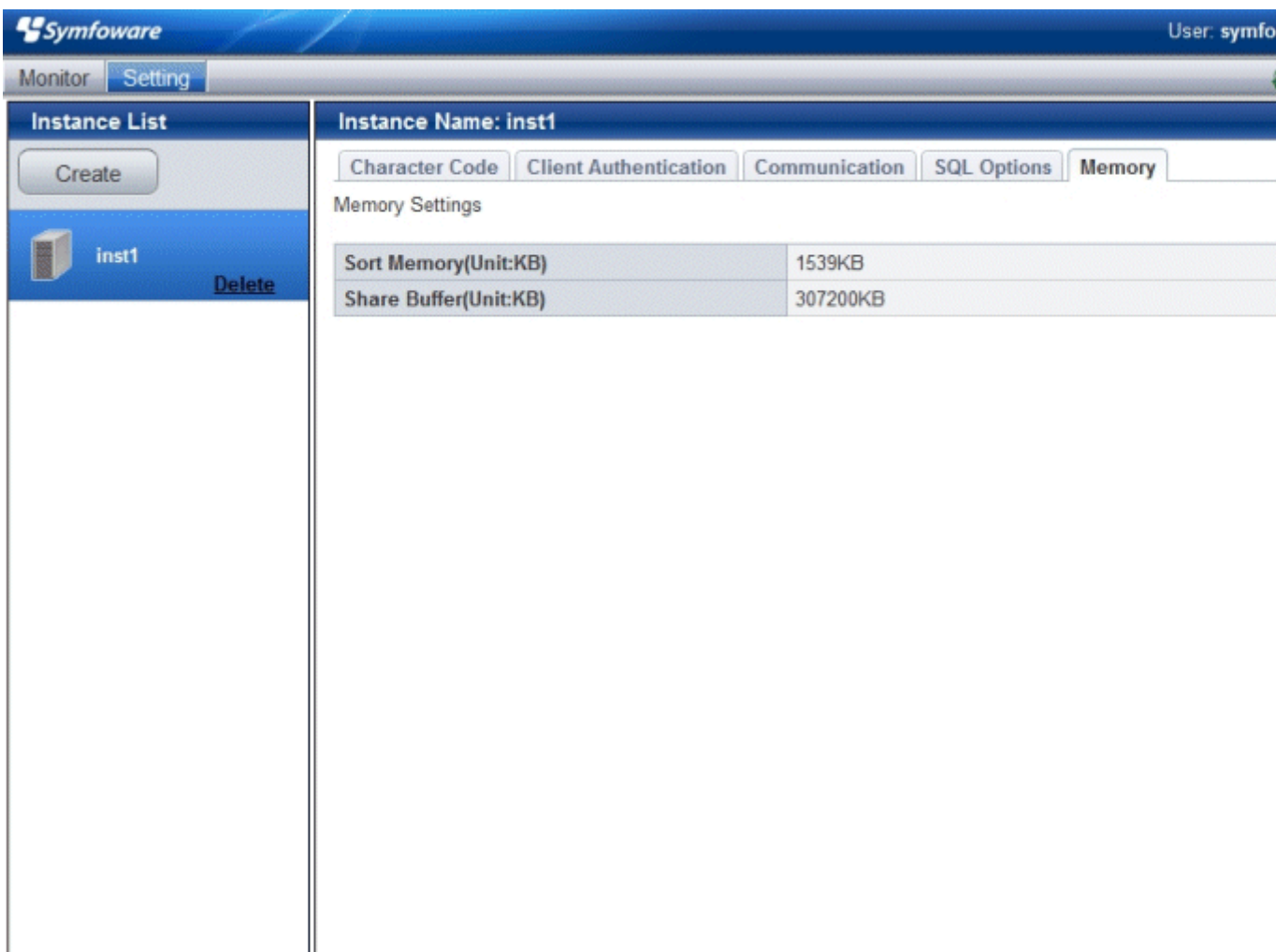
Changing allocated memory

1. Start WebAdmin and log in to the database server.

2. Select [Memory] from the [Setting] menu.

3. Click [Edit].

4. Edit [Sort Memory(Unit:KB)] and [Share Buffer(Unit:KB)], and then click [Modify].

Note

Kernel parameters need to be tuned to change the buffer size of the database (refer to "Managing Kernel Resources" in "Server Administration" in the PostgreSQL Documentation for details).

Also check if the memory used exceeds the memory installed (refer to "Parameters automatically set by WebAdmin according to the amount of memory" for information on how to check).

4.3.2 Using the initdb Command

This section describes the procedure to create an instance using the initdb command.

Creating an instance

Create an instance, with the database cluster storage destination specified in the PGDATA environment variable or in the -D option. Furthermore, the user that executed the initdb command becomes the instance administrator.

Note

- Instances created using the initdb command cannot be managed using WebAdmin.

- When creating multiple instances, ensure there is no duplication of database clusters and port numbers.

See

Refer to "initdb" in "Reference" in the PostgreSQL Documentation for information on the initdb command.

The procedure to create an instance is described below.

1. Use the OS user account that you want as the instance administrator.

   Connect with the server using the OS user account that you want as the instance administrator.

   You cannot use the OS superuser (root).

   The following example shows the OS superuser connected to the server being changed to the OS user account "symfo".

   Example

   ```
   # su symfo
   ```

2. Configure the environment variables

   Configure the environment variables in the server with the newly created instance.

   Set the following environment variables:

- PATH environment variables

  Add the installation directory "/bin".

- MANPATH environment variables

  Add the installation directory "/share/man".

- LD_LIBRARY_PATH environment variables

  Add the installation directory "/lib".

Example

The following example configures environment variables when the installation directory is "/opt/symfoserver64".

sh, bash

```
$ PATH=/opt/symfoserver64/bin:$PATH ; export PATH
$ MANPATH=/opt/symfoserver64/share/man:$MANPATH ; export MANPATH
$ LD_LIBRARY_PATH=/opt/symfoserver64/lib:$LD_LIBRARY_PATH ; export LD_LIBRARY_PATH
```

csh, tcsh

```
$ setenv PATH /opt/symfoserver64/bin:$PATH
$ setenv MANPATH /opt/symfoserver64/share/man:$MANPATH
$ setenv LD_LIBRARY_PATH /opt/symfoserver64/lib:$LD_LIBRARY_PATH
```

3. Create a database cluster

   Create the database cluster with the initdb command, specifying the storage destination directory.

   Specify the transaction log storage destination and the locale setting option as required.

   ### Example

   ```
   $ initdb -D /database/inst1 --xlogdir=/transaction/inst1 --lc-collate="C" --lc-ctype="C"
   ```

📑 Note

- To balance I/O load, consider deploying the transaction log storage destination to a disk device other than the database cluster storage destination and the backup data storage destination.

- Specify "C" or "POSIX" for collation and character category. Performance deteriorates if you specify a value other than "C" or "POSIX", although the behavior will follow the rules for particular languages, countries and regions. Furthermore, this may need to be revised when running applications on systems with different locales.
  For example, specify as follows:

  ```
  initdb --locale="C" --lc_messages="C"
  initdb --lc-collate="C" --lc-ctype="C"
  ```

📖 See

Refer to "Locale Support" in "Localization" in "Server Administration" in the PostgreSQL Documentation for information on locales.

4. Set port number.

   Set the port number and instance name in the /etc/services file of the OS. Specify a port number that does not conflict with other software.
   The port number specified here must also be set in the port parameter of postgresql.conf. The default is "26500".

5. Set the corefile output destination.

   Specify the output destination of the corefile, which can later be used to collect information for investigation, by setting the core_directory and core_contents parameters of postgresql.conf.

6. Set the backup storage destination.

    Specify the backup data storage destination and other backup settings when backup is to be performed as a provision against database errors.

7. Start an instance.

    Start with the start mode of the pg_ctl command.

    It is recommended to specify the -w option, which causes the command to return after waiting for the instance to start. If the -w option is not specified, it may not be possible to determine if the starting of the instance completed successfully or if it failed.

    Example

    ```
    $ pg_ctl start -w -D /database/inst1
    ```

4.4 Configuring Remote Connections

This section describes the settings required when connecting remotely to Symfoware Server from a database application or a client command.

4.4.1 When an Instance was Created with WebAdmin

Settings related to connection

The default is to accept connections from remote computers to the database.

Change "listen_addresses" in postgresql.conf to change this.

Refer to "Appendix E Configuring Parameters" for more information on postgresql.conf.

Client Authentication Information settings

The following content is set by default when WebAdmin is used to create an instance.

-   Authentication of remote connections from local machines is performed.

-   Only the instance administrator can perform connections in a UNIX domain socket.

When changing Client Authentication Information, select [Client Authentication] from [Setting], and then change the settings.

4.4.2 When an Instance was Created with the initdb Command

Connection settings

The default settings do not allow remote connections from the client to the database.

Change "listen_addresses" in postgresql.conf to perform remote connection.

All remote connections will be allowed when changed as shown below.

Example

```
listen_addresses = '*'
```

Also, configure the parameters shown below in accordance with the applications and number of client command connections.

Parameter name	Parameter description
superuser_reserved_connections	Used to reserve the connections required to manage Symfoware Server. Calculate and set this value based on the description below: - Connections in continuous use during activation of an instance using the autovacuum feature: 3 - Connections required by administrator for maintenance operations such as creating backups or rebuilding indexes: 1 - Connections used during pgAdmin operations; Number of clients used
max_connections	Set the value as: *numberOfSimultaneousConnectionsToInstance* + superuser_reserved_connections

Client authentication information settings

When trying to connect from a client to a database, settings are required to determine whether the instance permits connections from the client - if it does, then it is possible to make settings to determine if authentication is required.

See
. . . .
Refer to "The pg_hba.conf File" in "Server Administration" in the PostgreSQL Documentation for details.
. . . .

4.5 Other Settings

This section describes settings that are useful for operations.

4.5.1 Error Log Settings

This section explains the settings necessary to monitor errors in applications and operations, and to make discovering the causes easier.

Make error log settings only when instances are created with the initdb command.

When creating instances with WebAdmin, these settings are already made and hence do not need to be set. Furthermore, some parameters are used by WebAdmin, and if changed, may cause WebAdmin to no longer work properly. Refer to "Appendix E Configuring Parameters" for details.

Note
. . . .
Set the output destination for the system log to the server log so that it cannot be viewed by administrators of other instances.

Application errors are output to the system log or server log. The output destination directory for the system log and server log should have access permissions set so that they cannot be viewed by people other than the instance administrator.
. . . .

Edit the following parameters in postgresql.conf:

Parameter name	Parameter description	How to enable the settings
syslog_ident	Used to specify labels to attach to messages, so that these can be identified when output to the system log if more than one Symfoware Server is used.	reload option of the pg_ctl command

Parameter name	Parameter description	How to enable the settings
logging_collector	Specify "on" to ensure that messages are output by Symfoware Server to the server log file. The server log file is created in the pg_log directory in the database cluster.	restart option of the pg_ctl command
log_destination	Specify "stderr,syslog" to output messages from Symfoware Server to the screen and either the system log or the event log.	reload option of the pg_ctl command
log_line_prefix	Specify information to be added at the start of messages output by an instance. This information is useful for automatic monitoring of messages. You can output the SQLSTATE value, output time, executing host, application name, and user ID. Refer to "What To Log" in the PostgreSQL Documentation for details. Example: log_line_prefix = '%e: %t [%p]: [%l-1] user = %u,db = %d,remote = %r app = %a '	reload option of the pg_ctl command

Point

- If you want fewer application errors being output to the system log, refer to "When To Log" and "What To Log" in the PostgreSQL Documentation for information on how to reduce the output messages.

- If you want to separate errors output from other software, refer to "Where To Log" in the PostgreSQL Documentation to change the output destination to the server log file rather than the system log.

4.5.2 Configuring Automatic Start and Stop of an Instance

You can automatically start or stop an instance when the operating system on the database server is started or stopped.

Use the following procedure to configure automatic start and stop of an instance.

When you run an instance on a cluster system, the cluster system controls start and stop, so you do not need to use this feature.

1. Set the OS user account of the instance administrator.

   If you logged in using the OS user account of the instance administrator, set the environment variables required for starting the instance. This setting is required for executing the "su -" command described later.

2. Create a shell script.

   Create a shell script for reading the first argument and starting or stopping the instance.

   The shell script should read the first argument and start the instance if "start" is specified, or stop the instance if "stop" is specified. You must execute the "su -" command as the instance administrator to start or stop the instance.

3. Copy the shell script and set access permissions.

   As the OS superuser, copy to /etc/rc.d/init.d the shell script you created in step 2, and then set the access permissions.

   The following example creates an automatic start and stop script with the name "symfo_inst1".

   Example

   ```
   # cp symfo_inst1 /etc/rc.d/init.d/
   # chmod 755 /etc/rc.d/init.d/symfo_inst1
   ```

4. Register and enable automatic start and stop

   As the OS superuser, execute the chkconfig command to register and enable the script.

   Execute "chkconfig --add" to register the script, and execute "chkconfig --level" to set the run level and enable the script.

```
# chkconfig --add symfo_inst1
# chkconfig --level 25 symfo_inst1 on
```

Example of an automatic start and stop shell script for an instance

```
#!/bin/sh
# chkconfig: 2345 85 15
# description: Symfoware Server Open start / stop script
########################################################################

SYMDATA="/database/inst1"
SYMUSER=symfo
SYMLOG="$SYMDATA/serverlog"

LOCKFILE=/var/lock/subsys/symfo_inst1

case "$1" in
    start)
        su - $SYMUSER -c "pg_ctl start -D '$SYMDATA' -w " >$SYMLOG 2>&1
        if [ $? -eq 0 ];then
            touch $LOCKFILE
        fi
        ;;
    stop)
        su - $SYMUSER -c "pg_ctl stop -D '$SYMDATA' -m fast" >$SYMLOG 2>&1
        if [ $? -eq 0 ];then
            rm -f $LOCKFILE
        fi
        ;;
    restart)
        su - $SYMUSER -c "pg_ctl restart -D '$SYMDATA' -m fast" >$SYMLOG 2>&1
        if [ $? -eq 0 ];then
            touch $LOCKFILE
        fi
        ;;
    reload)
        su - $SYMUSER -c "pg_ctl reload -D '$SYMDATA'" >$SYMLOG 2>&1
        ;;
    status)
        su - $SYMUSER -c "pg_ctl status -D '$SYMDATA'"
        ;;
    *)
        echo $"Usage: $0 {start|stop|restart|reload|status}"
        exit 2
        ;;
esac
```

4.5.3 Settings when Using the features compatible with Oracle databases

The compatibility feature for Oracle databases enables Symfoware Server to be used without any special settings by creating a database instance. Note that settings are required only when using the SUBSTR function.

See
. . . .
Refer to "Notes on SUBSTR" in the Application Development Guide for details.
. . . .

4.6 Integration with the Linkexpress Replication Option

When integrated with Linkexpress and the Linkexpress Replication option, Symfoware Server achieves data integration such as load balancing through data distribution and real-time analysis through data linkage.
Note that this is only possible with Symfoware Server Standard Edition.

See

Refer to the Linkexpress and Linkexpress Replication option manuals for details on the settings required for data integration.

4.7 Integration with Message-Monitoring Software

To monitor messages output by Symfoware Server using software, configure the product to monitor SQLSTATE, instead of the message text - this is because the latter may change when Symfoware Server is upgraded.

Configure Symfoware Server to output messages in a format that can be read by the message-monitoring software by specifying "%e" in the log_line_prefix parameter of postgresql.conf to output the SQLSTATE value.

A setting example is shown below - it outputs the output time, executing host, application name, and user ID, in addition to the SQLSTATE value.

Example

```
log_line_prefix = '%e: %t [%p]: [%l-1] user = %u,db = %d,remote = %r app = %a '
```

See

Refer to "What To Log" in the PostgreSQL Documentation for information on how to configure the settings.

4.8 Deleting Instances

Instances can be deleted in the following ways:

- 4.8.1 Using WebAdmin

- 4.8.2 Using Server Commands

Note

- Always use WebAdmin to delete instances that were created using WebAdmin.

- If you have set automatic start and stop of the instance, execute the following commands to disable the script and cancel registration.

```
chkconfig nameOfShellScriptForAutomaticStartAndStop off
chkconfig --del nameOfShellScriptForAutomaticStartAndStop
```

Example

```
# chkconfig rc_symfosv_open_inst1 off
# chkconfig --del rc_symfosv_open_inst1
```

4.8.1 Using WebAdmin

This section explains how to delete instances using WebAdmin.

Use the following procedure to delete instances.

1. Stop the instance

   In the [Monitor] window, click [Stop].

   WebAdmin will automatically stop the instance if deleting the instance without stopping it beforehand.

2. Back up files.

   Before deleting the instance, back up any required files under the data storage destination, the backup data storage destination, and the transaction log storage destination.

3. Delete the instance

   In the [Instance List] window, select the desired instance, and the click [Delete] - in the confirmation window, click [Delete].

Note

Deleting an instance deletes only the following lowest-level directories. If they are not required, delete them manually.

- Data storage destination

- Backup data storage destination

- Transaction log storage destination (if different from the data storage destination)

4.8.2 Using Server Commands

This section explains how to delete instances using server commands.

Use the following procedure to delete instances.

1. Stop the instance

   Execute the stop mode of the pg_ctl command.

   An example is shown below:

   Example

   ```
   $ pg_ctl stop -D /data/inst1
   ```

2. Back up files.

   Before deleting the instance, back up any required files under the data storage destination, the backup data storage destination, and the transaction log storage destination.

3. Delete the instance

   Use a standard UNIX tool (the rm command) to delete the following directories:

   - Data storage destination

   - Backup data storage destination

   - Transaction log storage destination (if a directory different from the data storage directory was specified)

Chapter 5 Reinstallation

This chapter explains how to reinstall Symfoware Server.

📒 Note

If performing replication using the Linkexpress Replication option, perform the "Linkexpress" or "Linkexpress Replication option" migration procedures.

📚 See

Refer to the relevant Software Release Notes for information on "Linkexpress" and "Linkexpress Replication option" migration procedures.

5.1 Installation in Interactive Mode

Install according to the following procedure:

1. Stop the instance
2. Change to the superuser.
3. Mount the DVD drive.
4. Install.

📒 Note

- Configure the LANG environment variable in the console window where the install.sh command is executed in accordance with the display environment. If the LANG environment variable is not set correctly, the displayed characters may appear garbled..

- Do not enter the following halfwidth characters, otherwise silent.sh may not work properly:
  " # $ & ' ( ) ^ ~ \ | @ ` [ ] { } ; : < > tab

- Before starting installation, delete all urgent updates, temporary fixes, and peculiar updates that have been applied. After installation, apply the latest update that was applied.

1) Stop the instance

Stop all instances that are using the product to be reinstalled.

This should be performed by the instance administrator.

Using WebAdmin

In the [Monitor] window, click [Stop].

Using the Server Commands

Execute the stop mode of the pg_ctl command.

The following example illustrates this by using the database storage directory /database/inst1.

```
$ pg_ctl stop -D /database/inst1
```

2) Change to the superuser

Run the following command to switch to the superuser on the system.

```
$ su -
Password:******
```

3) Mount the DVD drive

Insert the server program DVD in the DVD drive, and run the command given below.

Note

....

If the automatic mount daemon (autofs) is used to mount DVDs automatically, the installer fails to start because "noexec" is set in the mount options. In this case, use the mount command to remount the DVD correctly, and then run the installation. Note that the mount options of a mounted DVD can be checked by executing the mount command without any arguments.

....

Example

```
# mount -t iso9660 -r -o loop /dev/dvd /media/dvd
```

4) Install

Follow the installation procedure described below.

This example illustrates reinstallation of Symfoware Server Standard Edition 64-bit V12.0.0.

1. Start reinstallation

    Run the install.sh command to start reinstallation.

    Example

    ```
    # LANG=en_US.UTF-8;export LANG
    # cd /media/dvd
    # ./install.sh
    ```

2. Select the product for reinstallation

    The list of products to be reinstalled is shown below.

    At least one server product must be selected.

    Steps 4 to 9 are repeated if multiple products are selected.

    ```
    The following products can be installed:
    1: Symfoware Server Standard Edition 64bit V12.0.0
    2: Symfoware Server Client 32bit V12.0.0
    3: Symfoware Server Client 64bit V12.0.0

    Select the product to be installed.
    To select multiple products, separate using commas (,). (Example: 1,2)
    [1,2,3,all,q](The default value is all): 1
    ```

3. Confirm the product for installation

    The window for checking which product(s) will be installed is displayed as follows:

    ```
    Selected product
      Symfoware Server Standard Edition 64bit V12.0.0

    Do you want to install the above product?
    y: Proceed to the next step
    n: Select the product again
    q: Quit without installing
    [y,n,q](The default value is y):y
    ```

4. Check the product name and installation environment

    The message for the product name and installation environment check is displayed as follows.

    ```
    ==============================================================================
    Symfoware Server Standard Edition 64bit V12.0.0
    ```

```
===============================================================================

Installation environment check will start.
Installation environment check has completed.
```

5. Select the installation type

The following window may be displayed, depending on the product being installed. Enter a number.

```
Select the installation type.
Select a number if performing an upgrade installation (reinstallation).

1: Symfoware Server Standard Edition 64bit V12.0.0
q: Quit without installing
[1,q]: 1
```

6. Confirm the installation type

The installation type is displayed as shown below.

Enter "y" to start installation using the displayed installation type.

```
1: Symfoware Server Standard Edition 64bit V12.0.0

Do you want to install the above product?
y: Proceed to the next step
n: Select the product again
q: Quit without installing
[y,n,q](The default value is y): y
```

7. Display the start message

The start message is displayed as shown below.

```
Upgrade installation (reinstallation) will start.
```

8. Display the installation status

The installation status is displayed as follows:

```
Starting deletion.
Deletion is complete.

Starting installation.
Installation is complete.

Starting setup. (*1)
Setup is complete. (*1)
```

*1: Displayed only when WebAdmin has been set up.

Information

. . . .

The above process must not be canceled using CTRL+C or 'kill -15'.

If you need to forcibly terminate the process, then follow the procedure below:

1. Run the following command to determine the process ID.

```
# ps -af | grep symfo_install
```

Example

```
root     14724 14653  0 09:56 pts/0    00:00:00 sh ./SERVER/symfo_install
root     14928 23458  0 09:56 pts/2    00:00:00 grep symfo_install
```

2. Run the following command to forcibly terminate the process.

```
# kill -9 14724
```

9. Display the completion message

When installation completes, a message is displayed showing the installation results.

When the process completes successfully

The following message is displayed when reinstallation completes successfully.

```
Upgrade installation (reinstallation) has completed successfully.
```

When the process ends in an error

The following message is displayed when an error occurs during reinstallation.

```
error: ./SERVER/packages/r60x64/FJSVsymdb12006-12006E.6-2.x86_64.rpm: not an rpm package (or
package manifest):

ERROR: An error occurred in FJSVsymdb12006 installation.

Upgrade installation (reinstallation) has terminated abnormally.
```

Note

If an error occurs during reinstallation, take the following corrective actions:

1. Eliminate the cause by referring to the error message.

2. Execute the install.sh command again.

Chapter 6 Uninstallation

This chapter describes the procedure for uninstalling Symfoware Server.

6.1 Uninstallation in Interactive Mode

Uninstall according to the following procedure:

1. Stop the instance.

2. Change to the superuser.

3. Uninstall.

📌 Note

. . . .

- To uninstall in a cluster system, first stop the cluster application and then delete the resources for both the cluster application and Symfoware Server before performing uninstallation.
  Refer to the Cluster Operation Guide for information on other operations.

- Configure the LANG environment variable in the console window where the symfo_remove command is executed in accordance with the display environment. If the LANG environment variable is not set correctly, the displayed characters may appear garbled.

- Do not enter fullwidth characters or the following halfwidth characters, otherwise symfo_remove may not work properly.
  " # $ & ' ( ) ^ ~ \ | @ ` [ ] { } ; : < > tab

- The installation directory may still remain after uninstallation - if it is not required, then delete it.

- If performing operation with WebAdmin, back up the following file before uninstallation.
  Instances will not be recognized from WebAdmin even if Symfoware Server is reinstalled after uninstallation.
  If performing operation with WebAdmin after reinstalling Symfoware Server, replace the following file after installation.

  installationDirectory/gui/data/gui-instances

- If you have set automatic start and stop of the instance, execute the following commands to disable the script and cancel registration.

  chkconfig *nameOfShellScriptForAutomaticStartAndSto* off
  chkconfig --del *nameOfShellScriptForAutomaticStartAndStop*

  Example

  ```
  # chkconfig rc_symfosv_open_inst1 off
  # chkconfig --del rc_symfosv_open_inst1
  ```

. . . .

1) Stop the instance

Stop all instances that are using the product to be uninstalled.

Using WebAdmin

In the [Monitor] window, click [Stop].

Using the Server Commands

Execute the stop mode of the pg_ctl command.

The following example illustrates this by using the database storage directory /database/inst1.

```
$ pg_ctl stop -D /database/inst1
```

2) Change to the superuser

Run the following command to switch to the superuser on the system.

```
$ su -
Password:******
```

3) Uninstall

Use the following procedure to uninstall.

The example illustrates uninstallation of Symfoware Server Standard Edition 64-bit V12.0.0.

See

To uninstall the Symfoware Server client feature, refer to the Installation and Setup Guide for Client.

1. Start uninstallation

Run the symfo_remove command to start uninstallation.

Example

```
# LANG=en_US.UTF-8;export LANG
# installationDestination/setup/symfo_remove
```

2. Check the uninstallation

The message for the uninstallation check is displayed as shown below. Enter "y" to start uninstallation.

```
"Symfoware Server Standard Edition 64bit V12.0.0" will be uninstalled.

Do you want to uninstall the above product?
y: Start the uninstallation
q: Quit without uninstalling
[y,q](The default value is q): y
```

3. Display the uninstallation status

The uninstallation status is displayed as shown below.

```
Starting uninstallation.
Uninstallation is complete.
```

Information

The above process must not be canceled using CTRL+C or 'kill -15'.

If you need to forcibly terminate the process, then follow the procedure below:

1. Run the following command to determine the process ID.

```
# ps -af | grep symfo_remove
```

Example

```
root    21176 18612  0 01:21 pts/0    00:00:00 /bin/sh /opt/symfoserver64/setup/symfo_remove
root    21289 17480  0 01:21 pts/1    00:00:00 grep symfo_remove
```

2. Run the following command to forcibly terminate the process.

```
# kill -9 21176
```

4. Display the completion message

When uninstallation completes, a message is displayed showing the uninstallation results.

When the process completes successfully

The following message is displayed when uninstallation completes successfully.

```
Uninstallation of "Symfoware Server Standard Edition 64bit V12.0.0" has completed successfully.
```

When the process ends in an error

The following message is displayed when an error occurs during uninstallation.

```
Uninstallation of "Symfoware Server Standard Edition 64bit V12.0.0" has ended in an error.
```

Note

If an error occurs during uninstallation, take the following corrective actions:

1. Eliminate the cause by referring to the error message.

2. Execute the symfo_remove command again.

6.2 Uninstallation in Silent Mode

Uninstall according to the following procedure:

1. Stop the instance.

2. Change to the superuser.

3. Uninstall.

Note

- To uninstall in a cluster system, first stop the cluster application and then delete the resources for both the cluster application and Symfoware before performing uninstallation.
  Refer to the Symfoware Server Cluster Operation Guide for information on other operations.

- The installation directory may still remain after uninstallation - if it is not required, then delete it.

- If you have set automatic start and stop of the instance, execute the following commands to disable the script and cancel registration.

```
chkconfig nameOfShellScriptForAutomaticStartAndSto off
chkconfig --del nameOfShellScriptForAutomaticStartAndStop
```

Example

```
# chkconfig rc_symfosv_open_inst1 off
# chkconfig --del rc_symfosv_open_inst1
```

1) Stop the instance

Stop all instances that are using the product to be uninstalled.

Using WebAdmin

In the [Monitor] window, click [Stop].

Using the Server Commands

Execute the stop mode of the pg_ctl command.

The following example illustrates this by using the database storage directory /database/inst1.

```
$ pg_ctl stop -D /database/inst1
```

2) Change to the superuser

Run the following command to switch to the superuser on the system.

```
$ su -
Password:******
```

3) Uninstall

Use the following procedure to uninstall.

The example illustrates uninstallation of Symfoware Server Standard Edition 64-bit V12.0.0.

📦 See
....

To uninstall the Symfoware Server client feature, refer to the Installation and Setup Guide for Client.
....

1. Start uninstallation

Run the symfo_remove command with the -S option to start uninstallation.

Example

```
# LANG=en_US.UTF-8;export LANG
# installationDestination/setup/symfo_remove -S
```

📘 Information
....

The above process must not be canceled using CTRL+C or 'kill -15'.

If you need to forcibly terminate the process, then follow the procedure below:

1. Run the following command to determine the process ID.

```
# ps -af | grep symfo_remove
```

Example

```
root     21176 18612  0 01:21 pts/0    00:00:00 /bin/sh /opt/symfoserver64/setup/
symfo_remove -S
root     21289 17480  0 01:21 pts/1    00:00:00 grep symfo_remove
```

2. Run the following command to forcibly terminate the process.

```
# kill -9 21176
```
....

2. Check the uninstallation results

The uninstaller result is output to the log file.

Log file

"nnnn" refers to the numeric part of the product version and level. For example, V12.0.0 is written as "1200".

64-bit products

```
File: /var/log/symfoware_sv_64_nnnn.log
```

32-bit products

```
File: /var/log/symfoware_sv_32_nnnn.log
```

Return values

The following return values are output:

Return values	Meaning
0	Uninstallation was successful.
3	A process is running.
4	Failed to uninstall the package.
64	Failed to delete product information from Uninstall (middleware).
106	The command was not executed with administrator privileges.

Appendix A Installation in Silent Mode

This appendix provides specifications for installation in silent mode.

A.1 Specification Format

The installation parameters CSV file, which is specified as the argument for the silent installer, has three columns per line in CSV format.

```
sectionName, parameterName, value
sectionName, parameterName, value
     :
```

Enter the following settings in respective columns.

Item	Settings	Optional
sectionName	Specify the section name. There are two types of section names: "installInfo": Set the product information. "parameters": Set the parameter information for this product.	Mandatory.
parameterName	Specify the parameter name. Each section has a valid parameter.	Mandatory
value	Specify the value.	Optional

📗 Note

. . . .

- Blank lines cannot be included.

- Section names and parameter names cannot be omitted.

- Undefined parameters cannot be set in lines where the section name is "installInfo". Also, note that the same parameter cannot be specified multiple times.

- Specify at least one line with the section name "parameters".

- Undefined parameters specified in lines within the "parameters" section will be ignored during execution. Note that when the same parameter is specified multiple times, the settings in the lowest line will be valid.

- The setting values for lines where the section name is "installInfo" may contain alphanumeric characters (at least one), and symbols, excluding double quotation marks (") and commas (,).

- Do not use the following halfwidth characters in the setting values for lines with the section name "parameters".

   " # $ & = ' ( ) ^ ~ \ | @ ` [ ] { } ; : < > tab

. . . .

📘 Information

. . . .

The template for the installation parameters CSV file is "mountpoint/sample/sample.csv".

. . . .

A.2 List of Parameters

This section describes the parameters that can be set for each section.

installInfo section

The parameters that can be set in the installInfo section are shown below.

No.	Type	Parameter		Description
1	Software name	**Parameter name**	softwareName	Optional.
		Value/Range	(Software name)	Specify the name of the software being installed.
		Default value	None	Symfoware Server Standard Edition(Open Interface)(32bit)
				Symfoware Server Standard Edition(Open Interface)(64bit)
2	OS name	**Parameter name**	OS	Optional.
		Value/Range	Linux	Specify the OS name for the software being installed.
		Default value	None	
3	Version	**Parameter name**	Version	Optional.
		Value/Range	(Version)	Specify the version of the software being installed.
		Default value	None	
4	Edition	**Parameter name**	Edition	Optional.
		Value/Range	(Edition)	Specify the edition of the software being installed.
		Default value	None	Standard Edition
5	Software ID	**Parameter name**	Name	Mandatory.
		Value/Range	(Software name)	Specify the software name and version in the following formats:
		Default value	None	Symfoware Server Standard Edition(Open Interface)(32bit) V12.0.0
				Symfoware Server Standard Edition(Open Interface)(64bit) V12.0.0

Example

The following specification example installs Symfoware Server Standard Edition (Open Interface) (64-bit) V12.0.0:

```
installInfo,softwareName,Symfoware Server Standard Edition(Open Interface)(64bit)
installInfo,OS,Linux
installInfo,Version,V12.0.0
installInfo,Edition,Standard Edition
installInfo,Name,Symfoware Server Standard Edition(Open Interface)(64bit) V12.0.0
```

parameters section

The parameters that can be set in the parameters section are shown below.

No.	Type	Parameter		Description
1	Installation destination of the server	**Parameter name**	ServerInstallPath	Optional.
		Value/Range	Path name	Specify the installation destination of the software.
		Default value	/opt/symfoserver32, or	The root directory(/) cannot be specified.
			/opt/symfoserver64	

No.	Type	Parameter		Description
2	Whether to install the client (32-bit)	**Parameter name**	Client32InstallExecute	Optional. Specify whether to run the installation of the client (32-bit). Y: Install N: Do not install
		Value/Range	Y or N	
		Default value	Y	
3	Installation destination of the client (32-bit)	**Parameter name**	Client32InstallPath	Optional. Specify the installation destination of the software. The root directory(/) cannot be specified.
		Value/Range	Path name	
		Default value	/opt/symfoclient32	
4	Whether to install the client (64-bit)	**Parameter name**	Client64InstallExecute	Optional. Specify whether to run the installation of the client (64-bit). Y: Install N: Do not install This parameter is ignored on 32-bit operating systems.
		Value/Range	Y or N	
		Default value	Y	
5	Installation destination of the client (64-bit)	**Parameter name**	Client64InstallPath	Optional. Specify whether to run the installation of the client (64-bit). This parameter is ignored on 32-bit operating systems. The root directory(/) cannot be specified.
		Value/Range	Path name	
		Default value	/opt/symfoclient64	
6	Whether to set up WebAdmin	**Parameter name**	WebSetupExecute	Optional. Specify whether to set up WebAdmin. Y: Install N: Do not install
		Value/Range	Y or N	
		Default value	Y	
7	Web server port number	**Parameter name**	WebPortNumber1	Optional. Specify the port number of the Web server.
		Value/Range	1024 to 32767	
		Default value	26515	
8	WebAdmin internal port number	**Parameter name**	WebPortNumber2	Optional. Specify the WebAdmin internal port number.
		Value/Range	1024 to 32767	
		Default value	26516	

Example

The following specification example installs Symfoware Server Standard Edition (Open Interface) (64-bit) V12.0.0:

```
parameters,ServerInstallPath,/opt/symfoserver64
parameters,Client32InstallExecute,N
parameters,Client64InstallExecute,N
parameters,WebSetupExecute,Y
parameters,WebPortNumber1,26515
parameters,WebPortNumber2,26516
```

A.3 Messages and Return Values

Messages are output when errors are detected during parametric analysis.

If an error is detected during installation of the product, a message is output to the log:

Log file

"nnnn" refers to the numeric part of the product version and level. For example, V12.0.0 is written as "1200".

64-bit product:

```
Path name: /var/log/symfoware_sv_64_nnnn.log
```

32-bit product:

```
Path name: /var/log/symfoware_sv_32_nnnn.log
```

Messages and return values

CSV file errors

The following messages are output if errors are detected while parsing CSV files.

Return value	Message	Explanation and actions
4	CSV file error:code = 1, Invalid CSV error.	There is an error in the specification format of the CSV file.
4	CSV file error:code = 2, installInfo/Name is required.	Either installInfo or the Name parameter has not been specified.
4	CSV file error:code = 3, Invalid installInfo key.	There is an error in the installInfo specification. Or the section name is invalid.
4	CSV file error:code = 4, Duplicated installInfo key.	The same parameter has been defined more than once in installInfo.
4	CSV file error:code = 5, Invalid character length.	No setting value is specified, or the specified string is too long.
4	CSV file error:code = 6, Invalid character format or encoding.	An invalid character has been specified in the installation parameters CSV file.
4	CSV file error:code = 8, Parameter is required.	There is no line in the "parameters" section.
20	The input file does not exist.	The input file does not exist.
21	The value of @1@ is incorrect,the value is @2@.	The value is incorrect. Specify the correct value. The parameter name is displayed in @1@. The specified parameter is displayed in @2@.
22	The value same at @1@ and @2@ is specified.	The same value is specified in different parameters. Specify different values. The parameter name is displayed in @1@ and @2@.
23	The @2@ of @1@ already exists.	The path already exists. Specify a different path. The parameter name is displayed in @1@. The specified value is displayed in @2@.
26	Port number @1@ is already used in the service file(/etc/services).	The port number is already being used. Specify an unused port number. The port number is displayed in @1@

Return value	Message	Explanation and actions
29	USAGE : silent.sh inputfile	The argument specified in the command is incorrect. Specify the correct argument.

Product installer errors

The following return values are returned when errors occur while the product installer is running.

Return value	Explanation
0	Completed successfully.
2	Cannot perform upgrade installation (reinstallation).
3	A process is running.
4	Failed to uninstall the package.
5	Failed to install the package.
11	A product that cannot coexist with Symfoware has been installed.
12	This OS is not supported.
32	An identical product is already installed.
61	Failed to install Uninstall (middleware).
62	Installation failed because Uninstall (middleware) is running.
63	Failed to register product information in Uninstall (middleware).
64	Failed to delete product information from Uninstall (middleware).
65	Failed to install FJQSS.
68	Failed to set up WebAdmin.
99	A system error occurred.
106	The command was not executed with administrator privileges.

A.4 CSV File Format

The format of CSV files is based on RFC4180, with the following specifications.

Records

- Separate each record with a "CRLF" newline (operation is not guaranteed with only a "CR" or "LF" newline).

- Specify a newline at the end of a file.

- Separate each field within a record with a halfwidth comma ",".

Format	Record		
aaa,bbb,ccc	aaa	bbb	ccc

- If several commas are entered in succession, or if a comma precedes a newline, the data following the comma is regarded as empty.

Format	Record		
aaa,,ccc	aaa		ccc
aaa,bbb,	aaa	bbb	

- Headers cannot be specified

Format	Record		
	field1	field2	field 3
aaa,bbb,ccc	aaa	bbb	ccc

Appendix B Multi-Version Installation

This appendix describes how to install a version different from the one currently installed.

B.1 Installation in Interactive Mode

Install according to the following procedure:

1. Change to the superuser.

2. Mount the DVD drive.

3. Install.

Note

- Configure the LANG environment variable in the console window where the install.sh command is executed in accordance with the display environment. If the LANG environment variable is not set correctly, the displayed characters may appear garbled.

- Do not enter the following halfwidth characters, otherwise install.sh may not work properly.

  " # $ & ' ( ) ^ ~ \ | @ ` [ ] { } ; : < > tab

1) Change to the superuser

Run the following command to switch to the superuser on the system.

```
$ su -
Password:******
```

2) Mount the DVD drive

Insert the server program DVD in the DVD drive, and run the command given below.

Note

If the automatic mount daemon (autofs) is used to mount DVDs automatically, the installer fails to start because "noexec" is set in the mount options. In this case, use the mount command to remount the DVD correctly, and then run the installation. Note that the mount options of a mounted DVD can be checked by executing the mount command without any arguments.

Example

```
# mount -t iso9660 -r -o loop /dev/dvd /media/dvd
```

3) Install

Follow the installation procedure described below.

This example illustrates installation of Symfoware Server Standard Edition 64-bit V12.0.0 in an environment where a different version is already installed.

1. Start installation

   Run the install.sh command to start installation.

   Example

   ```
   # LANG=en_US.UTF-8;export LANG
   # cd /media/dvd
   # ./install.sh
   ```

2. Select the product for installation

The list of products to be installed is shown below.

At least one server product must be selected.

Steps 4 to 12 are repeated if multiple products are selected.

Note that no WebAdmin setup information is displayed or processed during the client installation.

```
The following products can be installed:
1: Symfoware Server Standard Edition 64bit V12.0.0
2: Symfoware Server Client 32bit V12.0.0
3: Symfoware Server Client 64bit V12.0.0

Select the product to be installed.
To select multiple products, separate using commas (,). (Example: 1,2)
[1,2,3.all,q](The default value is all): 1
```

Information

To create a 32-bit application in a 64-bit environment, Symfoware Server Client 32-bit is required. It is therefore recommended that you use the default value "all" to install all products.

3. Confirm the product for installation

The window for checking which product(s) will be installed is displayed as follows:

```
Selected product
  Symfoware Server Standard Edition 64bit V12.0.0

Do you want to install the above product?
y: Proceed to the next step
n: Select the product again
q: Quit without installing
[y,n,q](The default value is y): y
```

4. Check the product name and installation environment

The message for the product name and installation environment check is displayed as follows.

```
===============================================================================
Symfoware Server Standard Edition 64bit V12.0.0
===============================================================================

Installation environment check will start.
Installation environment check has completed.
```

5. Select the installation type

The following window may be displayed, depending on the product being installed. Enter "m".

```
Select the installation type.
Select m for multi-version installation.

m: Start the multi-version installation
q: Quit without installing
[m,q]: m
```

6. Display the start message

The start message is displayed as follows:

```
Multi-version installation will start.
```

The following window is displayed. Change the information as required.

```
Modify the information below to ensure that it is not duplicated with that of the
currently  installed product:
  Installation directory
  Web server port number
  WebAdmin internal port number
```

7. Change the installation information

The window for checking the installation information is displayed as follows: Enter "c".

```
Installation directory information
  Installation directory: /opt/symfoserver64

WebAdmin setup information
  WebAdmin setup: Execute
  Web server port number: 26515
  WebAdmin internal port number: 26516

Start installation using the above information?
y: Start the installation
c: Change the information
q: Quit without installing
[y,c,q](The default value is y): c
```

If you have not set up WebAdmin, refer to "Appendix C Setting Up and Removing WebAdmin" for details.

8. Enter the installation destination

The window to enter the installation destination is displayed as follows:

Enter an installation destination different from the one for the currently-installed product.

```
Specify the installation directory.
[directory name,q](The default value is /opt/symfoserver64): /opt/symfosv1200
```

9. Enter the WebAdmin setup information

The window to enter the WebAdmin setup information is displayed as follows:

Input a port number different from the port number that has already been used.

```
Do you want to execute WebAdmin setup?
y: Execute
n: Do not execute
[y,n,q](The default value is y):

Specify the Web server port number.
Web server port number [1024-32767,q](The default value is 26515.):26517

Specify the WebAdmin internal port number.
WebAdmin internal port number [1024-32767,q](The default value is 26516): 26518
```

10. Confirm the installation information

The installation information is displayed as shown below. The actual window will display the information that has been entered and selected.

Enter "y" to start installation using the displayed installation information.

```
Installation directory information
  Installation directory: /opt/symfosv1200

WebAdmin setup information
  WebAdmin setup: Execute
  Web server port number: 26517
  WebAdmin internal port number: 26518
```

```
Start installation using the above information?
y: Start the installation
c: Change the information
q: Quit without installing
[y,c,q](The default value is y): y
```

11. Display the installation status

The installation status is displayed as follows:

```
Starting installation.
Installation is complete.

Starting setup.       (*1)
Setup is complete.    (*1)
```

*1: Displayed only when "Execute" is selected for WebAdmin setup.

12. Display and check completion messages

When installation completes, a message is displayed showing the installation results.

When the process completes successfully

The following message is displayed when installation completes successfully.

```
Multi-version installation has completed successfully.
```

When the process ends in an error

The following message is displayed when an error occurs during installation.

```
error: ./SERVER/packages/r60x64/FJSVsymdb12006-12006E.6-2.x86_64.rpm: not an rpm package (or
package manifest):


ERROR: An error occurred in FJSVsymdb12006 installation.


Multi-version installation has terminated abnormally.
```

Note

....

If an error occurs during installation, take the following corrective actions:

1. Eliminate the cause by referring to the error message.

2. Execute the install.sh command again.

....

B.2 Installation in Silent Mode

The procedure to perform a multi-version installation in silent mode is the same as for an initial installation in silent mode. Refer to "3.2 Installation in Silent Mode" for details.

However, note that the installation parameters CSV file must be modified to ensure that the parameters listed below are not duplicated with those of the currently-installed Symfoware Server.

- ServerInstallPath

- Client32InstallPath

- Client64InstallPath

- WebPortNumber1

- WebPortNumber2

Appendix C Setting Up and Removing WebAdmin

This appendix describes how to set up and remove WebAdmin.

C.1 Setting Up WebAdmin

This section explains how to set up WebAdmin.

C.1.1 Setting Up WebAdmin

Follow the procedure below to set up WebAdmin.

1. Change to the superuser

   Acquire superuser privileges on the system.

   Example

   ```
   $ su -
   Password:******
   ```

2. Set up WebAdmin

   Set up WebAdmin.

   Example

   If Symfoware Server is installed in "/opt/symfoserver64":

   ```
   # cd /opt/symfoserver64/gui/sbin
   # ./WebAdminSetup
   ```

3. Specify the port number

   Specify the following port numbers to be used in WebAdmin.

   Refer to the "/etc/services" file and only change to a different port number if there is overlap with a port number from another service.

   Make a note of the port number for the Web server, because it will be required for activating the WebAdmin window.

Item	Value (recommended value)
Web server port number enter port number of Web Server (default: 26515):	26515
WebAdmin internal port number enter Internal port number for WebAdmin (default: 26516):	26516
WebAdmin automatic start Start WebAdmin automatically when system starting ? [y,n] (default: y)	y

Web server port number

   Specify a numeric value from 1024 to 32767 for the port number to be used for communication between the Web browser and the Web server.

   The Web server port number will be registered as a port number with the following service name in the "/etc/services" file.

64-bit product:

   symfo_1200_SE_64_WebAdmin_Port1

32-bit product:

   symfo_1200_SE_32_WebAdmin_Port1

WebAdmin internal port number

Specify a numeric value from 1024 to 32767 for the port number to be used for communication between the Web server and the WebAdmin runtime environment.

The WebAdmin internal port number will be registered as a port number with the following service name in the /etc/services file:

64-bit product:

symfo_1200_SE_64_WebAdmin_Port2

32-bit product:

symfo_1200_SE_32_WebAdmin_Port2

WebAdmin automatic start

Select whether or not to start WebAdmin when the machine is started.

📝 Note

. . . .

- Unused port numbers
  Irrespective of the information specified in the "/etc/services" file, unused port numbers in the OS and other products can sometimes be automatically numbered and then used, or port numbers specified in environment files within products may also be used. Check the port numbers used by the OS and other products, and ensure that these are not duplicated.

- Access restrictions
  Prevent unauthorized access and maintain security by using a firewall product, or the packet filtering feature of a router device, to restrict access to the server IP address and the various specified port numbers.

. . . .

C.1.2 Activating the Web Server Feature of WebAdmin

Follow the procedure below to activate the Web server feature of WebAdmin.

1. Change to the superuser

   Acquire superuser privileges on the system.

   Example

   ```
   $ su -
   Password:******
   ```

2. Activate the Web server feature of WebAdmin

   Execute the WebAdminStart command to activate the Web server feature of WebAdmin.

   Example

   If Symfoware Server is installed in "/opt/symfoserver64":

   ```
   # cd /opt/symfoserver64/gui/sbin
   # ./WebAdminStart
   ```

C.1.3 Stopping the Web Server Feature of WebAdmin

Follow the procedure below to stop the Web server feature of WebAdmin.

1. Change to the superuser

   Acquire superuser privileges on the system.

   Example

   ```
   $ su -
   Password:******
   ```

2. Stop the Web server feature of WebAdmin

Execute the WebAdminStop command to stop the Web server feature of WebAdmin.

Example

If Symfoware Server is installed in "/opt/symfoserver64":

```
# cd /opt/symfoserver64/gui/sbin
# ./WebAdminStop
```

C.2 Removing WebAdmin

This section explains how to remove WebAdmin.

This removal procedure stops WebAdmin and ensures that it no longer starts automatically when the machine is restarted.

1. Change to the superuser

Acquire superuser privileges on the system.

Example

```
$ su -
Password:******
```

2. Remove WebAdmin setup

Execute the WebAdminSetup command to remove WebAdmin setup.

Example

If Symfoware Server is installed in "/opt/symfoserver64":

```
# cd /opt/symfoserver64/gui/sbin
# ./WebAdminSetup -d
```

Appendix D Checking the Version of the Installed Product

To check the version of Symfoware Server installed, start the Uninstall (middleware) tool. The procedure for starting the tool is described below.

1) **Change to the superuser**

Change to the superuser:

```
$ su -
Password:******
```

2) **Start the Uninstall (middleware) tool**

Start the Uninstall (middleware) tool.

```
# /opt/FJSVcir/cimanager.sh -c
```

Appendix E Configuring Parameters

WebAdmin operates and manages databases according to the contents of the following configuration files:

- postgresql.conf

  Contains various items of information that define the operating environment of Symfoware Server.

- pg_hba.conf

  Contains various items of information related to client authentication.

These configuration files are deployed to a data storage destination. Data is written to them when the instance is created by WebAdmin and when settings are changed, and data is read from them when the instance is started and when information from the [Setting] menu is displayed.

Direct editing of each configuration file is possible with a text editor.

See
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Refer to "Server Configuration" and "Client Authentication" in "Server Administration" in the PostgreSQL Documentation for information on the parameters.
. . . .

postgresql.conf

Parameters that can be changed in WebAdmin

The postgresql.conf parameters that can be changed in WebAdmin are shown below:

Tab	WebAdmin item	Parameter
Character Code	Character Set	client_encoding
	Message Locale	lc_messages
Communication	Port Number	port
	Max Connection	max_connections
SQL Options	Interpretation of Expression = NULL	transform_null_equals
	Date Output Format	DateStyle (*1)
	Interval Oputput Format	IntervalStyle
	The number of digits for floating values	extra_float_digits
	Transaction Isolation Levels	default_transaction_isolation
	Currency Format	lc_monetary
	Date and Time Format	lc_time
	Numerical Value Format	lc_numeric
Memory	Sort Memory(Unit:KB)	work_mem
	Share Buffer(Unit:KB)	shared_buffers

*1: If you specify "Postgres" as the output format, dates will be output in the "12-17-1997" format, not the "Wed Dec 17 1997" format used in the PostgreSQL Documentation.

Parameters set by WebAdmin

Parameters set by WebAdmin during instance startup are shown below (they will be ignored even if specified in postgresql.conf):

Parameter	Value
log_destination	stderr,syslog

Parameter	Value
logging_collector	on
log_line_prefix	'%e: %t [%p]: [%l-1] user = %u,db = %d,remote = %r app = %a '
log_directory	/var/tmp/symfo_*version*/*instanceAdmin_instanceName*/log
log_filename (*1)	logfile-%a.log
log_file_mode	0600
log_truncate_on_rotation	on
log_rotation_age	1d

*1: The server logs are split into files based on the day of the week, and are rotated after each week.

Parameters automatically set by WebAdmin according to the amount of memory

The postgresql.conf parameters automatically set according to the amount of installed memory, during the creation of instances by WebAdmin, are shown below:

Parameter	Value
shared_buffers	30% of the machine's installed memory
work_mem	30% of the machine's installed memory / max_connections / 2
effective_cache_size	75% of the machine's installed memory
maintenance_work_mem	10% of the machine's installed memory / (1 + autovacuum_max_workers)

When creating multiple instances and when changing the maximum number of connections or the buffer size of a database, estimate the amount of memory required using the following procedures:

1. Use the above formula to determine parameter settings values that will avoid memory shortages.

2. When creating multiple instances, create new instances.

3. Change the setting values for each parameter determined in step 1 by directly editing them in the WebAdmin [Setting] menu or with a text editor.

See

Kernel parameters need to be tuned according to the parameters being changed (refer to "Managing Kernel Resources" in "Server Administration" in the PostgreSQL Documentation for details).

Note

- Do not directly edit the following postgresql.conf parameters with a text editor, otherwise WebAdmin may not work properly if you make a mistake):

  - port

  - archive_mode

  - archive_command

  - wal_level

  - log_line_prefix

  - log_destination

- logging_collector

- log_directory

- log_file_mode

- log_filename

- log_truncate_on_rotation

- log_rotation_age

- backup_destination

- You must take care with the following parameter:

- superuser_reserved_connections

Set it to a number that includes the 3 connections required in WebAdmin (the default is 3).

. . . .

pg_hba.conf

Refer to "Client Authentication" in "Server Administration" in the PostgreSQL Documentation for information on content that can be configured in pg_hba.conf.

Note
. . . .

- Configure the instance administrator permissions in the "local" connection format settings. WebAdmin may not work properly if permissions are not configured.

- If you specify an item or value that cannot be set by WebAdmin when editing the pg_hba.conf file with a text editor, it will not be possible to reference that line from WebAdmin.

. . . .

Appendix F Uninstall (middleware) Tool

The Uninstall (middleware) tool is a common tool for Fujitsu middleware products. It manages information about the Fujitsu middleware products installed, as well as launching the product uninstallers. However, it cannot be used to uninstall Symfoware Server.

Note
....

This tool manages information for other Fujitsu middleware products, as well as for Symfoware Server. Do not uninstall it unless it is absolutely necessary.

If you must uninstall this tool, follow the steps below:

1. Start the Uninstall (middleware) tool, and ensure that there are no other Fujitsu middleware products left on the system:

   ```
   /opt/FJSVcir/cimanager.sh -c
   ```

   -c: Command interface

   Note: The command will fail to start if the command path includes spaces, so do not move this command to a directory whose name contains spaces.

2. If no Fujitsu middleware products are installed, run the following uninstall command:

   ```
   /opt/FJSVcir/bin/cirremove.sh
   ```

3. In the " This software is a common tool of Fujitsu products.Are you sure you want to remove it?[y/n]: " prompt, enter "y" - the uninstallation will finish in a few seconds.

4. If the following directories remain, delete them and any files they may contain:

   ```
   /opt/FJSVcir/
   ```
....

Appendix G Estimating Database Disk Space Requirements

This appendix describes how to estimate database disk space requirements.

G.1 Estimating Table Size Requirements

The following tables provide the formulas for estimating table size requirements.

Table G.1 Estimation formula when the record length is 2032 bytes or less

Item	Estimation formula (bytes)
(1) Record length	23 + NULL map + OID + column data NULL map: Number of columns / 8 (*1) OID: 4 for a table "WITH OID". The default is 0. Column data: Sum of the lengths of columns (*2) *1: Rounded up to the next integer. *2: The length of each column depends on its data type (refer to "G.3 Sizes of Data Types" for details). - You must adjust the sum length (record head + NULL map + OID) and record length so that they are a multiple of 8 bytes. For example, if the calculation gives 28 bytes, add 4 to make 32 bytes. - Each column data length must be a multiple of a certain number of bytes, depending on the data type. For example, to align the storage location of INT type data to a multiple of 4 bytes, add 2 to the following table column data size so that 2 (size of c1)+2+4 (size of c2)=8 bytes. `create table tb1(c1 char(1),c2 int)` - If the calculated record length exceeds 2032 bytes, variable-length data in the record may be automatically compressed. In this case, use the estimation formula given in "Table G.2 Estimation formula when the record length exceeds 2032 bytes" to estimate table size requirements.
(2) Number of records per page	8168 (*1) / ((1) record length + 4 (*2)) *1: Page length (8192) - page head (24) *2: Pointer length (4) - Round the number of records per page calculated at (2) to the nearest integer.
(3)Number of pages required for storing records	Total number of records / (2) number of records per page Round the number of pages required for storing records calculated at (3) to the nearest integer.
(4) Amount of space	(3) Number of pages required for storing records x page length x safety factor (*1) *1: Specify 2.0 or higher. - This is the safety factor assumed if vacuuming is performed for garbage collection in tables and indexes.

Table G.2 Estimation formula when the record length exceeds 2032 bytes

Item	Estimation formula (bytes)
(4) Amount of space	Total number of records x (1) record length x safety factor (*1) *1: Specify 2.0 or higher.

Item	Estimation formula (bytes)
	- This is the safety factor assumed if vacuuming is performed for garbage collection in tables and indexes.

G.2 Estimating Index Size Requirements

This section provides the formulas for estimating index size requirements.

Open SQL provides five index types: B-tree, Hash, GiST, GIN, and SP-GiST (the same as PostgreSQL). If you do not specify the index type in the CREATE INDEX statement, a B-tree index is generated.

The following describes how to estimate a B-tree index.

A B-tree index is saved as a fixed-size page of 8 KB. The page types are meta, root, leaf, internal, deleted, and empty. Since leaf pages usually account for the highest proportion of space required, you need to calculate the requirements for these only.

Table G.3 Estimation formula when the key data length is 512 bytes or less

Item	Estimation formula (bytes)
(1) Entry length	8 (*1) + key data length (*2) *1: Entry head *2: The key data length depends on its data type (refer to "G.3 Sizes of Data Types" for details). The key data length must be a multiple of 8 bytes. For example, if the calculation gives 28 bytes, adjust the length to 32 bytes. - f the key data length exceeds 512 bytes, key data may be automatically compressed. In this case, use the estimation formula given in "Table G.4 Estimation formula when the key data length exceeds 512 bytes" to estimate the key data length.
(2) Page size requirement	8152 (*1) *1: Page length (8192) - page header (24) - special data (16) = 8152
(3) Number of entries per page	(2) Page size requirement / ((1) entry length + 4 (*1)) *1: Pointer length - Round the number of entries per page calculated at (3) to the nearest integer.
(4) Number of pages required for storing indexes	Total number of records / (3) number of entries per page - Round the number of pages required for storing indexes calculated at (4) to the nearest integer.
(5) Space requirement	(4) Number of pages required for storing indexes x 8192 (*1) / usage rate (*2) *1: Page length *2: Specify 0.7 or lower.

Table G.4 Estimation formula when the key data length exceeds 512 bytes

Item	Estimation formula (bytes)
(5) Space requirement	Total number of records x key data length x compression ratio (*1) / usage rate (*2) *1: The compression ratio depends on the data value, so specify 1. *2: Specify 0.7 or lower as the usage rate.

G.3 Sizes of Data Types

This section lists the sizes of the data types.

G.3.1 Sizes of Fixed-Length Data Types

The following table lists the sizes of fixed-length data types.

Data type	Size (bytes)
SMALLINT (INT2)	2
INTEGER (INT4)	4
BIGINT (INT8)	8
REAL	4
DOUBLE PRECISION	8
SERIAL (SERIAL4)	4
BIGSERIAL (SERIAL8)	8
MONEY	8
FLOAT	8
FLOAT (1-24)	4
FLOAT (25-53)	8
TIMESTAMP WITHOUT TIME ZONE	8
TIMESTAMP WITH TIME ZONE	8
DATE	4
TIME WITHOUT TIME ZONE	8
TIME WITH TIME ZONE	12
INTERVAL	12
BOOLEAN	1
CIDR	IPv4: 7 IPv6: 19
INET	IPv4: 7 IPv6: 19
MACADDR	6
POINT	16
LINE	32
LSEG	32
BOX	32
CIRCLE	24

G.3.2 Sizes of Variable-Length Data Types

The following table lists the sizes of variable-length data types.

Data type	Size (bytes)	Remarks
path	Length of size portion + 12 + 16 x number of vertices	1) When carrying out division, round to the next integer.
polygon	Length of size portion + 36 + 16 x number of vertices	2) If the real data length is less than 127, then the length of the size portion is 1 byte, otherwise it is 4 bytes.
decimal	Length of size portion + 2 + (integer precision / 4 + decimal precision / 4) x 2	3) The number of bytes per character depends on the character set (refer to "G.3.4 Number of Bytes per Character" for details).
numeric		

Data type	Size (bytes)	Remarks
bytea	Length of size portion + real data length	
character varying(n), varchar(n)	Length of size portion + number of characters x number of bytes per character	
character(n), char(n)	Length of size portion + n x number of bytes per character	
text	Length of size portion + number of characters x number of bytes per character	

G.3.3 Sizes of Array Data Types

The following table lists the sizes of array data types.

Data type	Size (bytes)	Remarks
Array	Length of size portion + 12 + 8 x number of dimensions + data size of each item	If the real data length is less than 127, then the length of the size portion is 1 byte, otherwise it is 4 bytes. - Example of estimation when array data is "ARRAY[[1,2,3],[1,2,3]]" Number of dimensions: 2 INTEGER data size: 4 Total size = 1+12+8x2+6x4 = 53

G.3.4 Number of Bytes per Character

The following table lists the number of bytes per character.

The given values relate to the common character sets EUC-JP and UTF8.

Character type	Character set	Number of bytes per character
ASCII	EUC_JP	1
Halfwidth katakana	EUC_JP	2
JIS X 0208 kanji characters	EUC_JP	2
JIS X 0212 kanji characters	EUC_JP	3
ASCII	UTF8	1
Halfwidth katakana	UTF8	3
JIS X 0208 kanji characters	UTF8	3
JIS X 0212 kanji characters	UTF8	3

G.4 Estimating Transaction Log Space Requirements

This section provides the formula for estimating transaction log space requirements.

```
Transaction log space requirements = ( checkpoint_segments x 3 + 1 ) x 16 MB
```

However, if the update volume is extremely high (for example, due to a large data load and batch processing), disk writing at a checkpoint may not be able to keep up with the load, and a higher number of transaction logs than indicated here may temporarily be accumulated.

G.5 Estimating Archive Log Space Requirements

This section explains how to estimate archive log space requirements.

The archive log is an archive of the transaction logs from the time of a previous backup to the present, so it fluctuates depending on the backup period and the content of update transactions.

The longer the backup period and the more update transactions, the greater the space required for the archive log.

Therefore, measure the actual archive log space by using a test environment to simulate backup scheduling and database update in a real operating environment.

G.6 Estimating Backup Disk Space Requirements

This section provides the formula for estimating backup disk space requirements.

```
Backup disk space requirements = size of the database cluster + transaction log space requirements
                        + archive log space requirements
```

Appendix H Estimating Memory Requirements

This section describes the formulas for estimating Symfoware Server memory requirements.

Use the formula below to obtain a rough estimate of the memory amount used for Symfoware Server.

```
symfowareServerRequiredMemory = sharedMemoryAmount + localMemoryAmount
```

Shared memory amount

Refer to "Table: PostgreSQL Shared Memory Usage" in "Shared Memory and Semaphores" under "Server Administration" in the PostgreSQL Documentation for information on shared memory.

Local memory amount

```
localMemoryAmount = processStackArea
                  + memoryUsedInDbSessionsThatUseTempTables
                  + memoryUsedInDbSessionsThatPerformSortAndHashTableOperations
                  + memoryUsedInMaintenanceOperations
                  + baseMemoryUsedInEachProcess
                  + memoryUsedPreparingForDataAccess
```

Process stack area

```
processStackArea
  = max_stack_depth x (max_connections + autovacuum_max_workers + 9)
```

This formula evaluates to the maximum value.
Actually it is used according to the growth of the stack.
In the formula above, 9 is the number of processes that perform roles specific to servers.

Memory used in database sessions that use temporary tables

```
memoryUsedInDbSessionsThatUseTempTables
  = temp_buffers x max_connections
```

This formula evaluates to the maximum value.
Memory is gradually used as temporary buffers are used, and is released when the session ends.

Memory used in database sessions that perform sort and hash table operations

```
memoryUsedInDbSessionsThatPerformSortAndHashTableOperations
  = work_mem x max_connections
```

This formula evaluates to the maximum value.
Memory is gradually used as operations such as sort are performed, and is released when the query ends.

Memory used in maintenance operations

```
memoryUsedInMaintenanceOperations
  = maintenance_work_mem x (numOfSessionsPerformingMaintenance + autovacuum_max_workers)
```

Note that 'maintenance operations' are operations such as VACUUM, CREATE INDEX, and ALTER TABLE ADD FOREIGN KEY.

Base memory used in each process

```
baseMemoryUsedInEachProcess
  = 3MB x (max_connections + autovacuum_max_workers + 9)
```

This formula evaluates to the memory used when server processes are running.
In the formula above, 9 is the number of processes that perform roles specific to servers.

Memory used preparing for data access

```
memoryUsedPreparingForDataAccess
 = variationAmount x (max_connections + autovacuum_max_workers + 4)

  where variationAmount = shared_buffers / 8KB x 4 bytes
       (note that 8KB is the page length, and 4 bytes is the size of page management data)
```

This formula evaluates to the memory required to access the database cache in the shared memory.

In the formula above, among the processes that perform roles specific to servers, 4 is the number of processes that access the database.

Appendix I   Quantitative Limits

This appendix lists the quantitative limits of Symfoware Server.

Table I.1 Data size

Item	Limit
Data size per record for input data files (COPY statement, psql command \copy meta command)	Up to 800 megabytes (*1)
Data size per record for output data files (COPY statement, psql command \copy meta command)	Up to 800 megabytes (*1)
Output data file (pg_dump, pg_dumpall) size	Up to one terabyte
Sort work area size (under pgsql_tmp)	Up to one terabyte
Core file size	Up to one terabyte

*1: Operation might proceed correctly even if operations are performed with a quantity outside the limits.

Table I.2 Length of identifier

Item	Limit
Database name	Up to 63 bytes (*1)(*2)
Schema name	Up to 63 bytes (*1)(*2)
Table name	Up to 63 bytes (*1)(*2)
View name	Up to 63 bytes (*1)(*2)
Index name	Up to 63 bytes (*1)(*2)
Table space name	Up to 63 bytes (*1)(*2)
Cursor name	Up to 63 bytes (*1)(*2)
Function name	Up to 63 bytes (*1)(*2)
Aggregate function name	Up to 63 bytes (*1)(*2)
Trigger name	Up to 63 bytes (*1)(*2)
Constraint name	Up to 63 bytes (*1)(*2)
Conversion name	Up to 63 bytes (*1)(*2)
Role name	Up to 63 bytes (*1)(*2)
Cast name	Up to 63 bytes (*1)(*2)
Collation sequence name	Up to 63 bytes (*1)(*2)
Encoding method conversion name	Up to 63 bytes (*1)(*2)
Domain name	Up to 63 bytes (*1)(*2)
Extension name	Up to 63 bytes (*1)(*2)
Operator name	Up to 63 bytes (*1)(*2)
Operator class name	Up to 63 bytes (*1)(*2)
Operator family name	Up to 63 bytes (*1)(*2)
Rewrite rule name	Up to 63 bytes (*1)(*2)
Sequence name	Up to 63 bytes (*1)(*2)
Text search settings name	Up to 63 bytes (*1)(*2)
Text search dictionary name	Up to 63 bytes (*1)(*2)

Item	Limit
Text search parser name	Up to 63 bytes (*1)(*2)
Text search template name	Up to 63 bytes (*1)(*2)
Data type name	Up to 63 bytes (*1)(*2)
Enumerator type label	Up to 63 bytes (*1)(*2)

*1: This is the character string byte length when converted by the server character set character code.

*2: If an identifier that exceeds 63 bytes in length is specified, the excess characters are truncated and it is processed.

Table I.3 Database object

Item	Limit
Number of databases	Less than 4,294,967,296 (*1)
Number of schemas	Less than 4,294,967,296 (*1)
Number of tables	Less than 4,294,967,296 (*1)
Number of views	Less than 4,294,967,296 (*1)
Number of indexes	Less than 4,294,967,296 (*1)
Number of table spaces	Less than 4,294,967,296 (*1)
Number of functions	Less than 4,294,967,296 (*1)
Number of aggregate functions	Less than 4,294,967,296 (*1)
Number of triggers	Less than 4,294,967,296 (*1)
Number of constraints	Less than 4,294,967,296 (*1)
Number of conversion	Less than 4,294,967,296 (*1)
Number of roles	Less than 4,294,967,296 (*1)
Number of casts	Less than 4,294,967,296 (*1)
Number of collation sequences	Less than 4,294,967,296 (*1)
Number of encoding method conversions	Less than 4,294,967,296 (*1)
Number of domains	Less than 4,294,967,296 (*1)
Number of extensions	Less than 4,294,967,296 (*1)
Number of operators	Less than 4,294,967,296 (*1)
Number of operator classes	Less than 4,294,967,296 (*1)
Number of operator families	Less than 4,294,967,296 (*1)
Number of rewrite rules	Less than 4,294,967,296 (*1)
Number of sequences	Less than 4,294,967,296 (*1)
Number of text search settings	Less than 4,294,967,296 (*1)
Number of text search dictionaries	Less than 4,294,967,296 (*1)
Number of text search parsers	Less than 4,294,967,296 (*1)
Number of text search templates	Less than 4,294,967,296 (*1)
Number of data types	Less than 4,294,967,296 (*1)
Number of enumerator type labels	Less than 4,294,967,296 (*1)
Number of default access privileges defined in the ALTER DEFAULT PRIVILEGES statement	Less than 4,294,967,296 (*1)

Item	Limit
Number of large objects	Less than 4,294,967,296 (*1)
Number of rows in tables defined by WITH OIDS	Less than 4,294,967,296 (*1)
Number of index access methods	Less than 4,294,967,296 (*1)

*1: The total number of all database objects must be less than 4,294,967,296.

Table I.4 Schema element

Item	Limit
Number of columns that can be defined in one table	Up to 1,600
Table row length	Up to 400 gigabytes
Number of columns comprising a unique constraint	Up to 32 columns
Data length comprising a unique constraint	Less than 2,000 bytes (*1)(*2)
Table size	Up to one terabyte
Search condition character string length in a trigger definition statement	Up to 800 megabytes (*1)(*2)

*1: Operation might proceed correctly even if operations are performed with a quantity outside the limits.

*2: This is the character string byte length when converted by the server character set character code.

Table I.5 Index

Item	Limit
Number of columns comprising a key (B-tree, GiST, GIN index)	Up to 32 columns
Key length	Less than 2,000 bytes (*1)

*1: This is the character string byte length when converted by the server character set character code.

Table I.6 Data types and attributes that can be handled

Item			Limit
Character	Data length		Data types and attributes that can be handled (*1)
	Specification length (n)		Up to 10,485,760 characters (*1)
Numeric	External decimal expression		Up to 131,072 digits before the decimal point, and up to 16,383 digits after the decimal point
	Internal binary expression	2 bytes	From -32,768 to 32,767
		4 bytes	From -2,147,483,648 to 2,147,483,647
		8 bytes	From -9,223,372,036,854,775,808 to 9,223,372,036,854,775,807
	Internal decimal expression		Up to 13,1072 digits before the decimal point, and up to 16,383 digits after the decimal point
	Floating point expression	4 bytes	From -3.4E+38 to -7.1E-46, 0, or from 7.1E-46 to 3.4E+38
		8 bytes	From -1.7E+308 to -2.5E-324, 0, or from 2.5E-324 to 1.7E+308
bytea			Up to one gigabyte minus 53 bytes
Large object			Up to two gigabytes

*1: This is the character string byte length when converted by the server character set character code.

Table I.7 Function definition

Item	Limit
Number of arguments that can be specified	Up to 100
Number of variable names that can be specified in the declarations section	No limit
Number of SQL statements or control statements that can be specified in a function processing implementation	No limit

Table I.8 Data operation statement

Item	Limit
Maximum number of connections for one process in an application (remote access)	4,000 connections
Number of expressions that can be specified in a selection list	Up to 1,664
Number of tables that can be specified in a FROM clause	No limit
Number of unique expressions that can be specified in a selection list/ DISTINCT clause/ORDER BY clause/GROUP BY clause within one SELECT statement	Up to 1,664
Number of expressions that can be specified in a GROUP BY clause	No limit
Number of expressions that can be specified in an ORDER BY clause	No limit
Number of SELECT statements that can be specified in a UNION clause/INTERSECT clause/EXCEPT clause	Up to 4,000 (*1)
Number of nestings in joined tables that can be specified in one view	Up to 4,000 (*1)
Number of functions or operator expressions that can be specified in one expression	Up to 4,000 (*1)
Number of expressions that can be specified in one row constructor	Up to 1,664
Number of expressions that can be specified in an UPDATE statement SET clause	Up to 1,664
Number of expressions that can be specified in one row of a VALUES list	Up to 1,664
Number of expressions that can be specified in a RETURNING clause	Up to 1,664
Total expression length that can be specified in the argument list of one function specification	Up to 800 megabytes (*2)
Number of cursors that can be processed simultaneously by one session	No limit
Character string length of one SQL statement	Up to 800 megabytes (*1) (*3)
Number of input parameter specifications that can be specified in one dynamic SQL statement	No limit
Number of tokens that can be specified in one SQL statement	Up to 10,000
Number of values that can be specified as a list in a WHERE clause IN syntax	No limit
Number of expressions that can be specified in a USING clause	No limit
Number of JOINs that can be specified in a joined table	Up to 4,000 (*1)

Item	Limit
Number of expressions that can be specified in COALESCE	No limit
Number of WHEN clauses that can be specified for CASE in a simple format or a searched format	No limit
Data size per record that can be updated or inserted by one SQL statement	Up to one gigabyte minus 53 bytes
Number of objects that can share a lock simultaneously	Up to 256,000 (*1)

*1: Operation might proceed correctly even if operations are performed with a quantity outside the limits.

*2: The total number of all database objects must be less than 4,294,967,296.

*3: This is the character string byte length when converted by the server character set character code.

Index