FUJITSU

ServerView Resource Orchestrator Virtual Edition V3.1.0

Design Guide

Windows/Linux

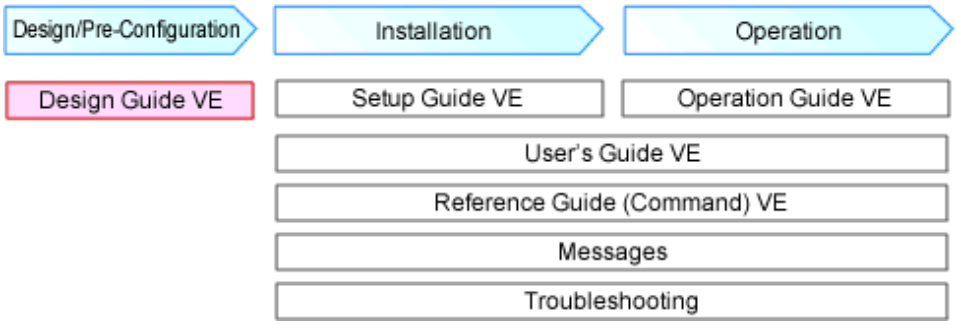
J2X1-7671-01ENZ0(00)
July 2012

Preface

Resource Orchestrator Documentation Road Map

The documentation road map for Resource Orchestrator is as shown below.

Resource Orchestrator Documentation Road Map



For information about the documents for Resource Orchestrator, refer to the "Chapter 1 Documentation Road Map".

Purpose

This manual provides an outline of ServerView Resource Orchestrator (hereinafter Resource Orchestrator) and the design and preparations required for setup.

Target Readers

This manual is written for people who will install Resource Orchestrator.
When setting up systems, it is assumed that readers have the basic knowledge required to configure the servers, storage, and network devices to be installed.

Organization

This manual is composed as follows:

Chapter 1 Documentation Road Map

Explains the documentation road map, and how to read it.

Chapter 2 Overview

Provides an overview of Resource Orchestrator.

Chapter 3 Flow of Resource Orchestrator Design and Preparations

Explains the flow of design and preparations for Resource Orchestrator.

Chapter 4 System Configuration Design

Explains points to keep in mind when setting up a Resource Orchestrator environment.

Chapter 5 Defining User Accounts

Explains the user accounts used in Resource Orchestrator.

Chapter 6 Defining and Configuring the Server Environment

Explains how to define and configure server environments.

Chapter 7 Defining and Configuring the Network Environment

Explains how to define and pre-configure the network environment.

Chapter 8 Defining and Configuring the Storage Environment

Explains how to decide and configure the storage environment.

Chapter 9 Defining and Configuring Server Virtualization Software

Explains how to decide and configure server virtualization software.

Chapter 10 Installing and Defining Single Sign-On

Explains the function to perform Single Sign-On in coordination with ServerView Operations Manager.

Chapter 11 Deciding and Configuring the Power Monitoring Environment

Explains how to decide and configure the power monitoring environment.

Appendix A Port List

Explains the ports used by Resource Orchestrator.

Appendix B HTTPS Communications

Explains the HTTPS communication protocol used by Resource Orchestrator and its security features.

Appendix C Hardware Configuration

Explains how to configure hardware.

Appendix D Server Virtualization Products

Explains the functions available for each server virtualization product managed in Resource Orchestrator.

Glossary

Explains the terms used in this manual. Please refer to it when necessary.

Notational Conventions

The notation in this manual conforms to the following conventions.

- When using Resource Orchestrator and the functions necessary differ due to the necessary basic software (OS), it is indicated as follows:

[Windows Manager]	Sections related to Windows manager
[Linux Manager]	Sections related to Linux manager
[Windows]	Sections related to Windows (When not using Hyper-V)
[Linux]	Sections related to Linux
[Red Hat Enterprise Linux]	Sections related to Red Hat Enterprise Linux
[Solaris]	Sections related to Solaris or Solaris Containers
[VMware]	Sections related to VMware
[Hyper-V]	Sections related to Hyper-V
[Xen]	Sections related to Xen
[KVM]	Sections related to RHEL-KVM
[Solaris Containers]	Sections related to Solaris containers
[Physical Servers]	Sections related to physical servers
[VM host]	Sections related to VMware, Windows Server 2008 with Hyper-V enabled, Xen, RHEL-KVM, and Solaris containers

- Unless specified otherwise, the blade servers mentioned in this manual refer to PRIMERGY BX servers.
- Oracle Solaris may also be indicated as Solaris, Solaris Operating System, or Solaris OS.
- References and character strings or values requiring emphasis are indicated using double quotes (").
- Window names, dialog names, menu names, and tab names are shown enclosed by brackets ([ ]).
- Button names are shown enclosed by angle brackets (< >) or square brackets ([ ]).

- The order of selecting menus is indicated using [ ]-[ ].
- Text to be entered by the user is indicated using bold text.
- Variables are indicated using italic text and underscores.
- The ellipses ("...") in menu names, indicating settings and operation window startup, are not shown.
- The ">" used in Windows is included in usage examples. When using Linux, read ">" as meaning "#".
- The URLs in this manual were correct when the manual was written.

Menus in the ROR console

Operations on the ROR console can be performed using either the menu bar or pop-up menus.
By convention, procedures described in this manual only refer to pop-up menus.

Abbreviations

The following abbreviations are used in this manual:

Abbreviation	Products
Windows	Microsoft(R) Windows Server(R) 2008 Standard Microsoft(R) Windows Server(R) 2008 Enterprise Microsoft(R) Windows Server(R) 2008 R2 Standard Microsoft(R) Windows Server(R) 2008 R2 Enterprise Microsoft(R) Windows Server(R) 2008 R2 Datacenter Microsoft(R) Windows Server(R) 2003 R2, Standard Edition Microsoft(R) Windows Server(R) 2003 R2, Enterprise Edition Microsoft(R) Windows Server(R) 2003 R2, Standard x64 Edition Microsoft(R) Windows Server(R) 2003 R2, Enterprise x64 Edition Windows(R) 7 Professional Windows(R) 7 Ultimate Windows Vista(R) Business Windows Vista(R) Enterprise Windows Vista(R) Ultimate Microsoft(R) Windows(R) XP Professional operating system
Windows Server 2008	Microsoft(R) Windows Server(R) 2008 Standard Microsoft(R) Windows Server(R) 2008 Enterprise Microsoft(R) Windows Server(R) 2008 R2 Standard Microsoft(R) Windows Server(R) 2008 R2 Enterprise Microsoft(R) Windows Server(R) 2008 R2 Datacenter
Windows 2008 x86 Edition	Microsoft(R) Windows Server(R) 2008 Standard (x86) Microsoft(R) Windows Server(R) 2008 Enterprise (x86)
Windows 2008 x64 Edition	Microsoft(R) Windows Server(R) 2008 Standard (x64) Microsoft(R) Windows Server(R) 2008 Enterprise (x64)
Windows Server 2003	Microsoft(R) Windows Server(R) 2003 R2, Standard Edition Microsoft(R) Windows Server(R) 2003 R2, Enterprise Edition Microsoft(R) Windows Server(R) 2003 R2, Standard x64 Edition Microsoft(R) Windows Server(R) 2003 R2, Enterprise x64 Edition
Windows 2003 x64 Edition	Microsoft(R) Windows Server(R) 2003 R2, Standard x64 Edition Microsoft(R) Windows Server(R) 2003 R2, Enterprise x64 Edition
Windows 7	Windows(R) 7 Professional Windows(R) 7 Ultimate

Abbreviation	Products
Windows Vista	Windows Vista(R) Business Windows Vista(R) Enterprise Windows Vista(R) Ultimate
Windows XP	Microsoft(R) Windows(R) XP Professional operating system
Windows PE	Microsoft(R) Windows(R) Preinstallation Environment
Linux	Red Hat(R) Enterprise Linux(R) AS (v.4 for x86) Red Hat(R) Enterprise Linux(R) ES (v.4 for x86) Red Hat(R) Enterprise Linux(R) AS (v.4 for EM64T) Red Hat(R) Enterprise Linux(R) ES (v.4 for EM64T) Red Hat(R) Enterprise Linux(R) AS (4.5 for x86) Red Hat(R) Enterprise Linux(R) ES (4.5 for x86) Red Hat(R) Enterprise Linux(R) AS (4.5 for EM64T) Red Hat(R) Enterprise Linux(R) ES (4.5 for EM64T) Red Hat(R) Enterprise Linux(R) AS (4.6 for x86) Red Hat(R) Enterprise Linux(R) ES (4.6 for x86) Red Hat(R) Enterprise Linux(R) AS (4.6 for EM64T) Red Hat(R) Enterprise Linux(R) ES (4.6 for EM64T) Red Hat(R) Enterprise Linux(R) AS (4.7 for x86) Red Hat(R) Enterprise Linux(R) ES (4.7 for x86) Red Hat(R) Enterprise Linux(R) AS (4.7 for EM64T) Red Hat(R) Enterprise Linux(R) ES (4.7 for EM64T) Red Hat(R) Enterprise Linux(R) AS (4.8 for x86) Red Hat(R) Enterprise Linux(R) ES (4.8 for x86) Red Hat(R) Enterprise Linux(R) AS (4.8 for EM64T) Red Hat(R) Enterprise Linux(R) ES (4.8 for EM64T) Red Hat(R) Enterprise Linux(R) 5 (for x86) Red Hat(R) Enterprise Linux(R) 5 (for Intel64) Red Hat(R) Enterprise Linux(R) 5.1 (for x86) Red Hat(R) Enterprise Linux(R) 5.1 (for Intel64) Red Hat(R) Enterprise Linux(R) 5.2 (for x86) Red Hat(R) Enterprise Linux(R) 5.2 (for Intel64) Red Hat(R) Enterprise Linux(R) 5.3 (for x86) Red Hat(R) Enterprise Linux(R) 5.3 (for Intel64) Red Hat(R) Enterprise Linux(R) 5.4 (for x86) Red Hat(R) Enterprise Linux(R) 5.4 (for Intel64) Red Hat(R) Enterprise Linux(R) 5.5 (for x86) Red Hat(R) Enterprise Linux(R) 5.5 (for Intel64) Red Hat(R) Enterprise Linux(R) 5.6 (for x86) Red Hat(R) Enterprise Linux(R) 5.6 (for Intel64) Red Hat(R) Enterprise Linux(R) 5.7 (for x86) Red Hat(R) Enterprise Linux(R) 5.7 (for Intel64) Red Hat(R) Enterprise Linux(R) 6 (for x86) Red Hat(R) Enterprise Linux(R) 6 (for Intel64) Red Hat(R) Enterprise Linux(R) 6.1 (for x86) Red Hat(R) Enterprise Linux(R) 6.1 (for Intel64) Red Hat(R) Enterprise Linux(R) 6.2 (for x86) Red Hat(R) Enterprise Linux(R) 6.2 (for Intel64) SUSE(R) Linux Enterprise Server 10 Service Pack2 for x86 SUSE(R) Linux Enterprise Server 10 Service Pack2 for EM64T SUSE(R) Linux Enterprise Server 10 Service Pack3 for x86 SUSE(R) Linux Enterprise Server 10 Service Pack3 for EM64T SUSE(R) Linux Enterprise Server 11 for x86 SUSE(R) Linux Enterprise Server 11 for EM64T SUSE(R) Linux Enterprise Server 11 Service Pack1 for x86 SUSE(R) Linux Enterprise Server 11 Service Pack1 for EM64T

Abbreviation	Products
	Oracle Enterprise Linux Release 5 Update 4 for x86 (32 Bit) Oracle Enterprise Linux Release 5 Update 4 for x86_64 (64 Bit) Oracle Enterprise Linux Release 5 Update 5 for x86 (32 Bit) Oracle Enterprise Linux Release 5 Update 5 for x86_64 (64 Bit)
Red Hat Enterprise Linux	Red Hat(R) Enterprise Linux(R) AS (v.4 for x86) Red Hat(R) Enterprise Linux(R) ES (v.4 for x86) Red Hat(R) Enterprise Linux(R) AS (v.4 for EM64T) Red Hat(R) Enterprise Linux(R) ES (v.4 for EM64T) Red Hat(R) Enterprise Linux(R) AS (4.5 for x86) Red Hat(R) Enterprise Linux(R) ES (4.5 for x86) Red Hat(R) Enterprise Linux(R) AS (4.5 for EM64T) Red Hat(R) Enterprise Linux(R) ES (4.5 for EM64T) Red Hat(R) Enterprise Linux(R) AS (4.6 for x86) Red Hat(R) Enterprise Linux(R) ES (4.6 for x86) Red Hat(R) Enterprise Linux(R) AS (4.6 for EM64T) Red Hat(R) Enterprise Linux(R) ES (4.6 for EM64T) Red Hat(R) Enterprise Linux(R) AS (4.7 for x86) Red Hat(R) Enterprise Linux(R) ES (4.7 for x86) Red Hat(R) Enterprise Linux(R) AS (4.7 for EM64T) Red Hat(R) Enterprise Linux(R) ES (4.7 for EM64T) Red Hat(R) Enterprise Linux(R) AS (4.8 for x86) Red Hat(R) Enterprise Linux(R) ES (4.8 for x86) Red Hat(R) Enterprise Linux(R) AS (4.8 for EM64T) Red Hat(R) Enterprise Linux(R) ES (4.8 for EM64T) Red Hat(R) Enterprise Linux(R) 5 (for x86) Red Hat(R) Enterprise Linux(R) 5 (for Intel64) Red Hat(R) Enterprise Linux(R) 5.1 (for x86) Red Hat(R) Enterprise Linux(R) 5.1 (for Intel64) Red Hat(R) Enterprise Linux(R) 5.2 (for x86) Red Hat(R) Enterprise Linux(R) 5.2 (for Intel64) Red Hat(R) Enterprise Linux(R) 5.3 (for x86) Red Hat(R) Enterprise Linux(R) 5.3 (for Intel64) Red Hat(R) Enterprise Linux(R) 5.4 (for x86) Red Hat(R) Enterprise Linux(R) 5.4 (for Intel64) Red Hat(R) Enterprise Linux(R) 5.5 (for x86) Red Hat(R) Enterprise Linux(R) 5.5 (for Intel64) Red Hat(R) Enterprise Linux(R) 5.6 (for x86) Red Hat(R) Enterprise Linux(R) 5.6 (for Intel64) Red Hat(R) Enterprise Linux(R) 5.7 (for x86) Red Hat(R) Enterprise Linux(R) 5.7 (for Intel64) Red Hat(R) Enterprise Linux(R) 6 (for x86) Red Hat(R) Enterprise Linux(R) 6 (for Intel64) Red Hat(R) Enterprise Linux(R) 6.1 (for x86) Red Hat(R) Enterprise Linux(R) 6.1 (for Intel64) Red Hat(R) Enterprise Linux(R) 6.2 (for x86) Red Hat(R) Enterprise Linux(R) 6.2 (for Intel64)
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Abbreviation	Products
	Red Hat(R) Enterprise Linux(R) 5.5 (for x86) Red Hat(R) Enterprise Linux(R) 5.5 (for Intel64) Red Hat(R) Enterprise Linux(R) 5.6 (for x86) Red Hat(R) Enterprise Linux(R) 5.6 (for Intel64) Red Hat(R) Enterprise Linux(R) 5.7 (for x86) Red Hat(R) Enterprise Linux(R) 5.7 (for Intel64)
Red Hat Enterprise Linux 6	Red Hat(R) Enterprise Linux(R) 6 (for x86) Red Hat(R) Enterprise Linux(R) 6 (for Intel64) Red Hat(R) Enterprise Linux(R) 6.1 (for x86) Red Hat(R) Enterprise Linux(R) 6.1 (for Intel64) Red Hat(R) Enterprise Linux(R) 6.2 (for x86) Red Hat(R) Enterprise Linux(R) 6.2 (for Intel64)
RHEL-KVM	Red Hat(R) Enterprise Linux(R) 6.1 (for x86) Virtual Machine Function Red Hat(R) Enterprise Linux(R) 6.1 (for Intel64) Virtual Machine Function Red Hat(R) Enterprise Linux(R) 6.2 (for x86) Virtual Machine Function Red Hat(R) Enterprise Linux(R) 6.2 (for Intel64) Virtual Machine Function
Xen	Citrix XenServer(TM) 5.5 Citrix Essentials(TM) for XenServer 5.5, Enterprise Edition Red Hat(R) Enterprise Linux(R) 5.3 (for x86) Linux Virtual Machine Function Red Hat(R) Enterprise Linux(R) 5.3 (for Intel64) Linux Virtual Machine Function Red Hat(R) Enterprise Linux(R) 5.4 (for x86) Linux Virtual Machine Function Red Hat(R) Enterprise Linux(R) 5.4 (for Intel64) Linux Virtual Machine Function Red Hat(R) Enterprise Linux(R) 5.5 (for x86) Linux Virtual Machine Function Red Hat(R) Enterprise Linux(R) 5.5 (for Intel64) Linux Virtual Machine Function Red Hat(R) Enterprise Linux(R) 5.6 (for x86) Linux Virtual Machine Function Red Hat(R) Enterprise Linux(R) 5.6 (for Intel64) Linux Virtual Machine Function Red Hat(R) Enterprise Linux(R) 5.7 (for x86) Linux Virtual Machine Function Red Hat(R) Enterprise Linux(R) 5.7 (for Intel64) Linux Virtual Machine Function
DOS	Microsoft(R) MS-DOS(R) operating system, DR DOS(R)
SUSE Linux Enterprise Server	SUSE(R) Linux Enterprise Server 10 Service Pack2 for x86 SUSE(R) Linux Enterprise Server 10 Service Pack2 for EM64T SUSE(R) Linux Enterprise Server 10 Service Pack3 for x86 SUSE(R) Linux Enterprise Server 10 Service Pack3 for EM64T SUSE(R) Linux Enterprise Server 11 for x86 SUSE(R) Linux Enterprise Server 11 for EM64T SUSE(R) Linux Enterprise Server 11 Service Pack1 for x86 SUSE(R) Linux Enterprise Server 11 Service Pack1 for EM64T
Oracle Enterprise Linux	Oracle Enterprise Linux Release 5 Update 4 for x86 (32 Bit) Oracle Enterprise Linux Release 5 Update 4 for x86_64 (64 Bit) Oracle Enterprise Linux Release 5 Update 5 for x86 (32 Bit) Oracle Enterprise Linux Release 5 Update 5 for x86_64 (64 Bit)
Solaris	Solaris(TM) 10 Operating System
SCVMM	System Center Virtual Machine Manager 2008 R2 System Center 2012 Virtual Machine Manager
VMware	VMware(R) Infrastructure 3 VMware vSphere(R) 4 VMware vSphere(R) 4.1 VMware vSphere(R) 5
VMware ESX	VMware(R) ESX(R)
VMware ESX 4	VMware(R) ESX(R) 4
VMware ESXi	VMware(R) ESXi(TM)

Abbreviation	Products
VMware ESXi 5.0	VMware(R) ESXi(TM) 5.0
VMware Infrastructure 3	VMware(R) Infrastructure 3
VMware Infrastructure Client	VMware(R) Infrastructure Client
VMware vSphere 4.0	VMware vSphere(R) 4.0
VMware vSphere 4.1	VMware vSphere(R) 4.1
VMware vSphere 5	VMware vSphere(R) 5
VMware vSphere Client	VMware vSphere(R) Client
VMware vCenter Server	VMware(R) vCenter(TM) Server
VMware vClient	VMware(R) vClient(TM)
VIOM	ServerView Virtual-IO Manager
ServerView Agent	ServerView SNMP Agents for MS Windows (32bit-64bit) ServerView Agents Linux ServerView Agents VMware for VMware ESX Server
Excel	Microsoft(R) Office Excel(R) 2010 Microsoft(R) Office Excel(R) 2007 Microsoft(R) Office Excel(R) 2003
Excel 2010	Microsoft(R) Office Excel(R) 2010
Excel 2007	Microsoft(R) Office Excel(R) 2007
Excel 2003	Microsoft(R) Office Excel(R) 2003
RCVE	ServerView Resource Coordinator VE
ROR	ServerView Resource Orchestrator
ROR VE	ServerView Resource Orchestrator Virtual Edition
ROR CE	ServerView Resource Orchestrator Cloud Edition
Resource Coordinator	Systemwalker Resource Coordinator
Resource Coordinator VE	ServerView Resource Coordinator VE Systemwalker Resource Coordinator Virtual server Edition
Resource Orchestrator	ServerView Resource Orchestrator

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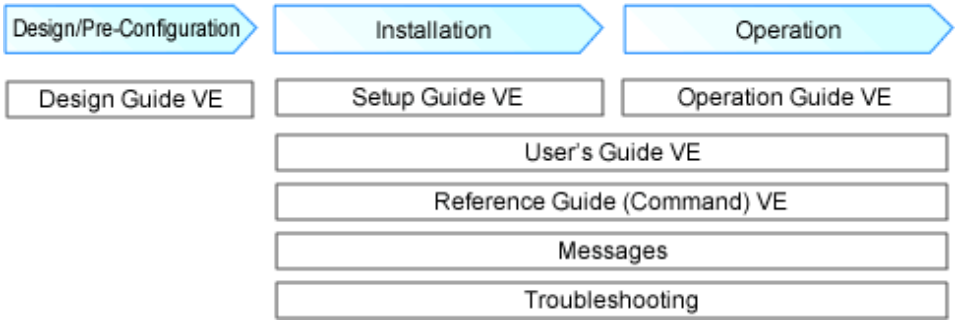
Month/Year Issued, Edition	Manual Code
July 2012, First Edition	J2X1-7671-01ENZ0(00)

Contents

Chapter 1 Documentation Road Map

This chapter explains Documentation Road Map.

Figure 1.1 Documentation road map [Virtual Edition]



The following manuals are provided with Resource Orchestrator. Please refer to them when necessary:

Table 1.1 Manual Name, Abbreviated Form, Purpose [Virtual Edition]

Manual Name	Abbreviated Form	Purpose
ServerView Resource Orchestrator Virtual Edition V3.1.0 Design Guide	Design Guide VE	Please read this first. Read this when you want information about the purposes and uses of basic functions, and how to Design Resource Orchestrator.
ServerView Resource Orchestrator Virtual Edition V3.1.0 Setup Guide	Setup Guide VE	Read this when you want information about how to install Resource Orchestrator.
ServerView Resource Orchestrator Virtual Edition V3.0.0 Operation Guide	Operation Guide VE	Read this when you want information about how to operate systems that you have configured.
ServerView Resource Orchestrator Virtual Edition V3.0.0 User's Guide	User's Guide VE	Read this when you want information about how to operate the GUI.
ServerView Resource Orchestrator Virtual Edition V3.1.0 Reference Guide (Command)	Reference Guide VE	Read this when you want information about how to use commands.
ServerView Resource Orchestrator Virtual Edition V3.1.0 Messages	Messages	Read this when you want detailed information about the corrective actions for displayed messages.
ServerView Resource Orchestrator Virtual Edition V3.1.0 Troubleshooting	Troubleshooting	Read this when you want Troubleshooting.

Chapter 2 Overview

This chapter provides an overview of Resource Orchestrator.

2.1 Features

Resource Orchestrator is server management software which improves the usability and availability of server systems. It uniformly manages physical servers as well as virtual servers created using server virtualization software (VMware and others).

The level of functionality provided by Resource Orchestrator differs depending on the managed hardware environment. For details, refer to the corresponding "Note" in "2.5 Hardware Environment".

This section explains some of the features provided by Resource Orchestrator.

- **Integrated Management of Physical and Virtual Servers**

  Resource Orchestrator provides an integrated management console for environments composed of physical and virtual servers. It helps administrators manage server configurations, monitor hardware failures, and determine the cause and impact of system errors by automatically detecting and displaying the following information.

  - Resource Orchestrator provides a tree-based view of chassis and server hardware and their operating systems (physical OS, VM host, or VM guest).
    This enables easy confirmation and tracking of relationships between chassis, servers, and operating systems.
  - Resource Orchestrator monitors server hardware and displays icons representative of each server's status.

  Resource Orchestrator also allows administrators to manage both physical and virtual servers in a uniform manner. Once registered, resources can be managed uniformly regardless of server models, types of server virtualization software, or differences between physical and virtual servers.

- **Auto-Recovery of Failed Servers**

  The function allows failed applications to automatically be recovered onto an available spare server by pre-allocating spare servers to managed servers.
  Depending on the server's boot method, one of the four following switchover methods can be used to recover applications on a spare server:

  - Backup and restore

    This method is used in local boot environments where servers boot from an internal disk. Backing up the system disk of a primary server in advance allows automatic restoration and startup of the spare server when the primary server fails.

  - HBA address rename

    This method is used in SAN boot environments where servers start from boot disks located in SAN storage arrays. If the primary server fails, its World Wide Name (WWN) is inherited by the spare server, which then automatically starts up from the same SAN disk. This is made possible by the I/O virtualization (*1) capabilities of the HBA address rename function, which is able to dynamically re-configure the WWN of an I/O adapter (HBA).

  - VIOM server profile exchange method

    This method is used in environments where servers start from boot disks located in SAN storage arrays or on a storage device connected to the LAN. If the primary server fails, the World Wide Name (WWN) and MAC address, boot configuration, and network configuration set in its server profile are inherited by the spare server, which then automatically starts up from the same boot disk. This is made possible by the I/O virtualization (*1) capabilities of the HBA address rename function, which is able to dynamically re-configure the WWN of an I/O adapter (HBA).
    For details on server profiles, refer to the ServerView Virtual-IO Manager manual.

    *1: Refer to "I/O Virtualization".

  - Storage affinity switchover method

    This method is used in SAN boot environments where servers start from boot disks located in SAN storage arrays. If the primary server fails, its switch zoning and host affinity configurations set in the fibre channel switch and the SAN storage using ESC are inherited by the WWN (World Wide Name) of the spare server, which then automatically starts up from the same SAN disk.

The following LAN switch settings can also be exchanged between primary and spare servers during server switchover. This feature supports the backup and restore, HBA address rename, and VIOM server profile exchange methods.

- VLAN
- Port groups (For PRIMERGY BX900/BX400 LAN switch blades operating in IBP mode)

Several servers can share one or more common spare servers, irrespective of the kind of servers used (physical or virtual), or the applications that are running on them.
Spare servers can also be shared between physical and virtual servers. This is done by combining Auto-Recovery with the high availability feature provided with the server virtualization software used.

Note that the Auto-Recovery function differs from clustering software (such as PRIMECLUSTER) in the following respect:

- Server failure detection

  The Auto-Recovery function can detect hardware failures using server management software (such as ServerView Agents) and server management devices (management blades, management boards, or remote management controllers). It cannot detect system slowdowns.

- **Automated Server Installation and Setup**

The following three features simplify server installation and setup:

- Deploying multiple servers via server cloning

  Server cloning is a feature that distributes a cloning image (collected from the system disk of a reference server) to other physical servers.
  When a cloning image is created, network-specific settings such as host names and IP addresses are removed from the cloning image. This network-specific configuration is dynamically re-configured on the servers to which the cloning image is distributed. This makes it possible to create duplicates of existing servers that will use the same operating system and software.

- Simplified server installation using I/O virtualization

  I/O virtualization via HBA address rename (*1) allows storage devices to be set up independently and prior to the rest of the server installation process. Servers can then be installed and set up without the involvement of storage administrators.

  *1: Refer to "I/O Virtualization".

- Multiple server installations using the pre-configuration feature

  The pre-configuration feature can be used to configure all settings required for a Resource Orchestrator setup in a system configuration file, which can then be easily imported from the ROR console.
  The system configuration file is in CSV format and can be edited easily even in environments where Resource Orchestrator is not installed.

- **Streamlined Server Maintenance**

The following features help to identify which servers need to be replaced, and assist administrators with maintenance required after replacement of a server:

- Automatic maintenance LED activation on failed servers. (*1)

  *1: Depending on the hardware being used, this feature may or may not be available. For details, refer to the corresponding "Note" in "2.5 Hardware Environment".

- In SAN boot environments, the I/O virtualization (*1) provided by either HBA address rename or VIOM makes it possible to restore a failed server's original WWN definition to the replacement server. Resource Orchestrator is able to quickly reconnect a replaced server to its original volume(s) and start it up from the same operating system without accessing any storage device.
  Moreover, with the ability to automatically re-define MAC addresses, boot configuration, and network configuration using VIOM, it is no longer necessary to re-configure network devices or applications that depend on MAC address values.

  *1: Refer to "I/O Virtualization".

- In local boot environments, a system image backed up beforehand can be easily restored to the replaced server to simplify server replacement.

- **Easy Server Monitoring**

  When managing PRIMERGY BX servers, BladeViewer can be used to easily check server statuses and perform other daily operations. In BladeViewer, server statuses are displayed in a format similar to the physical configuration of a blade server system, making server management and operation more intuitive. BladeViewer provides the following features:

  - Display of server blades' mount statuses.
  - An intuitive way to monitor and control multiple server blades' power statuses.
  - Easier visualization of which applications are running on each server blade. This helps to quickly identify any affected applications when a hardware fault occurs on a server blade.

- **Easy Network Monitoring**

  For PRIMERGY BX servers, Resource Orchestrator provides a Network Map function, which helps visualize and relate physical networks (between servers and LAN switches) together with virtualized networks (from VLANs or virtual switches used in server virtualization software). The Network Map provides the following features:

  - Automatic detection and display of network connections (topology) and link statuses between heterogeneous network resources.
  - Facilitates overall network consistency diagnostics and identification of the resources (physical and virtual) affected by a network issue.
  - Displays comprehensive content that can be used as a communication basis for server and network administrators, thus smoothing out coordination between the two parties.

- **Monitoring of Power Consumption**

  By activating the power monitoring feature, it is possible to monitor trends in power consumption for resources equipped with power monitoring capabilities, or resources connected to a registered power monitoring device (PDU or UPS). The power consumption data regularly collected from the power monitoring environment can be output to a file in CSV format or as a graph.

- **Relocation of VM Guests**

  By integrating with VM management software (such as VMware vCenter Server or others) and VM hosts (such as Citrix XenServer or others), Resource Orchestrator provides the ability to migrate VM guests between physical servers directly from the ROR console. When used with other Resource Orchestrator functions, this enables the following:

  - Regrouping of all VM guests to a subset of servers and shut down of any unused servers or chassis to reduce overall power consumption.
  - When server maintenance becomes necessary, VM guests can be migrated to alternative servers and their applications kept alive during maintenance work.

I/O Virtualization

I/O adapters (HBA) for servers are shipped with an assigned physical address that is unique across the world. This World Wide Name (WWN) is used by the storage network to identify servers. Until now, the WWN settings on storage networks needed to be updated whenever servers were added, replaced, or switched over. Resource Orchestrator uses I/O virtualization technology that makes server-side I/O control possible. It does this by replacing physically-bound WWNs with virtual WWNs assigned to each server based on its role in the system. Resource Orchestrator can handle two different I/O virtualization technologies (HBA address rename and VIOM).
With VIOM, the ability to re-define MAC addresses of network interfaces, boot configuration, and network configuration means that it is no longer necessary to re-configure network devices or applications that depend on Mac address values.

- The "I/O virtualization option" is required when using HBA address rename.
- ServerView Virtual-IO Manager should be installed on the admin server when integrating Resource Orchestrator with VIOM.
- The following features are unavailable when ServerView Deployment Manager shares the same subnet (admin LAN). In such cases, it is recommended to use ServerView Deployment Manager and ServerView Virtual-IO Manager instead.
  - Cloning

- Backup and restore
- HBA address rename
- Server switchover (based on the backup-restore and HBA address rename methods)

For details, refer to "Appendix B Co-Existence with ServerView Deployment Manager" in the "Setup Guide VE".

2.2 Function Overview

This section details the functions provided by Resource Orchestrator.

Table 2.1 Functions Available for Managed Servers

Function	Description	Benefits	Target resource		
			Physical OS	VM host (*1)	VM guest (*1)
Monitoring	A function for monitoring resource statuses of servers and displaying if the status is normal or not by using the GUI.	Helps identify the cause of a failure and determine its impact on servers, thereby streamlining hardware maintenance.	Yes (*2)	Yes (*2)	Yes
Power control	A function for turning servers ON or OFF.	Enables remote control of a managed server's power state without having direct access to it. This simplifies periodic maintenance tasks that involve power control operations.	Yes	Yes	Yes
Backup and restore (*3)	Creates system image backups of servers that can be easily restored when needed. System images are centrally stored on a disk on the admin server.	Creating backups before any configuration change, OS or software installation, or patch application can drastically reduce the time to restore a server to its original state when hardware or software problems occur.	Yes (*4)	Yes (*4, *5)	No
Hardware maintenance	Functions to simplify hardware replacement. When connected with a SAN, it is not necessary to re-configure storage units by configuring the I/O virtualization settings. Moreover, with the ability to re-define MAC addresses, boot configuration, and network configuration using VIOM, it is no longer necessary to re-configure network devices or applications that depend on MAC address values.	Lightens the workload associated with hardware replacement and reduces the risk of operational errors.	Yes	Yes	-
Server switchover	Recover applications upon hardware failure by switching over primary servers with pre-assigned spare servers.	Shortens and simplifies the recovery procedure in the event of server failure.	Yes	Yes (*6)	No
Cloning (*3)	Creates a cloning image of a reference server and deploys it to other managed servers. Cloning images are centrally	Simplifies OS and software installation when servers are added. Allows servers with identical OS and software configurations to share common backups.	Yes	No	No

Function	Description	Benefits	Target resource		
			Physical OS	VM host (*1)	VM guest (*1)
	stored on a disk on the admin server.				

Yes: Supported
No: Not supported
-: Not applicable
*1: The level of functionality may differ depending on the server virtualization software used for VM hosts and VM guests. Refer to "D.1 Common Functions of Server Virtualization Software" for details.
*2: Depending on the hardware being used, this feature may or may not be available. For details, refer to the corresponding "Note" in "2.5 Hardware Environment".
*3: Not necessary when ServerView Deployment Manager shares the same subnet (admin LAN).
*4: Not supported when using clustering software on managed servers.
*5: When backing up a VM host containing VM guests on its own boot disk, behavior differs according to the server virtualization product used. For details, refer to "D.3 Functional Differences between Products".
*6: Only HBA address rename-based, VIOM-based, or ESC-based switchovers are supported for VM hosts.

Table 2.2 Functions Available for Each Target Operating System

Function		OS (Physical OS, VM Host)										
		Windows		Linux		VMware		Solaris		Xen		KVM
		Windows	Hyper-V (*1, *2)	Red Hat/ Oracle	SUSE (*3)	vSphere 4 (*4, *5, *6)	Infrastructure 3	Solaris 10	Solaris containers	Citrix	Red Hat	Red Hat
Monitoring		Yes	Yes	Yes (*7)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Power control		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Backup and restore		Yes (*8)	Yes (*8)	Yes (*9)	Yes (*10)	No	Yes	No	No	Yes (*10, *11)	Yes (*12)	Yes (*12)
Server switch over	Backup and restore method	Yes (*8)	Yes (*8)	Yes	Yes (*13)	No	Yes	No	No	Yes	Yes	Yes
	HBA address rename method	Yes (*8)	Yes (*8)	Yes	Yes (*13)	Yes	Yes	No	No	Yes	Yes	Yes
	VIOM server profile exchange method	Yes (*8)	Yes (*8)	Yes	Yes (*13)	Yes	Yes	No	No	Yes	Yes	Yes
	Storage affinity switchover method	No	No	No	No	No	No	Yes (*14)	Yes (*14)	No	No	No
Ping monitoring (*15)		Yes	Yes	Yes	Yes	Yes (*16)	Yes	Yes	Yes	Yes	Yes	Yes
Cloning		Yes (*17)	No	Yes (*9)	Yes (*10, *18)	No	No	No	No	No	No	No
VLAN settings (*19)		Yes	Yes	Yes	Yes	Yes	Yes	No	No	Yes	Yes	Yes

Function	OS (Physical OS, VM Host)										
	Windows		Linux		VMware		Solaris		Xen		KVM
	Windows	Hyper-V (*1, *2)	Red Hat/ Oracle	SUSE (*3)	vSphere 4 (*4, *5, *6)	Infrastructure 3	Solaris 10	Solaris containers	Citrix	Red Hat	Red Hat
Pre-configuration	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Yes: Supported
No: Not supported
*1: Only supported when the manager is running on Windows.
*2: VM guest migrations and VM maintenance mode settings require Microsoft(R) System Center Virtual Machine Manager 2008 R2. Moreover, PowerShell 2.0 should be installed on the manager.
*3: Disable the use of persistent network device names.
*4: With BIOS time settings, it is only possible to set UTC (Coordinated Universal Time) for VMware ESX/ESXi of VMware vSphere 4 or later version servers, and local time for Windows servers. Therefore, as the same settings cannot be made, operation with spare servers being shared between VMware ESX/ESXi of VMware vSphere 4 and later versions of servers, and Windows servers is not possible.
*5: When upgrading from VMware Infrastructure 3, system images of VM hosts that were collected prior to the upgrade will be available after the upgrade is complete. However, even if system images from before the upgrade are used for server switchover (using the backup and restore method), the VM hosts will not operate properly. Please be sure to release spare server settings for server switchover using the backup and restore method before performing upgrades. It is recommended to delete all system images collected before change, unless those images are specifically needed.
*6: Management of VM guests with VMware Fault Tolerance enabled is not supported by Resource Orchestrator.
*7: Oracle Enterprise Linux is reported as Red Hat Enterprise Linux.
*8: You must have a volume license for the version of Windows to be installed on managed servers by Resource Orchestrator. With Windows Server 2008, and OEM license can be applied, however OEM licenses are also necessary for restoration target servers, spare servers, and servers after replacement.
*9: When the admin server or a managed server is using Linux, an ext4 file system cannot be used to perform backup and restore and cloning.
*10: When using the backup and restore functions, ensure that the file system is an ext3 file system.
*11: When performing restoration using Resource Orchestrator, do so using hardware with the same NIC configuration as when the backup was made. When performing restoration after NIC's have been replaced or reconfigured, reinstall XenServer referring to the manual for Citrix XenServer.
*12: VM maintenance mode is not supported by this server virtualization product. As a result, system images can be backed up and restored without having to set or release the target VM hosts from VM maintenance mode.
*13: When using the backup and restore method of Resource Orchestrator for server switchover, configure the same SCSI WWID for the source and target.
*14: When configuring the OS file system using UFS, enable logging in the mount settings for UFS file systems in order to prevent fsck execution at startup. Refer to the Solaris System Administration Guide for details on the UFS logging settings.
*15: For details on how to configure these settings, refer to "Chapter 8 Configuring Monitoring Information" in the "Setup Guide VE".
*16: For VMware ESXi, this function is not supported.
*17: You must have a volume license for the version of Windows to be installed on managed servers by Resource Orchestrator.
*18: Auto-configuration of network parameters cannot be used.
*19: Only supported for blade models.

Table 2.3 Functions Available for Blade Chassis

Function	Description	Benefits
Power control	A function for turning chassis ON or OFF.	Enables remote control of a chassis's power state without needing to connect to its management blade. This simplifies periodic maintenance tasks that involve power control operations.

Table 2.4 Functions Available for the Admin Server

Function	Description	Benefits
Pre-configuration	Systems made up of multiple servers can be easily configured or modified using the pre-configuration function to import a pre-defined system configuration file.	Prevents setup mistakes by performing numerous setup operations in a single action. System configuration files can be easily edited on machines where Resource Orchestrator is not installed.
Backup and Restore	Backs up or restores a Resource Orchestrator installation.	Performing backups after configuration changes are made in Resource Orchestrator enables prompt recovery of the admin server in case its internal data is damaged due to administration mistakes or other problems.

Table 2.5 Functions Available for LAN Switches

Function	Description	Benefits	LAN Switch Blades (*1)			LAN Switch
			Switch Mode	IBP Mode	End-Host Mode	
Monitoring	Monitors LAN switches and displays their statuses (normal or error) graphically.	Simplifies identification of the cause and impact of LAN switch failure on servers and speeds up hardware maintenance.	Yes	Yes	Yes	Yes
Network Map	Helps visualize and relate physical networks (between servers and LAN switch blades) together with virtualized networks (from VLANs or virtual switches used in server virtualization software).	Automatically detects and displays network connections (topology) and link statuses for different kinds of resources (network equipment or server virtualization software).	Yes	Yes	Yes	Yes
VLAN Settings	Automates VLAN settings (port VLAN or tagged VLAN) on LAN switches adjacent to servers.	Simplifies the VLAN configuration of LAN switches when adding new servers. During automatic recovery of a failed server, VLANs are automatically reconfigured to preserve connectivity and avoid manual network re-configurations.	Yes	No	Yes	No
Port Group Settings	Automates port group settings on LAN switch blades in IBP mode during server switchover.	Reduces the number of steps necessary to recover the network configuration of a failed server.	No	Yes	No	No
Restore	Restores a LAN switch to its most recent VLAN configuration.	Restores the VLAN configuration on a replaced LAN switch to the configuration that was active before replacement.	Yes	No	Yes	No

Yes: Supported
No: Not supported
*1: For PRIMERGY BX600 LAN switches please refer to the "switch mode" column.

Table 2.6 Functions Available for Power Monitoring Targets

Function	Description	Benefits
Power consumption monitoring	Monitors power consumption trends for resources equipped with power monitoring capabilities, or resources connected to power monitoring devices (PDU or UPS).	This function can be used to measure the effectiveness of environmental policies and cost-saving initiatives on power consumption.

Function	Description	Benefits
	Collects and outputs power consumption data over a given period.	

*1: For details on supported devices, refer to "2.5 Hardware Environment".

Table 2.7 Functions Available for Virtual Machines

Function (*1)	Description	Benefits
Migration of VM guests between servers	Migrates a VM guest from one physical server to another.	Facilitates optimization of VM guest deployments according to server load or planned maintenance.
VM maintenance mode control	Sets (or releases) VM hosts to (or from) a specific state that allows safe server maintenance.	VM hosts can be easily set out of and back into operation.
VM Home Position setting, migration and clearing	Functions for setting, migrating, and clearing VM Home Positions.	Even if VM guests are migrated to different locations, they can be easily returned to their original locations.

*1: Available functions may vary according to the server virtualization software used. Refer to "D.1 Common Functions of Server Virtualization Software" for details.

2.3 Function Differences Depending on Product

The functions available for Resource Orchestrator differ depending on the Resource Orchestrator product purchased.

The functions available for ServerView Resource Orchestrator Virtual Edition (hereinafter ROR VE) and ServerView Resource Orchestrator Cloud Edition (hereinafter ROR CE) differ as follows:

Table 2.8 Function Differences Depending on Product

Function	Description	ROR VE	ROR CE
Server monitoring	A function for monitoring resource statuses of servers and displaying if the status is normal or not by using the GUI.	Yes	Yes
Power control	A function for turning servers ON or OFF.	Yes	Yes
Backup and restore	Creates system image backups of servers that can be easily restored when needed. System images are centrally stored on a disk on the admin server.	Yes	Yes
Hardware maintenance	Functions to simplify hardware replacement.	Yes	Yes
Server switchover	Recover applications upon hardware failure by switching over primary servers with pre-assigned spare servers.	Yes	Yes (*1)
Cloning	Creates a cloning image of a reference server and deploys it to other managed servers. Cloning images are centrally stored on a disk on the admin server.	Yes	Yes (*2)
Resource Pool	A function for effective use of resources.	No	Yes
L-Server	A function that provides L-Servers, logical servers including physical and virtual servers, which are comprised of appropriate resources in a resource pool, such as servers, storage, OS images and network.	No	Yes
L-Platform	A function that provides hierarchical systems comprised of multiple L-Servers, network resources, and network device resources.	No	Yes
Templates	A function that defines L-Platform and L-Server specifications to enable simple configuration of L-Platforms and L-Servers.	No	Yes
Tenants	A function that enables multiple departments to divide and share resources safely.	No	Yes

Function	Description	ROR VE	ROR CE
Dashboard	A function that can be used to easily check resource statuses.	No	Yes
Network device monitoring	Network monitoring is a function which monitors status of resources such as firewalls and displays them using a GUI as normal, abnormal etc	No	Yes
Disaster Recovery	A function that prepares a backup system (a backup site) at remote sites to handle fatal damage caused by disasters, enabling administrators to perform switchover when trouble occurs.	No	Yes (*3)
NS Appliance	NS Appliance is a function which ensures network security by seperating a multi-tier system into individual layers. This runs as a virtual appliance on Physical L-Server.	No	Yes (*4)

*1: Available for physical servers registered in the server tree. For details, refer to "Chapter 18 Server Switchover Settings" of the "User's Guide VE".
*2: Available for physical servers registered in the server tree. For details, refer to "Chapter 17 Cloning [Physical Servers]" of the "User's Guide VE".
*3: Available when the Disaster Recovery option is purchased.
*4: Available when the NS option is purchased.

The support provided for managed server hardware and server virtualization software differs for ROR VE and ROR CE.

The functions of ROR VE can be used with ROR CE, even with hardware and server virtualization software that is not supported.

Example

When using SPARC Enterprise series servers for ROR CE, server management operations, such as server maintenance and switchover can be performed. However, resource pool management operations are not available.

Table 2.9 Managed Server Hardware Differences Depending on Product

Software	Hardware	ROR VE (*1)	ROR CE
Manager	PRIMERGY RX series/BX series/TX series	Yes	Yes
	PRIMEQUEST	Yes	Yes
Agent	PRIMERGY RX series/BX series/TX series	Yes	Yes
	Other PC servers	Yes	Yes
	PRIMEQUEST	Yes	Yes
	SPARC Enterprise series	Yes	Yes

*1: For details, refer to "2.5 Hardware Environment".

Table 2.10 Server Virtualization Software Differences Depending on Product

Software	Server Virtualization Product	ROR VE (*1)	ROR CE
Agent	VMware	Yes	Yes
	Hyper-V	Yes	Yes
	RHEL-Xen	Yes	Yes
	RHEL-KVM	Yes	Yes
	Citrix XenServer	Yes	No
	Oracle VM	No	Yes
	Solaris containers	Yes	Yes

*1: For details, refer to "2.4.2.1 Required Basic Software".

2.4 Software Environment

Resource Orchestrator is composed of the following DVD-ROM.

- ServerView Resource Orchestrator (Windows version)
- ServerView Resource Orchestrator (Linux version)
- ServerView Resource Orchestrator (Solaris version)

2.4.1 Software Organization

Resource Orchestrator is composed of the following software.

Table 2.11 Software Organization

Software	Functional Overview
ServerView Resource Orchestrator V3.1.0 Manager (hereinafter manager)	- Used to control managed servers and neighboring network devices - Operates on the admin server
ServerView Resource Orchestrator V3.1.0 Agent (hereinafter agent)	- Performs pre-configuration during deployment, monitors operating servers, and controls backup and cloning - Operates on managed servers (*1)
ServerView Resource Orchestrator V3.1.0 HBA address rename setup service (hereinafter HBA address rename setup service)	- Realization of high availability of the HBA address rename setup used by the admin server (*2) - Operates on a separate device from the admin server or managed servers, such as a desktop computer

*1: When using a combination of a manager of this version and agents of earlier versions, only operations provided by the agent version are guaranteed.
*2: For details on HBA address rename setup, refer to "8.1 Defining the Storage Environment".

2.4.2 Software Requirements

This section explains the software requirements for installation of Resource Orchestrator.

2.4.2.1 Required Basic Software

The basic software listed below is required when using Resource Orchestrator.

Required Basic Software

Table 2.12 [Windows Manager]

Basic Software (OS)	Remarks
Microsoft(R) Windows Server(R) 2008 Standard (x86, x64) Microsoft(R) Windows Server(R) 2008 Enterprise (x86, x64) Microsoft(R) Windows Server(R) 2008 R2 Standard Microsoft(R) Windows Server(R) 2008 R2 Enterprise Microsoft(R) Windows Server(R) 2008 R2 Datacenter	The Server Core installation option is not supported.
Microsoft(R) Windows Server(R) 2003 R2, Standard Edition Microsoft(R) Windows Server(R) 2003 R2, Enterprise Edition Microsoft(R) Windows Server(R) 2003 R2, Standard x64 Edition Microsoft(R) Windows Server(R) 2003 R2, Enterprise x64 Edition	SP2 or later supported.

Table 2.13 [Linux Manager]

Basic Software (OS)	Remarks
Red Hat(R) Enterprise Linux(R) 6.2 (for x86) Red Hat(R) Enterprise Linux(R) 6.2 (for Intel64) Red Hat(R) Enterprise Linux(R) 6.1 (for x86) Red Hat(R) Enterprise Linux(R) 6.1 (for Intel64) Red Hat(R) Enterprise Linux(R) 6 (for x86) Red Hat(R) Enterprise Linux(R) 6 (for Intel64) Red Hat(R) Enterprise Linux(R) 5.7 (for x86) Red Hat(R) Enterprise Linux(R) 5.7 (for Intel64) Red Hat(R) Enterprise Linux(R) 5.6 (for x86) Red Hat(R) Enterprise Linux(R) 5.6 (for Intel64) Red Hat(R) Enterprise Linux(R) 5.5 (for x86) Red Hat(R) Enterprise Linux(R) 5.5 (for Intel64) Red Hat(R) Enterprise Linux(R) 5.4 (for x86) Red Hat(R) Enterprise Linux(R) 5.4 (for Intel64) Red Hat(R) Enterprise Linux(R) 5.3 (for x86) Red Hat(R) Enterprise Linux(R) 5.3 (for Intel64)	Prepare any required driver kits, update kits, or software. For information about required software, refer to the manual of the server or the Linux installation guide. About Required Package, refer to "Table 2.32 Required Package of Manager [Linux Manager]". The Linux Kernel version depending on the hardware corresponds to the version supported by Fujitsu.

Table 2.14 Agent [Windows]

Basic Software (OS)	Remarks
Microsoft(R) Windows Server(R) 2008 Standard (x86, x64) Microsoft(R) Windows Server(R) 2008 Enterprise (x86, x64) Microsoft(R) Windows Server(R) 2008 R2 Standard Microsoft(R) Windows Server(R) 2008 R2 Enterprise Microsoft(R) Windows Server(R) 2008 R2 Datacenter	The Server Core installation option is not supported.
Microsoft(R) Windows Server(R) 2003, Standard Edition Microsoft(R) Windows Server(R) 2003, Enterprise Edition Microsoft(R) Windows Server(R) 2003, Standard x64 Edition Microsoft(R) Windows Server(R) 2003, Enterprise x64 Edition	SP2 supported.
Microsoft(R) Windows Server(R) 2003 R2, Standard Edition Microsoft(R) Windows Server(R) 2003 R2, Enterprise Edition Microsoft(R) Windows Server(R) 2003 R2, Standard x64 Edition Microsoft(R) Windows Server(R) 2003 R2, Enterprise x64 Edition	SP2 or later supported.

Table 2.15 Agent [Hyper-V]

Basic Software (OS)	Remarks
Microsoft(R) Windows Server(R) 2008 Standard (x64) Microsoft(R) Windows Server(R) 2008 Enterprise (x64) Microsoft(R) Windows Server(R) 2008 R2 Standard Microsoft(R) Windows Server(R) 2008 R2 Enterprise Microsoft(R) Windows Server(R) 2008 R2 Datacenter	The Server Core installation option is not supported. Switch on the role of Hyper-V. Add MSFC.

Table 2.16 Agent [Linux]

Basic Software (OS)	Remarks
Red Hat(R) Enterprise Linux(R) 6.2 (for x86) Red Hat(R) Enterprise Linux(R) 6.2 (for Intel64) Red Hat(R) Enterprise Linux(R) 6.1 (for x86) Red Hat(R) Enterprise Linux(R) 6.1 (for Intel64) Red Hat(R) Enterprise Linux(R) 6 (for x86) Red Hat(R) Enterprise Linux(R) 6 (for Intel64) Red Hat(R) Enterprise Linux(R) 5.7 (for x86) Red Hat(R) Enterprise Linux(R) 5.7 (for Intel64)	Prepare any required driver kits, update kits, or software. For information about required software, refer to the manual of the server or the Linux installation guide. About required packages, refer to "Table 2.33 Required Packages of Agent [Linux]".

Basic Software (OS)	Remarks
Red Hat(R) Enterprise Linux(R) 5.6 (for x86) Red Hat(R) Enterprise Linux(R) 5.6 (for Intel64) Red Hat(R) Enterprise Linux(R) 5.5 (for x86) Red Hat(R) Enterprise Linux(R) 5.5 (for Intel64) Red Hat(R) Enterprise Linux(R) 5.4 (for x86) Red Hat(R) Enterprise Linux(R) 5.4 (for Intel64) Red Hat(R) Enterprise Linux(R) 5.3 (for x86) Red Hat(R) Enterprise Linux(R) 5.3 (for Intel64) Red Hat(R) Enterprise Linux(R) 5.2 (for x86) Red Hat(R) Enterprise Linux(R) 5.2 (for Intel64) Red Hat(R) Enterprise Linux(R) 5.1 (for x86) Red Hat(R) Enterprise Linux(R) 5.1 (for Intel64) Red Hat(R) Enterprise Linux(R) 5 (for x86) Red Hat(R) Enterprise Linux(R) 5 (for Intel64) Red Hat(R) Enterprise Linux(R) AS (4.8 for x86) Red Hat(R) Enterprise Linux(R) ES (4.8 for x86) Red Hat(R) Enterprise Linux(R) AS (4.8 for EM64T) Red Hat(R) Enterprise Linux(R) ES (4.8 for EM64T) Red Hat(R) Enterprise Linux(R) AS (4.7 for x86) Red Hat(R) Enterprise Linux(R) ES (4.7 for x86) Red Hat(R) Enterprise Linux(R) AS (4.7 for EM64T) Red Hat(R) Enterprise Linux(R) ES (4.7 for EM64T) Red Hat(R) Enterprise Linux(R) AS (4.6 for x86) Red Hat(R) Enterprise Linux(R) ES (4.6 for x86) Red Hat(R) Enterprise Linux(R) AS (4.6 for EM64T) Red Hat(R) Enterprise Linux(R) ES (4.6 for EM64T) Red Hat(R) Enterprise Linux(R) AS (4.5 for x86) Red Hat(R) Enterprise Linux(R) ES (4.5 for x86) Red Hat(R) Enterprise Linux(R) AS (4.5 for EM64T) Red Hat(R) Enterprise Linux(R) ES (4.5 for EM64T) Red Hat(R) Enterprise Linux(R) AS (v.4 for x86) Red Hat(R) Enterprise Linux(R) ES (v.4 for x86) Red Hat(R) Enterprise Linux(R) AS (v.4 for EM64T) Red Hat(R) Enterprise Linux(R) ES (v.4 for EM64T) SUSE Linux Enterprise Server 10 SP2 (for x86) SUSE Linux Enterprise Server 10 SP2 (for AMD64, Intel64) SUSE Linux Enterprise Server 10 SP3 (for x86) SUSE Linux Enterprise Server 10 SP3 (for AMD64, Intel64) SUSE Linux Enterprise Server 11 (for x86) SUSE Linux Enterprise Server 11 (for AMD64, Intel64) SUSE Linux Enterprise Server 11 SP1 (for x86) SUSE Linux Enterprise Server 11 SP1 (for AMD64, Intel64) Oracle Enterprise Linux Release 5 Update 4 for x86 (32 Bit) Oracle Enterprise Linux Release 5 Update 4 for x86_64 (64 Bit) Oracle Enterprise Linux Release 5 Update 5 for x86 (32 Bit) Oracle Enterprise Linux Release 5 Update 5 for x86_64 (64 Bit)	The Linux Kernel version depending on the hardware corresponds to the version supported by Fujitsu.

Table 2.17 Agent [Solaris]

Basic Software (OS)	Remarks
Solaris(TM) 10 Operating System	Supported after 05/09 (Update7). When using SAN boot, refer to the manual for Fibre Channel card driver, "SPARC Enterprise

Basic Software (OS)	Remarks
	- ETERNUS SAN Boot Environment Build Guide".

Table 2.18 Agent [VMware]

Basic Software (OS)	Remarks
VMware Infrastructure 3 VMware vSphere 4.0 VMware vSphere 4.1 VMware vSphere 5	Install Resource Orchestrator on the VMware ESX host. Use the VMware Service Console for installation. (*1)

*1: VMware ESXi of VMware vSphere 4.0 or earlier cannot be used for managed servers.
VMware ESXi of the version of VMware vSphere 4.1 or later can be used for managed servers, but there is no need to install Resource Orchestrator on VMware ESXi.

Table 2.19 Agent [Xen] [KVM]

Basic Software (OS)	Remarks
Citrix XenServer(TM) 5.5 Citrix Essentials(TM) for XenServer 5.5, Enterprise Edition Red Hat(R) Enterprise Linux(R) 6.2 (for x86) Red Hat(R) Enterprise Linux(R) 6.2 (for Intel64) Red Hat(R) Enterprise Linux(R) 6.1 (for x86) Red Hat(R) Enterprise Linux(R) 6.1 (for Intel64) Red Hat(R) Enterprise Linux(R) 5.7 (for x86) Red Hat(R) Enterprise Linux(R) 5.7 (for Intel64) Red Hat(R) Enterprise Linux(R) 5.6 (for x86) Red Hat(R) Enterprise Linux(R) 5.6 (for Intel64) Red Hat(R) Enterprise Linux(R) 5.5 (for x86) Red Hat(R) Enterprise Linux(R) 5.5 (for Intel64) Red Hat(R) Enterprise Linux(R) 5.4 (for x86) Red Hat(R) Enterprise Linux(R) 5.4 (for Intel64) Red Hat(R) Enterprise Linux(R) 5.3 (for x86) Red Hat(R) Enterprise Linux(R) 5.3 (for Intel64)	-

Table 2.20 HBA address rename setup service [Windows]

Basic Software (OS)	Remarks
Microsoft(R) Windows Server(R) 2008 Standard (x86, x64) Microsoft(R) Windows Server(R) 2008 Enterprise (x86, x64) Microsoft(R) Windows Server(R) 2008 R2 Standard Microsoft(R) Windows Server(R) 2008 R2 Enterprise Microsoft(R) Windows Server(R) 2008 R2 Datacenter	The Server Core installation option is not supported.
Microsoft(R) Windows Server(R) 2003 R2, Standard Edition Microsoft(R) Windows Server(R) 2003 R2, Enterprise Edition Microsoft(R) Windows Server(R) 2003 R2, Standard x64 Edition Microsoft(R) Windows Server(R) 2003 R2, Enterprise x64 Edition	SP2 or later supported.
Microsoft(R) Windows Vista(R) Business Microsoft(R) Windows Vista(R) Enterprise Microsoft(R) Windows Vista(R) Ultimate	-
Microsoft(R) Windows(R) XP Professional Edition	SP2 or later supported.
Microsoft(R) Windows(R) 7 Professional Microsoft(R) Windows(R) 7 Ultimate	-

Table 2.21 HBA address rename setup service [Linux]

Basic Software (OS)	Remarks
Red Hat(R) Enterprise Linux(R) 6.2 (for x86) Red Hat(R) Enterprise Linux(R) 6.2 (for Intel64) Red Hat(R) Enterprise Linux(R) 6.1 (for x86) Red Hat(R) Enterprise Linux(R) 6.1 (for Intel64) Red Hat(R) Enterprise Linux(R) 6 (for x86) Red Hat(R) Enterprise Linux(R) 6 (for Intel64) Red Hat(R) Enterprise Linux(R) 5.7 (for x86) Red Hat(R) Enterprise Linux(R) 5.7 (for Intel64) Red Hat(R) Enterprise Linux(R) 5.6 (for x86) Red Hat(R) Enterprise Linux(R) 5.6 (for Intel64) Red Hat(R) Enterprise Linux(R) 5.5 (for x86) Red Hat(R) Enterprise Linux(R) 5.5 (for Intel64) Red Hat(R) Enterprise Linux(R) 5.4 (for x86) Red Hat(R) Enterprise Linux(R) 5.4 (for Intel64) Red Hat(R) Enterprise Linux(R) 5.3 (for x86) Red Hat(R) Enterprise Linux(R) 5.3 (for Intel64)	Prepare any required driver kits, update kits, or software. For information about required software, refer to the manual of the server or the Linux installation guide. About Required Packages, refer to "Table 2.34 Required Package of HBA address rename setup service [Linux]". The Linux Kernel version depending on the hardware corresponds to the version supported by Fujitsu.

Note

[VMware]
The free version of VMware ESXi cannot be used for managed servers.
When using VMware ESXi for managed servers, purchase the appropriate license.

Installation will fail when a Resource Orchestrator agent is installed on an unsupported OS.

[Hyper-V]
When using Hyper-V on managed servers, the only supported OS of the admin server is Windows.

[Xen]
When using RHEL5-Xen on managed servers, the only supported OS of the admin server is Linux.

Required Basic Software: Admin Clients

It is not necessary to install Resource Orchestrator on admin clients, but the following basic software is required.

Table 2.22 Required Basic Software: Admin Clients

Basic Software (OS)	Remarks
Microsoft(R) Windows(R) 7 Professional Microsoft(R) Windows(R) 7 Ultimate	-
Microsoft(R) Windows Vista(R) Business Microsoft(R) Windows Vista(R) Enterprise Microsoft(R) Windows Vista(R) Ultimate	SP1 or later supported.
Microsoft(R) Windows(R) XP Professional Edition	SP2 or later supported.
Microsoft(R) Windows Server(R) 2008 Standard (x86, x64) Microsoft(R) Windows Server(R) 2008 Enterprise (x86, x64) Microsoft(R) Windows Server(R) 2008 R2 Standard Microsoft(R) Windows Server(R) 2008 R2 Enterprise Microsoft(R) Windows Server(R) 2008 R2 Datacenter	The Server Core installation option is not supported.
Microsoft(R) Windows Server(R) 2003 R2, Standard Edition Microsoft(R) Windows Server(R) 2003 R2, Enterprise Edition Microsoft(R) Windows Server(R) 2003 R2, Standard x64 Edition Microsoft(R) Windows Server(R) 2003 R2, Enterprise x64 Edition	SP2 or later supported.

Required Patches

Table 2.23 [Windows Manager]

Basic Software (OS)	Patch ID/Bundle Update
Microsoft(R) Windows Server(R) 2003 R2, Standard x64 Edition	Hotfix KB942589 (*1)
Microsoft(R) Windows Server(R) 2003 R2, Enterprise x64 Edition	Hotfix KB942589 (*1)

*1: Necessary when managing a managed server within a separate subnet to the admin server.

Table 2.24 [Linux Manager]

Basic Software (OS)	Patch ID/Bundle Update (*1)
Red Hat(R) Enterprise Linux(R) 5 (for x86)	Bundle Update U09031 (5.3 compatible) Bundle Update U09091 (5.4 compatible) Bundle Update U10041 (5.5 compatible)
Red Hat(R) Enterprise Linux(R) 5 (for Intel64)	Bundle Update U09031 (5.3 compatible) Bundle Update U09091 (5.4 compatible) Bundle Update U10041 (5.5 compatible)

*1: necessary when upgrading.

Table 2.25 Agent [Windows] [Hyper-V]

Basic Software (OS)	Patch ID/Bundle Update
None	-

Table 2.26 Agent [Linux]

Basic Software (OS)	Patch ID/Bundle Update (*1)
Red Hat(R) Enterprise Linux(R) 5 (for x86)	Bundle Update U07121 (5.1 compatible) Bundle Update U08071 (5.2 compatible) Bundle Update U09031 (5.3 compatible) Bundle Update U09091 (5.4 compatible) Bundle Update U10041 (5.5 compatible)
Red Hat(R) Enterprise Linux(R) 5 (for Intel64)	Bundle Update U07121 (5.1 compatible) Bundle Update U08071 (5.2 compatible) Bundle Update U09031 (5.3 compatible) Bundle Update U09091 (5.4 compatible) Bundle Update U10041 (5.5 compatible)
Red Hat(R) Enterprise Linux(R) AS (v.4 for x86)	Bundle Update U06091 (Update 4 compatible) Bundle Update U07061 (4.5 compatible) Bundle Update U08011 (4.6 compatible) Bundle Update U08091 (4.7 compatible) Bundle Update U09061 (4.8 compatible)
Red Hat(R) Enterprise Linux(R) ES (v.4 for x86)	Kernel Update kit (Update4/4.5/4.6/4.7/4.8 compatible)
Red Hat(R) Enterprise Linux(R) AS (v.4 for EM64T)	Bundle Update U06091 (Update 4 compatible) Bundle Update U07071 (4.5 compatible) Bundle Update U08011 (4.6 compatible) Bundle Update U08091 (4.7 compatible) Bundle Update U09061 (4.8 compatible)

Basic Software (OS)	Patch ID/Bundle Update (*1)
Red Hat(R) Enterprise Linux(R) ES (v.4 for EM64T)	Kernel Update kit (Update4/4.5/4.6/4.7/4.8 compatible)
SUSE Linux Enterprise Server 10 SP2 (for x86)	Kernel-2.6.16.60-0.23 or later
SUSE Linux Enterprise Server 10 SP2 (for AMD64, Intel64)	Kernel-2.6.16.60-0.23 or later
SUSE Linux Enterprise Server 10 SP3 (for x86)	Kernel-2.6.16.60-0.50.1 or later
SUSE Linux Enterprise Server 10 SP3 (for AMD64, Intel64)	Kernel-2.6.16.60-0.50.1 or later
SUSE Linux Enterprise Server 11 (for x86)	Kernel-2.6.27.19-5 or later
SUSE Linux Enterprise Server 11 (for AMD64, Intel64)	Kernel-2.6.27.19-5 or later
SUSE Linux Enterprise Server 11 SP1 (for x86)	Kernel-2.6.32 or later
SUSE Linux Enterprise Server 11 SP1 (for AMD64, Intel64)	Kernel-2.6.32 or later

*1: necessary when upgrading.

Table 2.27 Agent [Solaris]

Basic Software (OS)	Patch ID/Bundle Update
None	-

Table 2.28 Agent [VMware]

Basic Software (OS)	Patch ID/Bundle Update
None	-

Table 2.29 Agent [Xen] [KVM]

Basic Software (OS)	Patch ID/Bundle Update
None	-

Table 2.30 HBA address rename setup service [Windows]

Basic Software (OS)	Patch ID/Bundle Update
None	-

Table 2.31 HBA address rename setup service [Linux]

Basic Software (OS)	Patch ID/Bundle Update (*1)
Red Hat(R) Enterprise Linux(R) 5 (for x86)	Bundle Update U09031 (5.3 compatible) Bundle Update U09091 (5.4 compatible) Bundle Update U10041 (5.5 compatible)
Red Hat(R) Enterprise Linux(R) 5 (for Intel64)	Bundle Update U09031 (5.3 compatible) Bundle Update U09091 (5.4 compatible) Bundle Update U10041 (5.5 compatible)

*1: necessary when upgrading.

Required Packages [Linux]

The packages listed below are required when using Resource Orchestrator.
Install the required packages beforehand, if necessary.
The architecture of the required packages to be installed is shown enclosed by parenthesis "()".
For the items with no architecture to be installed is specified, install the package of the same architecture as the OS.

Table 2.32 Required Package of Manager [Linux Manager]

Basic Software (OS)	Required Packages
Red Hat(R) Enterprise Linux(R) 6.2 (for x86) Red Hat(R) Enterprise Linux(R) 6.2 (for Intel64) Red Hat(R) Enterprise Linux(R) 6.1 (for x86) Red Hat(R) Enterprise Linux(R) 6.1 (for Intel64) Red Hat(R) Enterprise Linux(R) 6 (for x86) Red Hat(R) Enterprise Linux(R) 6 (for Intel64)	alsa-lib(i686) apr(i686) apr-util(i686) compat-expat1(i686) compat-libtermcap(i686) compat-openldap(i686) compat-readline5(i686) cyrus-sasl-lib(i686) db4(i686) expat(i686) glibc(i686) keyutils-libs(i686) krb5-libs(i686) libcom_err(i686) libgcc(i686) libICE(i686) libselinux(i686) libSM(i686) libstdc++(i686) libtool-ltdl(i686) libuuid(i686) libX11(i686) libXau(i686) libxcb(i686) libXext(i686) libXi(i686) libXt(i686) libXtst(i686) ncurses-libs(i686) net-snmp net-snmp-utils nss-softokn-freebl(i686) openssl(i686) openssl098e(i686) redhat-lsb sqlite(i686) unixODBC(i686) zlib(i686)
Red Hat(R) Enterprise Linux(R) 5.7 (for x86) Red Hat(R) Enterprise Linux(R) 5.7 (for Intel64) Red Hat(R) Enterprise Linux(R) 5.6 (for x86) Red Hat(R) Enterprise Linux(R) 5.6 (for Intel64) Red Hat(R) Enterprise Linux(R) 5.5 (for x86) Red Hat(R) Enterprise Linux(R) 5.5 (for Intel64) Red Hat(R) Enterprise Linux(R) 5.4 (for x86) Red Hat(R) Enterprise Linux(R) 5.4 (for Intel64) Red Hat(R) Enterprise Linux(R) 5.3 (for x86) Red Hat(R) Enterprise Linux(R) 5.3 (for Intel64)	apr(i686) apr-util(i686) libxml2(i686) libxslt(i686) net-snmp net-snmp-utils postgresql-libs(i686) redhat-lsb

Table 2.33 Required Packages of Agent [Linux]

Basic Software (OS)	Required Packages
Red Hat(R) Enterprise Linux(R) 6.2 (for x86) Red Hat(R) Enterprise Linux(R) 6.2 (for Intel64) Red Hat(R) Enterprise Linux(R) 6.1 (for x86)	alsa-lib(i686) glibc(i686) libgcc(i686)

Basic Software (OS)	Required Packages
Red Hat(R) Enterprise Linux(R) 6.1 (for Intel64) Red Hat(R) Enterprise Linux(R) 6 (for x86) Red Hat(R) Enterprise Linux(R) 6 (for Intel64)	libICE(i686) libSM(i686) libstdc++(i686) libtool-ltdl(i686) libuuid(i686) libX11(i686) libXau(i686) libxcb(i686) libXext(i686) libXi(i686) libXt(i686) libXtst(i686) ncurses-libs(i686) net-snmp-utils readline(i686) sqlite(i686) sysfsutils unixODBC(i686)
Red Hat(R) Enterprise Linux(R) 5.7 (for x86) Red Hat(R) Enterprise Linux(R) 5.7 (for Intel64) Red Hat(R) Enterprise Linux(R) 5.6 (for x86) Red Hat(R) Enterprise Linux(R) 5.6 (for Intel64) Red Hat(R) Enterprise Linux(R) 5.5 (for x86) Red Hat(R) Enterprise Linux(R) 5.5 (for Intel64) Red Hat(R) Enterprise Linux(R) 5.4 (for x86) Red Hat(R) Enterprise Linux(R) 5.4 (for Intel64) Red Hat(R) Enterprise Linux(R) 5.3 (for x86) Red Hat(R) Enterprise Linux(R) 5.3 (for Intel64) Red Hat(R) Enterprise Linux(R) 5.2 (for x86) Red Hat(R) Enterprise Linux(R) 5.2 (for Intel64) Red Hat(R) Enterprise Linux(R) 5.1 (for x86) Red Hat(R) Enterprise Linux(R) 5.1 (for Intel64) Red Hat(R) Enterprise Linux(R) 5 (for x86) Red Hat(R) Enterprise Linux(R) 5 (for Intel64)	alsa-lib(i686) glibc(i686) libgcc(i686) libICE(i686) libselinux(i686) libsepol libSM(i686) libstdc++(i686) libX11(i686) libXau(i686) libXdmcp libXext(i686) libXi(i686) libXt(i686) libXtst(i686) ncurses-libs(i686) net-snmp-utils readline(i686) sqlite(i686)

Table 2.34 Required Package of HBA address rename setup service [Linux]

Basic Software (OS)	Required Packages
Red Hat(R) Enterprise Linux(R) 6.2 (for x86) Red Hat(R) Enterprise Linux(R) 6.2 (for Intel64) Red Hat(R) Enterprise Linux(R) 6.1 (for x86) Red Hat(R) Enterprise Linux(R) 6.1 (for Intel64) Red Hat(R) Enterprise Linux(R) 6 (for x86) Red Hat(R) Enterprise Linux(R) 6 (for Intel64)	alsa-lib(i686) glibc(i686) libgcc(i686) libICE(i686) libSM(i686) libstdc++(i686) libtool-ltdl(i686) libuuid(i686) libX11(i686) libXau(i686) libxcb(i686) libXext(i686) libXi(i686) libXt(i686) libXtst(i686)

Basic Software (OS)	Required Packages
	ncurses-libs(i686) readline(i686) sqlite(i686) unixODBC(i686)
Red Hat(R) Enterprise Linux(R) 5.7 (for x86) Red Hat(R) Enterprise Linux(R) 5.7 (for Intel64) Red Hat(R) Enterprise Linux(R) 5.6 (for x86) Red Hat(R) Enterprise Linux(R) 5.6 (for Intel64) Red Hat(R) Enterprise Linux(R) 5.5 (for x86) Red Hat(R) Enterprise Linux(R) 5.5 (for Intel64) Red Hat(R) Enterprise Linux(R) 5.4 (for x86) Red Hat(R) Enterprise Linux(R) 5.4 (for Intel64) Red Hat(R) Enterprise Linux(R) 5.3 (for x86) Red Hat(R) Enterprise Linux(R) 5.3 (for Intel64)	alsa-lib(x86_64) e2fsprogs-libs glibc(x86_64) libgcc(i686) libICE(x86_64) libSM(x86_64) libstdc++(i686) libX11(x86_64) libXau(x86_64) libXdmcp libXext(i686) libXi(i686) libXt(i686) libXtst(i686) ncurses(i686) readline(i686) sqlite(i686)

2.4.2.2 Required Software

The software listed below is required when using Resource Orchestrator.

Required Software (Windows Manager)

Required Software of Windows Manager is as follows.

Install the required software in the same server with the manager when there is no explanation.

When the ROR console is started as Windows manager, the required software of the management client needs it.

Table 2.35 [Windows Manager]

Required Software	Version	Remarks
ServerView Operations Manager for Windows (*1)	V4.20.25 or later	Necessary when using VIOM coordination or invoking the Web UI of server management software from the ROR console. Refer to "See Installation of Related ServerView Products". When using VIOM, refer to the VIOM manual and use a supported version of ServerView Operations Manager.
	V5.30 or later	Necessary when using VMware ESXi as a managed server, or Single Sign-ON. Use VMware ESXi or a version of ServerView Operations Manager that supports Single Sign-On.
Microsoft(R) LAN Manager module	-	Obtain it from the Microsoft FTP site. (*2)
BACS or Intel PROSet or PRIMECLUSTER GLS for Windows	-	Necessary when performing redundancy of the admin LAN for admin servers. When using PRIMECLUSTER GLS, the following patches are required.

Required Software	Version	Remarks
or OneCommand NIC Teaming and Multiple VLAN Manager		- TP002714XP-06
ServerView Virtual-IO Manager	2.6 or later	Necessary when using VIOM's Virtual I/O. It corresponds after ServerView Virtual-IO Manager V3.0.4 when BX920 S3 or BX924 S3 is a managed server.
VMware vCenter Server	2.0 2.5 4.0 4.1 5.0	Required when using migration of VM guests on VMware. Can be placed on the same admin server as the manager or on another server.
Microsoft(R) System Center Virtual Machine Manager 2008 R2 or Microsoft(R) System Center 2012 Virtual Machine Manager	-	Required when using migration, or setting or releasing VM maintenance mode of VM guests on Hyper-V. Can be placed on the same admin server as the manager or on another server. Configure control settings for a maximum of 31 sessions, referring to "SCVMM Server MaxShellPerUser Settings". It is necessary to install Microsoft(R) SQL Server and Windows(R) Automated Installation Kit for Windows(R) 7 beforehand, when using Microsoft(R) System Center 2012 Virtual Machine Manager. For details, confirm the system requirements for the Microsoft(R) System Center 2012 Virtual Machine Manager.
Windows PowerShell	2.0	Required when using migration, or setting or releasing VM maintenance mode of VM guests on Hyper-V.
SNMP Service	-	-
SNMP Trap Service (Standard OS service)	-	-
DHCP Server (Standard OS service)	-	Necessary when managing a managed server within a separate subnet to the admin server.
ETERNUS SF Storage Cruiser	14.2 or later	Necessary when using server switchover by ESC coordination.

*1: When installing managers in cluster environments, installation on both the primary and secondary nodes is necessary.
*2: Obtain it from the following Microsoft FTP site.

Microsoft FTP site

URL: ftp://ftp.microsoft.com/bussys/clients/msclient/dsk3-1.exe

*3: A local disk refers either to a server's internal disk, or to one stored in a storage blade.

Required Software (Linux Manager)

Required Software of Linux Manager is as follows.

Install the required software in the same server with the manager when there is no explanation.

Table 2.36 [Linux Manager]

Required Software	Version	Remarks
ServerView Operations Manager for Linux	V4.81.05 or later	Necessary when viewing the server management software Web UI from the ROR console.
	V5.30 or later	Necessary when using VMware ESXi as a managed server, or Single Sign-On.

Required Software	Version	Remarks
		Use VMware ESXi or a version of ServerView Operations Manager that supports Single Sign-On.
Microsoft(R) LAN Manager module	-	Necessary when using backup and restore, or cloning. Obtain it from the Microsoft FTP site. (*1)
ServerView Virtual-IO Manager	2.6 or later	Necessary when using VIOM's Virtual I/O. It corresponds after ServerView Virtual-IO Manager V3.0.4 when BX920 S3 or BX924 S3 is a managed server.
PRIMECLUSTER Enterprise Edition	4.2A00 or later	When an admin server is in a cluster configuration, one of the following software is necessary. The supported standby cluster type is 1:1 hot standby.
PRIMECLUSTER HA Server	4.2A00 or later	
PRIMECLUSTER GLS	-	Necessary when performing redundancy of the admin LAN for admin servers.
ETERNUS SF Storage Cruiser	14.2 or later	Necessary when using server switchover by ESC coordination.

*1: Obtain it from the following Microsoft FTP site.

Microsoft FTP site

URL: ftp://ftp.microsoft.com/bussys/clients/msclient/dsk3-1.exe

Table 2.37 Agent [Windows] [Hyper-V]

Required Software	Version	Remarks
ServerView Agents for Windows (*1)	V4.50.05 or later	-
"setupcl.exe" module "sysprep.exe" module	-	Necessary when using backup and restore, or cloning. Please refer to the Microsoft web site and obtain the latest module. (*2) When using Windows Server 2008, the modules are already configured in the OS so there is no need to obtain new modules.
BACS or Intel PROSet or PRIMECLUSTER GLS for Windows (*1) or OneCommand NIC Teaming and Multiple VLAN Manager	-	Necessary when performing redundancy of the admin LAN and public LAN for managed servers. When using PRIMECLUSTER GLS, the following patches are required. - TP002714XP-06

*1: When installing managers in cluster environments, installation on both the primary and secondary nodes is necessary.
*2: The necessary files vary depending on the CPU architecture (x86, x64) of the target system, and the OS version. Please refer to the Microsoft web site for the module to obtain.

Microsoft download web site

URL(x86):
http://www.microsoft.com/downloads/details.aspx?familyid=93F20BB1-97AA-4356-8B43-9584B7E72556&displaylang=en

URL(x64):
http://www.microsoft.com/downloads/details.aspx?familyid=C2684C95-6864-4091-BC9A-52AEC5491AF7&displaylang=en

After obtaining the latest version of module, place it in a work folder (such as C:\temp) of the system for installation and execute it.
For how to execute it, refer to "2.2.1.1 Software Preparation and Checks" in the "Setup Guide VE".
The module is not necessary after installation of agents.

Table 2.38 Agent [Linux]

Required Software	Version	Remarks
ServerView Agent for Linux (*1)	V4.90.14 or later	-

*1: When installing managers in cluster environments, installation on both the primary and secondary nodes is necessary.

Table 2.39 Agent [Red Hat Enterprise Linux]

Required Software	Version	Remarks
PRIMECLUSTER GLS (*1)	4.2A00 or later	Necessary when performing redundancy of the admin LAN and public LAN for managed servers. When performing cloning, settings for redundancy of the public LAN are configured automatically. For details, refer to "16.6 Network Parameter Auto-Configuration for Cloning Images" of the "User's Guide VE".

*1: When installing managers in cluster environments, installation on both the primary and secondary nodes is necessary.

Table 2.40 Agent [Solaris]

Required Software	Version	Remarks
PRIMECLUSTER GLS	4.2 or later	Necessary when performing redundancy of the admin LAN and public LAN for managed servers.
ETERNUS SF Storage Cruiser	14.2 or later	Necessary when using server switchover by ESC coordination on primary server of a managed server.

Table 2.41 Agent [VMware]

Required Software	Version	Remarks
ServerView Agents for VMware (*1)	V4.30-20 or later	Not necessary when using VMware ESXi for the agent.
ServerView ESXi CIM Provider	1.00 or later	Necessary when using VMware ESXi as a managed server.

*1: When installing managers in cluster environments, installation on both the primary and secondary nodes is necessary.

Table 2.42 Agent [Xen] [KVM]

Required Software	Version	Remarks
ServerView Agents for Linux (*1)	V4.81-14 or later	-

*1: When installing managers in cluster environments, installation on both the primary and secondary nodes is necessary.

Table 2.43 HBA address rename setup service [Windows]

Required Software	Version	Remarks
Windows(R) Internet Explorer(R)	8 9	Necessary for displaying the online help.

Table 2.44 HBA address rename setup service [Linux]

Required Software	Version	Remarks
Firefox	3	Necessary for displaying the online help.

Required Software: Admin Clients

The following software is necessary for admin clients.

Table 2.45 Required Software: Admin Clients

Required Software	Version	Remarks
Windows(R) Internet Explorer(R)	8 9	-
Java(TM) 2 Runtime Environment Standard Edition	(*1)	Necessary for displaying the management window of ServerView Operations Manager or the VM management console, on admin clients.
VMware Virtual Infrastructure Client	2.0 2.5	[VMware] Necessary on admin clients when using the functions for coordinating with VMware or the VM management software on managed servers.
VMware vSphere Client	4.0 4.1 5.0	
Hyper-V Manager	-	[Hyper-V] Necessary on admin clients when using the functions for coordinating with Hyper-V on managed servers.
Microsoft(R) System Center Virtual Machine Manager 2008 R2 VMM management console or Microsoft(R) System Center 2012 Virtual Machine Manager VMM console	-	[Hyper-V] Necessary on admin clients when using the function for coordinating with VM management software. Prepare the same version as VM management software for registration in Resource Orchestrator.
XenCenter	-	[Xen] Necessary on admin clients when using the function for coordinating with Citrix XenServer on managed servers.

*1: To display the management window of ServerView Operations Manager, please refer to the ServerView Operations Manager manual. When the VM management screen or the console screen is displayed, it is necessary since version 1.5.

See

Installation of Related ServerView Products

For advisory notes regarding the installation of the manager of "ServerView Operations Manager", refer to "Settings for ServerView Operations Manager 4.X for Windows" in "2.1.1.1 Software Preparation and Checks" in the "Setup Guide VE".

2.4.2.3 Exclusive Software

Resource Orchestrator cannot be used in combination with Resource Coordinator, Resource Orchestrator, or the following products.

ServerView Resource Coordinator VE is a name of old product name. Earlier versions cannot be used in combination with Resource Orchestrator, but upgrading is possible. For upgrading, refer to "Appendix E Upgrading from Earlier Versions" of the "Setup Guide VE".

Table 2.46 Exclusive Software

Software	Product Name
[Windows Manager]	ServerView Installation Manager (*1)
	ServerView Deployment Manager
[Linux Manager]	Server System Manager
Agent [Windows] [Hyper-V]	Server System Manager
	ServerView Deployment Manager (*2)
Agent [Linux]	Server System Manager
	ServerView Deployment Manager (*2)
Agent [Solaris]	Server System Manager (Manager only)
Agent [VMware]	ServerView Deployment Manager (*2)
Agent [Xen] [KVM]	ServerView Deployment Manager (*2)
HBA address rename setup service [Windows]	ServerView Deployment Manager
HBA address rename setup service [Linux]	Server System Manager

*1: As managers of this product include PXE server, use in combination with the PXE server required for remote installation of ServerView Installation Manager is not possible.
*2: ServerView Deployment Manager can be installed after Resource Orchestrator has been installed. For details on installation, refer to "2.2 Installing Agents" in the "Setup Guide VE".

Note

- When using an Active Directory domain controller as an admin server, it can be installed by promoting it to a domain controller after manager installation.
- Resource Orchestrator managers contain some functions of DHCP servers and PXE servers. Do not use products or services that use the functions of other DHCP servers or PXE servers on the admin LAN.

  Examples of Products Including DHCP Servers and PXE Servers

  - The Windows Server 2003 "Remote Installation Service", and the Windows Server 2008/Windows Server 2003 "Windows Deployment Service"
  - ADS (Automated Deployment Services) of Windows Server 2003
  - Boot Information Negotiation Layer (BINLSVC)
  - ServerView Deployment Manager (*1)
  - ServerStart (when using the remote installation function)

  *1: As PXE server is included, the use of some functions is restricted when it is used on the same admin LAN as ServerView Resource Orchestrator. For details, refer to "Appendix B Co-Existence with ServerView Deployment Manager" in the "Setup Guide VE".
- Resource Orchestrator managers contain some functions of TFTP servers.
  On manager, do not use the OS standard TFTP services.

[Windows]

- Depending on the domain type, there may be cases in which backup and restore, cloning, and server switchover using the backup and restore method cannot be used, or additional operations on managed servers are necessary.

Table 2.47 Function Restrictions Based on Domain Type

Domain Type	Backup and Restore	Cloning	Server Switchover Using Backup and Restore
Domain controller	No	No	No

Domain Type	Backup and Restore	Cloning	Server Switchover Using Backup and Restore
Member server (*1)	Yes (*2)	Yes (*2, *3)	Yes (*2, *4)
Workgroup	Yes	Yes	Yes

Yes: Use possible.
No: Use not possible.
*1: Member servers of Windows NT domains or Active Directory.
*2: After performing operations, it is necessary to join Windows NT domains or Active Directory again.
*3: Before obtaining cloning images, ensure that the server is not a member of a Windows NT domain or Active Directory.
*4: When switchover has been performed using Auto-Recovery, join Windows NT domains or Active Directory again before starting operations.

- When the domain type is domain controller, agents cannot be installed while the status promoted to domain controller.
- When the domain type is member server or work group, agents can be installed when logged in using a local account that belongs to the Administrators group.

[Physical Servers]

- Contact Fujitsu technical staff for information about ServerView Deployment Manager.

2.4.2.4 Static Disk Space

For new installations of Resource Orchestrator, the following static disk space is required.
The amount of disk space may vary slightly depending on the environment in question.

Table 2.48 Static Disk Space

Software	Folder	Required Disk Space (Unit: MB)
[Windows Manager]	*Installation_folder* (*1)	800
[Linux Manager]	/opt	665
	/etc/opt	15
	/var/opt	120
Agent [Windows] [Hyper-V]	*Installation_folder* (*1)	100
Agent [Linux] [Xen] [KVM]	/opt	95
	/etc/opt	5
	/var/opt	5
Agent [Solaris]	/opt	100
	/etc/opt	5
	/var/opt	5
HBA address rename setup service [Windows]	*Installation_folder* (*1)	75
HBA address rename setup service [Linux]	/opt	90
	/etc/opt	1
	/var/opt	3

*1: The installation folder name specified when this software is installed.
The default folder name when Windows is installed on C:\ is as follows:

C:\Fujitsu\ROR

2.4.2.5 Dynamic Disk Space

When using Resource Orchestrator, the following disk space is required for each folder, in addition to static disk space.

Table 2.49 Dynamic Disk Space

Software	Folder	Required Disk Space (Unit: MB)
[Windows Manager]	*Installation_folder* (*1)	2500 + *Number_of_managed_servers* * 4 + 16 * 10 (*3)
		Environmental_data_storage_area
	Image_file_storage_folder (*2)	*Image_file_storage_area*
[Linux Manager]	/etc	2
	/var/opt	2500 + *Number_of_managed_servers* * 4
		Environmental_data_storage_area
	Image_file_storage_directory (*2)	*Image_file_storage_area*
Agent [Windows] [Hyper-V]	*Installation_folder* (*1)	60
Agent [Linux] [Solaris] [VMware] [Xen] [KVM]	/etc	1
	/var/opt	1
HBA address rename setup service [Windows]	*Installation_folder* (*1)	60
HBA address rename setup service [Linux]	/etc	1
	/var/opt	60

*1: The installation folder name specified when this software is installed.
The default folder name when Windows is installed on C:\ is as follows:

C:\Fujitsu\ROR

*2: The name of the storage folder (directory) specified for image files when this software is installed.

[Windows]
The default folder name when Windows is installed on C:\ is as follows:

C:\Fujitsu\ROR\SVROR\ScwPro\depot

[Linux]
The default is as follows:

/var/opt/FJSVscw-deploysv/depot

*3: When the image operation is an error or a cancel, the data for investigation of the image operation is saved. It saves it up to 16MB or less and 10 times in the past by save once.

Environmental Data Storage Area

The environmental data storage area is the area necessary when using power monitoring.
The environmental data storage area is located in the installation folder of the admin server, and is used to store environmental data collected from power monitoring targets and aggregate data.
The amount of space that is necessary for the environmental data storage area can be determined from the number of power monitoring targets being registered, the polling interval, and the period the environmental data is to be stored for.
For details on each setting, refer to "11.1.1 Settings for the Power Monitoring Environment".
Estimate the necessary space using the following formula.

Necessary disk space (MB) = (*Detail_storage_period_(months)* * 6 / *polling_interval_(minutes)* + 10) * 3 * *number_of_power_monitoring_targets*

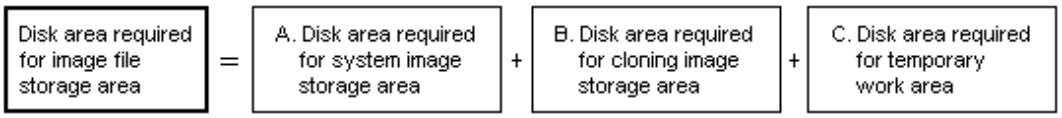
Image File Storage Area

The image file storage area is necessary when performing backup and cloning.
The image file storage area is secured on an admin server as an area to store the image files (system images and cloning images) collected through the backup and cloning of managed servers.

Note

Create the image file storage area on the local disk of the admin server, or SAN storage. It is not possible to specify folders on network drives, shared folders (NFS, SMB, etc.) on other machines on a network, or UNC format folders.

The space necessary for the image file storage area is the total amount of disk space necessary for the "system image storage area", the "cloning image storage area", and the "temporary work area".
Estimate the necessary space based on the disk space required for each storage area using the following formula.



Estimate the necessary space for the image file storage area using the following procedure.

1. **Calculate the size of image files.**

   Calculate the image file sizes as base data for estimating the required disk space for A, B, and C indicated above.
   The calculation method is given below.

   File size of image files = *Disk_space_per_managed_server* * *Compression_ratio*

   Disk_space_per_managed_server

   When system construction using the same software configuration has been performed before, use the consumed disk space of that system (the sum of the disk space for each partition when dividing one disk into multiple partitions).
   Check the consumed disk space using the relevant OS function.
   When system construction using the same software configuration has not been performed before, calculate the disk space from the required disk space indicated in the installation guide for each piece of software.
   For the OS, refer to "Examples of Calculation".

   Compression_ratio

   The compression ratio involved when storing the consumed disk space of managed servers as an image file on the admin server. Compression ratio is dependent on file content, and usually a compression ratio of around 50% can be expected. When there are many files that have already been compressed (installation media of software, image data, or other media), the overall compression ratio is lower.
   For the OS, refer to "Examples of Calculation".

   An example of the calculation of disk space and the compression ratio directly after OS installation is given below.

Example

Examples of Calculation

- For Windows Server 2003

  Used disk space: 1.9 GB -> After compression: 0.9 GB Compression ratio: 0.9/1.9 = 47%

2. **Calculate the space required for the system image storage area.**

   The system image storage area is the area necessary when performing backup. Secure space for each managed server for which backup system images are made.
   This is not necessary when not performing backup.

   Calculate the size of the system image storage area based on the image file size of step 1. Estimate the area for each managed server for which system images are backed up using the following formula, and use the total as the estimated size.

Disk space required for the system image storage area = *File_size_of_image_files* * *Number_of_versions*

   Number_of_versions

   The number of versions of system images. By default, up to three versions of system images can be managed.

   Point

   By reducing the number of versions of system images saved it is possible to reduce the amount of space required for the system image storage area.
   For details of how to change the number of system images saved, refer to "8.3 Changing the Maximum Number of System Image Versions" of the "User's Guide VE".

   The following is an example when three managed servers, A, B, and C are performing backup of system images, and the used disk space and compression ratios are expected to be the following values.

   Example

   Example of Estimation
   Server A - *Image_file_size*: 3.0 GB (Used disk space: 6.0 GB, Compression ratio 50%)
   Server B - *Image_file_size*: 1.6 GB (Used disk space: 4.0 GB, Compression ratio 40%)
   Server C - *Image_file_size*: 1.6 GB (Used disk space: 4.0 GB, Compression ratio 40%)

   (3.0 * 3) + (1.6 * 3) + (1.6 * 3) = 18.6 (GB)

3. **Calculate the space required for the cloning image storage area.**

   The cloning image storage area is the area necessary when performing cloning. Secure space for each managed server for which cloning images are collected.
   This is not necessary when not performing cloning.

   Calculate the size of the cloning image storage area based on the image file size of step 1. Estimate the area for each managed server from which cloning images are collected using the following formula, then set the total as the estimated size.

Disk space required for the cloning image storage area = *File_size_of_image_files* * *Number_of_versions*

   Number_of_versions

   The number of versions of cloning images. By default, up to three versions of cloning images can be managed.

   Point

   By reducing the number of versions of cloning images saved it is possible to reduce the amount of space required for the cloning image storage area.
   For details of how to change the number of cloning image versions saved, refer to "8.3 Changing the Maximum Number of System Image Versions" of the "User's Guide VE".

   The following is an example when managed servers A and B are used to collect cloning images, and the used disk space and compression ratios are expected to be the following values.

Example

Example of Estimation
Server A - *Image_file_size*: 3.0 GB (Used disk space: 6.0 GB, Compression ratio 50%)
Server B - *Image_file_size*: 1.6 GB (Used disk space: 4.0 GB, Compression ratio 40%)

(3.0 * 3) + (1.6 * 3) = 13.8 (GB)

4. **Calculate the space required for the temporary work area.**

   When collecting system images or cloning images, the temporary work area is necessary to keep the former version of images until collection of new system images or cloning images is completed.
   This is not necessary when not performing backup or cloning.

   Calculate the size of the temporary work area based on the image file size of step 1.
   Estimate the largest size of the image files of all managed servers, and determine the necessary area using the following formula.

Disk space required for the temporary work area = *Largest_image_file_size* * *Image_file_collection_multiplicity*

   Estimate image file collection multiplicity using operational designs in which image file collection (system image backup and cloning image collection) is simultaneously performed at the limit of multiplicity for multiple managed servers under management of an admin server. However, as Resource Orchestrator is designed not to exceed four multiplicities in order to reduce the load on the admin servers, the maximum multiplicity is 4.

   The following is an example when three managed servers, A, B, and C are used to collect system images or cloning images, and the file size of each image file is as below. In this example, the image file collection multiplicity is 3.

Example

Example of Estimation
Server A - *Image_file_size*: 3.0 GB (Used disk space: 6.0 GB, Compression ratio 50%)
Server B - *Image_file_size*: 1.6 GB (Used disk space: 4.0 GB, Compression ratio 40%)
Server C - *Image_file_size*: 1.6 GB (Used disk space: 4.0 GB, Compression ratio 40%)

3.0 * 3 = 9.0 (GB)

5. **Calculate the space necessary for the image file storage area based on the disk space calculated in 2. to 4.**

   Calculate the total amount of required space for A, B, and C calculated in steps 2 to 4. (A: Disk area required for system image storage area, B: Disk area required for cloning image storage area, C: Disk area required for temporary work area).

2.4.2.6 Memory Size

The memory size listed below is required when using Resource Orchestrator.

Table 2.50 Memory Size

Software	Memory Size (Unit: MB)
[Windows Manager]	1638 (3328 when managing VM guests)
[Linux Manager]	1638 (3328 when managing VM guests)
Agent [Windows] [Hyper-V]	32
Agent [Linux]	32
Agent [Solaris]	64
Agent [VMware]	32
Agent [Xen] [KVM]	32
Agent [Oracle VM]	32

2.5 Hardware Environment

The hardware conditions described in the table below must be met when using Resource Orchestrator.

Manager and Agent's required hardware conditions

Table 2.51 Required Hardware

Software	Hardware	Remarks
Manager	PRIMERGY BX series servers PRIMERGY RX series servers PRIMERGY TX series servers	The CPU must be a multi-core CPU. 4 GB or more of memory is necessary.
	PRIMEQUEST	-
Agent	PRIMERGY BX620 S4 PRIMERGY BX620 S5 PRIMERGY BX620 S6 PRIMERGY BX920 S1 PRIMERGY BX920 S2 PRIMETGY BX920 S3 PRIMERGY BX922 S2 PRIMERGY BX924 S2 PRIMERGY BX924 S3 PRIMERGY BX960 S1 PRIMERGY RX series servers PRIMERGY TX series servers Other PC servers	- When using servers other than PRIMERGY BX servers It is necessary to mount an IPMI-compatible (*1) server management unit (*2). - When using HBA address rename The "I/O virtualization option" is required. - Operation of VMware is not supported for other PC servers. - FT model servers are not supported. - When PRIMERGY BX920 S3 or BX924 S3 is used, Resource Orchestrator can use only Function 0 of each port..
	PRIMEQUEST	-
	SPARC Enterprise M series	To use power consumption monitoring, the XCP version should be version 1090 or later.
	SPARC Enterprise T5120 SPARC Enterprise T5140 SPARC Enterprise T5220 SPARC Enterprise T5240 SPARC Enterprise T5440	The ILOM version should be version 3.0 or later.
-	PRIMERGY SX650 PRIMERGY SX940	Registering a PRIMERGY BX series chassis displays it automatically. Installation of software is not necessary.
HBA address rename setup service	Personal computers (*3) PRIMERGY RX series servers PRIMERGY BX series servers PRIMERGY TX series servers PRIMEQUEST Other PC servers	-

*1: Supports IPMI 2.0.
*2: This usually indicates a Baseboard Management Controller (hereinafter BMC).

Note

The functions that agents can use differ depending on the hardware being used.

Table 2.52 Function Availability List

Function		PRIMERGY Series Servers		PRIMEQUEST	SPARC Enterprise	Other PC servers
		Blade Models	Rack Mount/Tower Models			
Status monitoring		Yes	Yes	Yes	Yes	Yes (*1)
Power operations		Yes	Yes	Yes	Yes	Yes
Backup and restore (*2)		Yes	Yes	Yes	No	Yes
Hardware maintenance		Yes	Yes (*3)	Yes (*3)	No	Yes (*3)
Maintenance LED		Yes	No	No	No	No
External management software		Yes	Yes	Yes	Yes	No
Server switchover	Backup and restore	Yes	Yes	No	No	Yes
	HBA address rename (*4)	Yes	Yes	No	No	No
	VIOM coordination	Yes (*5)	No	No	No	No
	ESC coordination	No	No	No	Yes (*6)	No
Cloning (*2, *7)		Yes	Yes	Yes (*11)	No	Yes
HBA address rename (*4)		Yes	Yes	No	No	No
VIOM coordination		Yes (*5)	No	No	No	No
VLAN settings		Yes	No	No	No	No
Pre-configuration		Yes	Yes	Yes	Yes	Yes
Power consumption monitoring		Yes (*8)	Yes (*9)	No	Yes (*10)	No

Yes: Use possible.
No: Use not possible.
*1: Server monitoring in coordination with server management software is not possible.
*2: When agents are operating on iSCSI disks, image operations are not possible for the following disk configurations.
Perform operation using a single iSCSI disk configuration.

- iSCSI disk + internal disk
- iSCSI disk + SAN disk

*3: Maintenance LEDs cannot be operated.
*4: When using HBA address rename, the mounted HBA must be compatible with HBA address rename.
*5: ServerView Virtual-IO Manager is required.
*6: Only M3000 servers, SPARC Enterprise Partition Models and T5120/T5140/T5220/T5240/T5440 servers with undivided areas are supported. Applying the patch T006147WP-04 [Windows Manager] or T006292LP-03 [Linux Manager], enables support of M3000 and SPARC Enterprise Partition Models with undivided areas. SPARC Enterprise Partition Models with divided areas are not supported.
*7: Cloning of Linux agents operating on iSCSI disks is not possible.
*8: Chassis BX900 S1, server BX920 S1, BX920 S2, BX920 S3, BX922 S2, BX924 S2, BX924 S3, and BX960 S1 are supported.
*9: Only rack mount models (RX200/300/600) are supported.
*10: Only M3000 servers are supported.
*11: Cloning is available only when Legacy boot is specified for the boot option. When UEFI is specified, cloning is unavailable.

Required Hardware for Admin Clients

The following hardware is required for admin clients:

Table 2.53 Required Hardware for Admin Clients

Software	Hardware	Remarks
Client	Personal computers PRIMERGY RX series servers PRIMERGY BX series servers PRIMERGY TX series servers Other PC servers	-

Hardware conditions of Power Monitoring Device

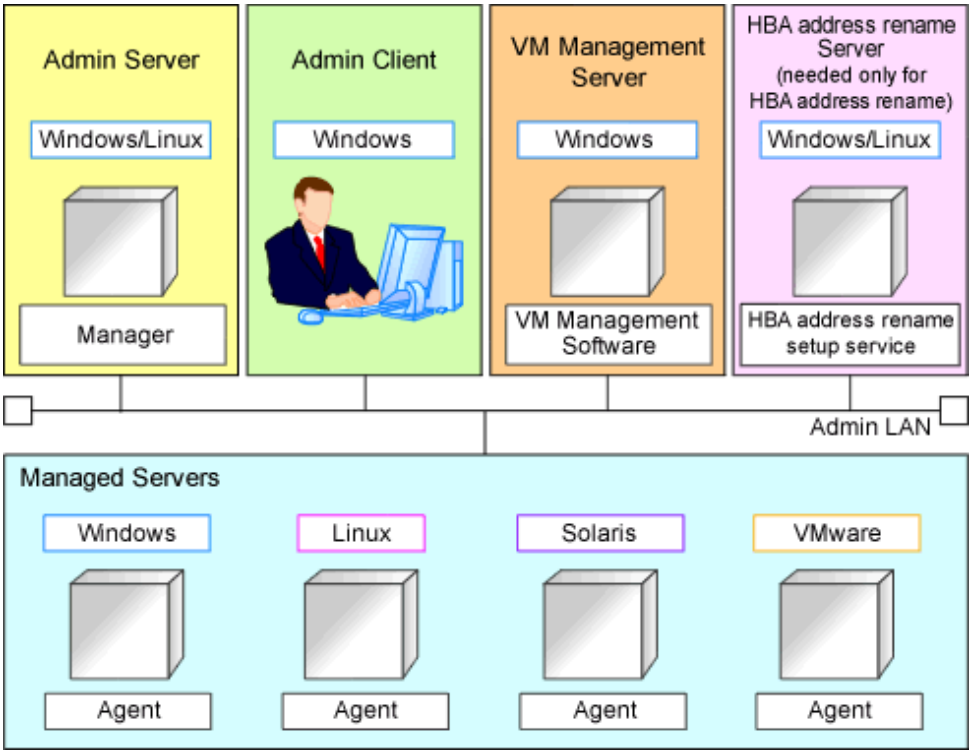
Table 2.54 Supported Power Monitring Device

Hardware	Remarks
Symmetra RM 4000VA PG-R1SY4K/PG-R1SY4K2	firmware version of the network management card is v2.5.4 or v3.0 or more.
Smart-UPS RT 10000 PY-UPAR0K/PG-R1SR10K	-
Smart-UPS RT 5000 PY-UPAC5K	-

2.6 System Configuration

This section provides an example of a Resource Orchestrator system configuration.

Figure 2.1 Example of System Configuration



Admin Server

The admin server is a server used to manage several managed servers.
The admin server operates in a Windows or Linux environment.
The Resource Orchestrator manager should be installed on the admin server. When performing I/O virtualization with VIOM, also install

ServerView Virtual-IO Manager. When performing server switchover using ESC coordination, also install ETERNUS SF Storage Cruiser.
The admin server can be made redundant by using clustering software.
It can also be used with the admin client.
The Resource Orchestrator agent cannot be installed on the admin server to monitor and manage the admin server itself.

Managed Server

Managed servers are the servers used to run applications. They are managed by the admin server.
Managed servers are categorized into the following two types:

- Primary servers on which Windows, Linux, Solaris, or server virtualization software is operating
- Spare servers used as backup for primary servers

Install agents on primary servers.
In server virtualization environments, the agent should only be installed on the VM host.

Admin Client

Admin clients are terminals used to connect to the admin server, which can be used to monitor and control the configuration and status of the entire system.
Admin clients should run in a Windows environment.

Install Web browsers on admin clients.
If a server virtualization software client is installed on an admin client, the software can be started from the client screen of Resource Orchestrator.

VM Management Server

A server on which VM management software (such as VMware vCenter Server) to integrate multiple server virtualization software products has been installed.
The VM management server can be standardized with the admin server.

HBA address rename Setup Service Server

A server on which the HBA address rename setup service operates.
This server is required to use server I/O virtualization by HBA address rename (not required when using only server I/O virtualization by VIOM).
When an admin server cannot be communicated with from a managed server, configure the necessary WWNs for starting the managed server instead of the admin server.
The HBA address rename server operates in a Windows or Linux environment.
Install the HBA address rename setup service online this server.
Use as an admin server and managed server at the same time is not possible.
Keep this server powered ON at all times, in preparation for admin server trouble or communication errors.

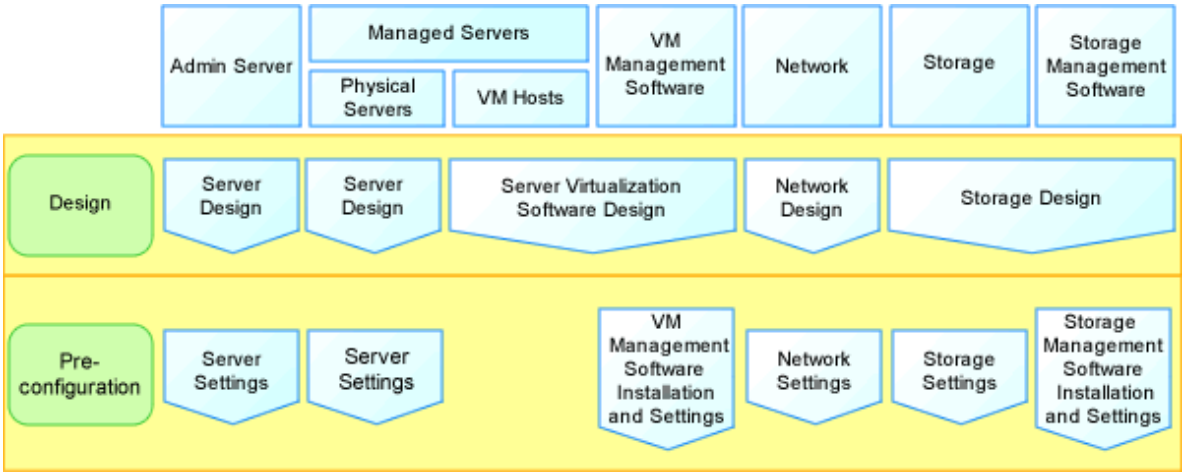
Admin LAN

The admin LAN is the LAN used by the admin server to control managed servers.
The admin LAN is set up separately from the public LAN used by applications on managed servers.
Using network redundancy software for the admin LAN enables redundancy for monitoring, power operations, and other functions.
Use the redundant line control function of PRIMECLUSTER GLS as network redundancy software if you want to perform redundancy of the admin LAN and use backup and restoration of system images even when errors have occurred for some LANs.

Chapter 3 Flow of Resource Orchestrator Design and Preparations

This chapter explains how to flow of Resource Orchestrator Design and Preparation.

Figure 3.1 prepare a Resource Orchestrator installation



Resource Orchestrator Setup Design

To introduce this product, the following content is designed.

- System Configuration Design

  For details, refer to "Chapter 4 System Configuration Design".

- Defining User Accounts

  For details, refer to "Chapter 5 Defining User Accounts".

- Define the Server Environment

  The server environment managed with the administrative server and this product is decided.

  For details, refer to "Chapter 6 Defining and Configuring the Server Environment".

- Define the Network Environment

  For details, refer to "Chapter 7 Defining and Configuring the Network Environment".

- Deciding the Storage Environment

  For details, refer to "8.1 Defining the Storage Environment".

- Deciding Server Virtualization Software

  The server virtualization software managed with this product is decided.

  For details, refer to "9.1 Deciding Server Virtualization Software".

- Installing and Defining Single Sign-On

- In order to use Single Sign-On, The single sign-on environment is decided.

- For details, refer to "Chapter 10 Installing and Defining Single Sign-On".

- Deciding the Power Monitoring Environment

  For details, refer to "11.1 Deciding the Power Monitoring Environment".

Pre-setup Preparations

The advance preparation is necessary before the manager of this product is introduced.

It does according to the following procedures.

- Configure the Server Environment

  The server environment managed with the administrative server and this product is set.

  For details, refer to "6.2 Configure the Server Environment".

- Configure the Network Environment

  For details, refer to ".

- Configuring the Storage Environment

  For details, refer to "8.2 Configuring the Storage Environment".

- Settings for Server Virtualization Software

  The server virtualization software managed with this product is set.

  For details, refer to "9.2 Settings for Server Virtualization Software"

- Installing and Defining Single Sign-On

- In order to use Single Sign-On, The single sign-on environment is set.

- For details, refer to "Chapter 10 Installing and Defining Single Sign-On".

- Configuring the Power Monitoring Environment

  For details, refer to "11.2 Configuring the Power Monitoring Environment".

Chapter 4 System Configuration Design

This appendix explains points to keep in mind when setting up a Resource Orchestrator environment:

- The maximum of managed servers can be registered in Resource Orchestrator is limited, and depends on the Resource Orchestrator license purchased.
  For details on the limit of managed servers, refer to license documentation.

  An error will occur when trying to register more managed servers than the above limit. This limit includes the spare servers used by recovery settings. However, it does not include VM guests.

- Clustering software can be used on managed servers.

  However, the following operations are not supported.

  - Managed Server Switchover
  - Backup and Restore

- Use of the Windows Server 2008 BitLocker drive encryption function (Windows BitLocker Drive Encryption) is not supported.

  If the admin server or managed servers are running under Windows Server 2008, do not encrypt the system disk using the BitLocker drive encryption function.

[Linux]
When installing an operating system on a PRIMEQUEST server, use legacy boot.

Chapter 5 Defining User Accounts

This chapter explains the user accounts used in Resource Orchestrator.

Overview

Managing user accounts in Resource Orchestrator prevents unsafe operations by unauthorized users, resulting in safer system administration.

User accounts are categorized into the following two user types:

Table 5.1 User Types

User types	Authority Level	Description
Privileged User	Manage	Can perform all operations on resources.
General User	Monitoring	Can only perform resource monitoring.

It is required to create at least one privileged user. The creation of general users is optional and depends on your own administration policy.

User accounts consist of the following:

- User name
- Password
- Authority level ("Manage" or "Monitor")

These Resource Orchestrator user accounts differ from the operating system user accounts on the admin server.

Refer to "A.2.1 List of Menus" in the "User's Guide VE" for information on the functions that these user accounts can execute.

Defining User Accounts

User accounts are categorized into the following two user types:

- Privileged User

  Privileged users can execute all operations for resources.

- General User

  General users can execute only reference operation of resources.

For details on the menus available from user accounts, refer to "A.2.1 List of Menus" in the "User's Guide VE".

User Account Conditions

Configure the following parameters for user accounts to be created on Resource Orchestrator:

User ID

The user ID must start with an alphabetical character, and can contain between 1 and 32 alphanumeric characters, underscores ("_"), hyphens ("-"), and periods (".").
When using OpenDS for the directory service used by Single Sign-On, the user ID (uid attribute) must be unique in the directory service.

Password (Confirm password)

- When Using Single Sign-On

  The string must be composed of alphanumeric characters and symbols, and can be between 8 and 64 characters long.

- When not using Single Sign-On

  The string must be composed of alphanumeric characters and symbols, and can be up to 16 characters long.

Authority Level

Select either "Manage" or "Monitor". There must be a privileged user.

Chapter 6 Defining and Configuring the Server Environment

This Chapter explains how to define and configure server environments.

6.1 Define the Server Environment

This section explains how to define setting values for server environments.

In this product, it corresponds to the following kind of servers. Decide the value set to the server according to the kind of the server.

- Blade Servers

  For details, refer to "6.1.1 Setting for Blade Servers".

- Rack Mount and Tower Servers

  For details, refer to "6.1.2 Settings for Rack Mount and Tower Servers".

- PRIMEQUEST

  For details, refer to "6.1.3 Setting for PRIMEQUEST".

- SPARC Enterprise M3000/T series

  For details, refer to "6.1.4 Setting for SPARC Enterprise M3000/T Series".

  When Switching Over SPARC Enterprise Servers, refer to "6.1.6 Settings when Switching Over SPARC Enterprise Servers".

- SPARC Enterprise M4000/M5000/M8000/M9000

  For details, refer to "6.1.5 Setting for SPARC Enterprise M4000/M5000/M8000/M9000".

When Switching Over SPARC Enterprise Servers, refer to "6.1.6 Settings when Switching Over SPARC Enterprise Servers".

It treats for the server that does not use the server management software as "Rack Mount and Tower Server".

For servers other than HP servers, a Baseboard Management Controller (hereinafter BMC) is used for server management.

6.1.1 Setting for Blade Servers

Choose values for the following management blade settings, given the following criteria:

Chassis name

This name is used to identify the chassis on the admin server. Each chassis name must be unique within the system.
The first character must be alphabetic, and the name can contain up to 10 alphanumeric characters and hyphens ("-").

Admin IP address (IP address of the management blade)

These IP addresses can be used to communicate with the admin server.

SNMP community name

This community name can contain up to 32 alphanumeric characters, underscores ("_"), and hyphens ("-").

SNMP trap destination

This must be the IP address of the admin server.

To enable server switchover and cloning between servers in different chassis, use the same SNMP community for each chassis.

6.1.2 Settings for Rack Mount and Tower Servers

Resource Orchestrator supports the following types of remote management controllers to manage servers.

- For PRIMERGY Servers

  iRMC2

- For HP Servers

  iLO2 (integrated Lights-Out)

- For DELL or IBM Servers

  BMC (Baseboard Management Controller)

Choose values for the following remote management controller settings according to the criteria listed below.

Admin IP address (IP address of the IPMI controller)

These IP addresses can be used to communicate with the admin server.

User name

Name of the user account used to log in the remote management controller and gain control over the managed server.
A user account with at least administration privileges within the remote management controller must be specified.
The user name can contain up to 16 alphanumeric characters and symbols (ASCII characters 0x20 to 0x7e).
If a user account with a name of 17 or more characters has already been set up, either create a new user account or rename it with a name of up to 16 characters.

Password

Password used to log in the remote management controller with the above user name.
The user name can contain up to 16 alphanumeric characters and symbols (ASCII characters 0x20 to 0x7e).
If a user account with password of 17 or more characters has already been set up, either create a new user account or change the password with one of up to 16 characters.

SNMP trap destination

The destination for SNMP traps sent by the remote management controller should be set as the admin server's IP address.

For PRIMERGY servers, the server status can be monitored from external server management software (ServerView Agents). In that case, choose a value for the following setting.

SNMP community name

Name of the SNMP community used to communicate with the server management software (ServerView Agents) on the managed server.
This community name can contain up to 32 alphanumeric characters, underscores ("_"), and hyphens ("-").

Note

Use the same SNMP community for each server when using server switchover and cloning functions.

6.1.3 Setting for PRIMEQUEST

Choose values for the following management board settings, given the following criteria:

Chassis name

This name is used to identify the PRIMEQUEST chassis on the admin server. Each chassis name must be unique within the system.
The first character must be alphabetic, and the name can contain up to 10 alphanumeric characters and hyphens ("-").

Admin IP address (Virtual IP address of the management board)

These IP addresses can be used to communicate with the admin server.

User name

Name of the user account used to log into remote server management and gain control over the managed server.
A user account with at least administration privileges within the remote server management must be specified.
This user name must be between 8 and 16 alphanumeric characters long.

Password

Password used to log in the remote management controller with the above user name.
This password must be between 8 and 16 alphanumeric characters long.

SNMP community name

This community name can contain up to 32 alphanumeric characters, underscores ("_"), and hyphens ("-").

SNMP trap destination

This must be the IP address of the admin server.

Note

To enable server switchover and cloning between servers in different chassis, use the same SNMP community for each chassis.

6.1.4 Setting for SPARC Enterprise M3000/T Series

Resource Orchestrator is able to manage SPARC Enterprise servers by using their XSCF interface for the M3000 series and the ILOM interface for the T series as a remote management controller.

For M3000

For M3000, choose values for the following XSCF settings according to the criteria listed below.

IP address

These IP addresses can be used to communicate with the admin server.

User name

Name of the user account used to log into XSCF and gain control over the managed server.
A user account with "platadm" privileges within XSCF must be specified.
The user name must start with an alphabet character, and can contain up to 31 alphanumeric characters, underscores ("_"), and hyphens ("-").

Password

Password used to log into the remote management controller with the above user name.
The user password can contain up to 32 alphanumeric characters, blank spaces (" "), and any of the following characters.
"!", "@", "#", "$", "%", "^", "&", "*", "[", "]", "{", "}", "(", ")", "-", "+", "=", "~", ",", ">", "<", "/", "'", "?", ";", ":"

SNMP trap destination

The destination for SNMP traps sent by XSCF should be set to the admin server's IP address.

SNMP community name

Name of the SNMP community used to communicate with XSCF.
This community name can contain up to 32 alphanumeric characters, underscores ("_"), and hyphens ("-").

For T Series

For the T series, choose values for the following ILOM settings according to the criteria listed below.

IP address

These IP addresses can be used to communicate with the admin server.

User name

The name of the user account used to log into ILOM and gain control over the managed server.
A user account with Admin privileges within ILOM must be specified.
The user name must start with an alphabet character, and can contain between 4 and 16 alphanumeric characters, underscores ("_"), and hyphens ("-").

Password

Password used to log into the remote management controller with the above user name.
The user password can contain between 8 and 16 alphanumeric characters, blank spaces (" "), and any of the following characters.
"!", "@", "#", "$", "%", "^", "&", "*", "[", "]", "{", "}", "(", ")", "-", "+", "=", "~", ",", ">", "<", "/", "'", "?", ";", ":"

SNMP trap destination

The destination for SNMP traps sent by ILOM should be set to the admin server's IP address.

SNMP community name

Name of the SNMP community used to communicate with ILOM.
This community name can contain up to 32 alphanumeric characters, underscores ("_"), and hyphens ("-").

6.1.5 Setting for SPARC Enterprise M4000/M5000/M8000/M9000

Resource Orchestrator is able to manage SPARC Enterprise servers by using their XSCF interface as a remote management controller. Choose values for the following XSCF settings according to the criteria listed below.

Chassis name

This name is used to identify the chassis for SPARC Enterprise M4000/M5000/M8000/M9000 servers on the admin server. Each chassis name must be unique within the system.
The first character must be alphabetic, and the name can contain up to 10 alphanumeric characters and hyphens ("-").

Admin IP address

These IP addresses can be used to communicate with the admin server.

User name

Name of the user account used to log into XSCF and gain control over the managed server.
A user account with "platadm" privileges within XSCF must be specified.
This name can contain up to 31 alphanumeric characters, hyphens ("-"), and underscores ("_").

Password

Password used to log into the remote management controller with the above user name.
The user password can contain up to 32 alphanumeric characters, blank spaces (" "), and any of the following characters.
"!", "@", "#", "$", "%", "^", "&", "*", "[", "]", "{", "}", "(", ")", "-", "+", "=", "~", ",", ">", "<", "/", "'", "?", ";", ":"

SNMP trap destination

The destination for SNMP traps sent by XSCF should be set to the admin server's IP address.

SNMP community name

Name of the SNMP community used to communicate with XSCF.
This community name can contain up to 32 alphanumeric characters, underscores ("_"), and hyphens ("-").

6.1.6 Settings when Switching Over SPARC Enterprise Servers

When integrating with ESC, it should be configured first. Register the Fibre Channel switches and storage units connected to primary servers and managed servers on ESC.

Note

When integrating with ESC, do not register servers used as spare server for Resource Orchestrator on ESC.

After registration, collect WWNs of HBAs set on physical servers or WWNs of CAs set on storage units.

Collection of WWNs of HBA Set on Physical Servers

From the client window of ESC, collect the WWNs for HBAs contained in the registered servers.
For servers that are not registered on ESC, collect WWNs from the seals, drivers, and utilities provided with HBA cards.
Refer to the storage device manual of each storage device for details.

Collection of WWNs of CA Set on Storage Units

From the client window of ESC, collect the WWNs for HBAs contained in the registered storage.
Refer to the storage device manual of each storage device for details.

Collected WWNs are reflected in the relationship between physical servers and HBA WWNs from the perspective of the server, and in the relationship between the storage CA and WWNs from the perspective of storage devices.
System configuration requires that the relationship between HBA WWNs, storage CA WWNs, and volumes from the perspective of storage devices be defined clearly.
When using a multi-path configuration, design the values to match the order of HBAs configured as primary servers or spare servers with those of the corresponding CAs.

Information

For integration with ESC, Resource Orchestrator supports configurations where managed servers have up to eight HBA ports mounted.

6.2 Configure the Server Environment

This section describes how to configure servers and chassis for Resource Orchestrator.

Set it according to the value decided by "6.1 Define the Server Environment" as follows.

- Setting for Blade Servers

  For details, refer to "6.2.1 Setting for Blade Servers".

- Settings for Rack Mount and Tower Servers

  For details, refer to "6.2.2 Settings for Rack Mount and Tower Servers".

- Setting for PRIMEQUEST

  For details, refer to "6.2.3 Setting for PRIMEQUEST".

- Setting for SPARC Enterprise M3000

  Please refer to the following.

  - "6.2.4 Setting SPARC Enterprise M3000"
  - "6.2.9 OBP(Open Boot Prom) Setting (SPARC Enterprise)"

- Setting for SPARC Enterprise M4000/M5000/M8000/M9000

  Please refer to the following.

  - "6.2.5 Setting for SPARC Enterprise M4000/M5000/M8000/M9000"
  - "6.2.9 OBP(Open Boot Prom) Setting (SPARC Enterprise)"

- Setting for SPARC Enterprise T Series

  Please refer to the following.

  - "6.2.6 Setting for SPARC Enterprise T Series"

- "6.2.9 OBP(Open Boot Prom) Setting (SPARC Enterprise)"

In the following servers, setting "6.2.7 BIOS Settings of Managed Servers".

- Blade Servers (not using VIOM)
- Rack Mount and Tower Servers
- PRIMEQUEST

When OS is installed on the managed server, setting "6.2.7 BIOS Settings of Managed Servers".

When VMware ESXi installed on the managed server, setting "6.2.10 Setting for ServerView Operations Manager(VMware ESXi)".

6.2.1 Setting for Blade Servers

Refer to the management blade manual to apply the settings chosen in "6.1.1 Setting for Blade Servers" to the management blade. Note that the SNMP community must be set to Write (read and write) access.

- Admin IP address (IP address of the management blade)
- SNMP community name
- SNMP trap destination

  This must be the IP address of the admin server.

Refer to the management blade manual to set the following SNMP agent settings.

- Set Agent SNMP Enable

  Set to "enable".

- Set Agent SNMP Security Enable

  Set to "disable".

Note

When powering off a chassis together with its enclosed server blades, servers are shut down using the graceful shutdown option of the management blade. To enable this feature, all servers within the chassis should have a ServerView Agents installed.

6.2.2 Settings for Rack Mount and Tower Servers

Refer to the remote management controller manual to configure the following on the IPMI controller.

- IP address
- User name
- Password
- SNMP trap destination

  This must be the IP address of the admin server.

6.2.3 Setting for PRIMEQUEST

Refer to the management board manual to apply the settings chosen in "6.1.3 Setting for PRIMEQUEST" to the management board. Note that the SNMP community must be set to Write (read and write) access.

- Admin IP address (Virtual IP address of the management board)
- User name
- Password
- SNMP community name
- SNMP trap destination

  This must be the IP address of the admin server.

Enable the following function referring the instructions given in the management board's manual.

- SNMP Agent

6.2.4 Setting SPARC Enterprise M3000

Refer to the management controller (XSCF) manual to apply the settings chosen in "6.1.4 Setting for SPARC Enterprise M3000/T Series" to the management controller.

- IP address
- User name
- Password
- SNMP community name
- SNMP trap destination

  This must be the IP address of the admin server.

Refer to the remote management controller(XSCF) manual to configure the following on the IPMI controller.

- SNMP Agent
- SSH Service
- HTTPS Service

Note

When assigning multiple IP addresses to multiple network interfaces on a XSCF module, ensure that the IP address used by Resource Orchestrator is assigned to the first of those network interfaces.

Set as follows to automatically start up the OS when powering.

- Set the "Autoboot" of the Domain Mode to "on".
- Set the mode switch of operator panel to "Locked" in the OpenBoot configuration.

6.2.5 Setting for SPARC Enterprise M4000/M5000/M8000/M9000

Refer to the management controller (XSCF) manual to apply the settings chosen in "6.1.5 Setting for SPARC Enterprise M4000/M5000/M8000/M9000" to configure the following on the IPMI controller.
Note that the SNMP community must be set to Write (read and write) access.

- Admin IP address (IP address of the remote management controller)
- User name
- Password

- SNMP community name
- SNMP trap destination

  This must be the IP address of the admin server.

Refer to the instructions given in the XSCF manual and enable the following functions.

- SNMP Agent
- SSH Service
- HTTPS Service
- Domain Autoboot

Set as follows to automatically start up the OS when powering.

- Set the "Autoboot" of the Domain Mode to "on".
- Set the mode switch of operator panel to "Locked" in the OpenBoot configuration.

6.2.6 Setting for SPARC Enterprise T Series

Refer to the management controller (ILOM) manual to apply the settings chosen in "6.1.4 Setting for SPARC Enterprise M3000/T Series" to configure the following on the IPMI controller.

- IP address
- User name
- Password
- SNMP community name
- SNMP trap destination

  This must be the IP address of the admin server.

For SPARC Enterprise T series servers, refer to the ILOM manual and enable the following services.

- SNMP Agent
- SSH Configuration
- HTTPS Configuration
- IPMI Status

6.2.7 BIOS Settings of Managed Servers

BIOS settings of managed servers must be set if VIOM is not used.

If VIOM is used, boot order settings must be configured in the VIOM server profile. For details, refer to "7.1.1 Registering VIOM Server Profiles" in the "User's Guide VE".

The following BIOS configurations must be modified.

System BIOS

This is the system BIOS for a managed server.
Enable or disable the internal SCSI BIOS and FC-HBA BIOS as appropriate, and set up the appropriate boot order.

Note

- The BIOS settings of server blades include an option to automatically start up servers when their enclosing chassis is powered on. For details, refer to the server blade manual.
- For PRIMERGY BX900/BX400, when an LND-PG203 is mounted as the LAN expansion card of the server blade, do not set the NIC of the LAN expansion card as "disable" in the server blade's BIOS settings.
  The connections between server blades and LAN switch blades are not shown correctly, when "disable" is set.
  The following functions do not operate correctly.
  - Changing and setting the VLAN for LAN switch blades (internal and external ports)
  - Server switchover (changing network settings while a server is switched over)
- If "UEFI" and "Legacy" are displayed when configuring boot settings from the network interface, select "Legacy".
- Set PXE VLAN Support to "Disabled" when the server switch over method is HBA address rename.

Internal SCSI BIOS

These are the BIOS settings for the internal SCSI disk(s) of a managed server.
Enable or disable booting from internal disks as appropriate.

FC-HBA BIOS

This is a BIOS setting that relates to FC-HBAs that have been installed as an expansion card in the blade server.
Enable or disable SAN boot as well as the connection of a SAN storage environment by means of a Fibre Channel switch.

Configure the following settings depending on the operating environment.

- **When using the backup/restore or cloning function**

  System BIOS

  Set the boot order as follows.

  1. Boot from the first admin LAN network interface (NIC1 (Index1))
  2. Boot from the network interface used by the admin LAN (NIC2 (Index2))
  3. Boot from CD-ROM (when a CD-ROM Drive is Connected)
  4. Boot from the disk

  Note

  - Do not change the boot order once a managed server has commenced operation. Even when booting from disk, there is no need to change the boot order.
  - Step 2 is only required for a redundant admin LAN configuration.
  - NICs other than NIC1 and NIC2 can also be used for the admin LAN. In this case, switch the order of step 1. and step 2. When using NICs other than NIC1 and NIC2 for the admin LAN, specify the same NIC configured in this procedure when registering the server.
    For details, refer to "7.3.2 Registering Blade Servers" and "7.4.1 Registering Rack Mount or Tower Servers" in the "User's Guide VE"

  Internal SCSI BIOS

  The servers to which a cloning image is deployed should have the same internal SCSI BIOS settings as those of the server from which the image was collected. Similarly, when using server switchover, primary servers and their spare servers should have the same internal SCSI BIOS settings.

FC-HBA BIOS

When using HBA address rename and SAN storage only for data storing purposes, disable boot from SAN. Refer to the manual of each FC-HBA for details on FC-HBA BIOS settings.

This setting is only required if a SAN storage system is used.

- **When using HBA address rename for SAN boot**

System BIOS

Enable the FC-HBA BIOS.
Set the boot order as follows:

1. Boot from the first admin LAN network interface (NIC1 (Index1))
2. Boot from the network interface used by the admin LAN (NIC2 (Index2))
3. Boot from CD-ROM (when a CD-ROM Drive is Connected)
4. Boot from a storage device

Note

- Do not change the boot order once a managed server has commenced operation. Even when booting from disk, there is no need to change the boot order.
- NICs other than NIC1 and NIC2 can also be used for the admin LAN. In this case, switch the order of step 1. and step 2. When using NICs other than NIC1 and NIC2 for the admin LAN, specify the same NIC configured in this procedure when registering the server.
  For details, refer to "7.3.2 Registering Blade Servers" and "7.4.1 Registering Rack Mount or Tower Servers" in the "User's Guide VE".
- If "UEFI" and "Legacy" are displayed when configuring boot settings from the network interface, select "Legacy".

Internal SCSI BIOS

If the managed server does not have an internal SCSI disk, disable the option to boot from an internal SCSI disk. However, in some cases (depending on a combination of factors such as server model, HBA model, and firmware), this option should either be enabled or disabled. Refer to the FC-HBA manual for instructions on whether or not to enable or disable boot from internal SCSI disk.

FC-HBA BIOS

Enable booting from SAN storage devices.

Refer to the manual of each FC-HBA for details on FC-HBA BIOS settings.

Note

- Restart the server saving BIOS configuration changes.
- HBA address rename may not work properly with older BIOS firmware versions.
  Please obtain and update the latest BIOS firmware from the following web site.

  URL: http://primeserver.fujitsu.com/primergy/

- **When using VIOM (SAN boot)**

System BIOS

Enable the FC-HBA BIOS.

Set the boot order as follows:

1. Boot from the first admin LAN network interface (NIC1 (Index1))

2. Boot from the network interface used by the admin LAN (NIC2 (Index2))
3. Boot from CD-ROM (when a CD-ROM Drive is Connected)
4. Boot from a storage device

Note

NICs other than NIC1 and NIC2 can also be used for the admin LAN. In this case, switch the order of step 1. and step 2. When using NICs other than NIC1 and NIC2 for the admin LAN, specify the same NIC configured in this procedure when registering the server.

For details, refer to "7.3.2 Registering Blade Servers" and "7.4.1 Registering Rack Mount or Tower Servers" in the "User's Guide VE"

Internal SCSI BIOS

Apply the same settings as those described in the above "When using HBA address rename for SAN boot" section.

FC-HBA BIOS

Apply the same settings as those described in the above "When using HBA address rename for SAN boot" section.

- **When using VIOM (iSCSI boot)**

System BIOS

Enable iSCSI boot for the NIC which is used for the iSCSI LAN.
Use the VIOM server profile for the iSCSI boot parameter settings.
For details on server profile setup, refer to the ServerView Virtual-IO Manager manual.
Set the boot order as follows:

1. Boot from the first admin LAN network interface (NIC1 (Index1))
2. Boot from the network interface used by the admin LAN (NIC2 (Index2))
3. Boot from the network interface used for the iSCSI LAN (NIC3(Index3))
4. Boot from the network interface used for the iSCSI LAN (NIC4(Index4))

Note

- Do not change the boot order once a managed server has commenced operation. Even when booting from disk, there is no need to change the boot order.
- NICs other than NIC1 and NIC2 can also be used for the admin LAN. In this case, switch the order of step 1. and step 2. When using NICs other than NIC1 and NIC2 for the admin LAN, specify the same NIC configured in this procedure when registering the server.
  For details, refer to "7.3.2 Registering Blade Servers" and "7.4.1 Registering Rack Mount or Tower Servers" in the "User's Guide VE"
- When using NIC3 or NIC4 for the admin LAN, use NICs other than NIC3 and NIC4 for the iSCSI LAN. In this case, switch the order of step 3. and step 4.

Internal SCSI BIOS

if the managed server does not have an internal SCSI disk, disable the option to boot from an internal SCSI disk. However, in some cases (depending on a combination of factors such as server, model, and firmware), this option should either be enabled or disabled. Refer to the hardware manual for instructions on whether or not to enable or disable boot from internal SCSI disk.

FC-HBA BIOS

Disable the function.

- When using VIOM (Local boot)

  Apply the same settings as those described in the above "When using the backup/restore or cloning function" section.

6.2.8 OS Settings for Managed Servers

When using the following functions, configure the OS to respond to ping commands.

- Auto-Recovery (for rack mount or tower servers)
- Configuration of monitoring information (ping monitoring)

6.2.9 OBP(Open Boot Prom) Setting (SPARC Enterprise)

When managing SPARC Enterprise servers from Resource Orchestrator, set the "auto-boot?" option to "true" in the OBP configuration. Otherwise, the operating system will not automatically start up when powering on SPARC Enterprise servers.

- SAN Boot Settings

  Configure the following settings on OBP for automatic boot from SAN storage devices.

  - auto-boot?

    Set to "true".

  - boot-device

    Set with a boot disk identifier at the beginning.

  Configure the following settings on OBP for HBAs connected to the boot disk.

  - HBA boot

    Enable the function.

  - Topology

    Set to NPORT connection.

  - Target devices

    Configure based on values set in "6.1.6 Settings when Switching Over SPARC Enterprise Servers".

For details, refer to "SPARC Enterprise SAN Boot Environment Build Guide" of the Fibre Channel card driver manual.

6.2.10 Setting for ServerView Operations Manager(VMware ESXi)

When managing VMware ESXi using Resource Orchestrator, register the target VMware ESXi with ServerView Operations Manager.

For details, refer to the ServerView Operations Manager manual.

Chapter 7 Defining and Configuring the Network Environment

This section explains how to define and pre-configure the network environment.

7.1 Network Configuration

The following will define the network configuration required by the system.

For each server, choose the network interfaces to use for the following purposes.

- Network interface assigned to the admin LAN
- Network interface assigned to the iSCSI LAN (Only when iSCSI is used)
- Network interface assigned to the public LAN

Choose the following settings to fit the system environment.

- Network redundancy settings
- Network configuration of LAN switch blades (when using PRIMERGY BX servers)

Refer to "Example of VLAN network configuration (with PRIMERGY BX600)" and the description below to design a network configuration.

- Admin LAN

  The admin LAN is the network used by the manager to communicate with agents on the managed servers and other managed devices.

  - Admin Server and Managed Servers

    The number of network interfaces required for the admin server and managed servers can be determined as follows.

    For a non-redundant configuration: one network interface
    For a redundant configuration: two network interfaces

    If HBA address rename is used, two network interfaces (named NIC1 and NIC2) are required regardless of network redundancy. For details, refer to "Required Network Configuration when Using HBA address rename".

    For PRIMERGY Managed Servers

    - For a non-redundant configuration

      NIC1 (Index1)

    - For a redundant configuration, or when using HBA address rename

      NIC1 (Index1) and NIC2 (Index2)

    The NICs above used by managed servers are the default values, and they can be changed when registering managed servers. For details, refer to "7.3.2 Registering Blade Servers" or "7.4.1 Registering Rack Mount or Tower Servers" in the "User's Guide VE".

    For PRIMEQUEST Managed Servers

    - For a non-redundant configuration

      The smallest NIC number of the GSPB allocated to a partition

    - For a redundant configuration, or when using HBA address rename

      The smallest and the second smallest NIC number of the GSPB allocated to a partition

Information

For blade servers, depending on the model of LAN switch blade used in the same chassis, the network interfaces whose index numbers are between 3 and 6 (NIC3 - NIC6) may not be available.

- Admin Client

  Set up routing to enable communications from the admin client to the admin server. It is also suggested to allow communications from the admin client to managed servers, server management units, and switch blades. Such routing configuration is necessary to allow access to ServerView and other management consoles.

  There is no need to set up routing if the admin client is already located within the admin LAN.

Note

- When using blade servers, connecting the management blade to a LAN switch blade will make the management blade inaccessible in the event of a LAN switch blade failure. Therefore, it is recommended that the management blade be connected to the admin LAN using a LAN switch outside the chassis.
- When performing I/O virtualization using HBA address rename, if specifying a 10Gbps expansion card (NIC) for the admin LAN, backup and restore, and cloning cannot be used.
- Do not place a DHCP server or a PXE server on the admin LAN.
- Do not configure multiple IP addresses for network interfaces used on the admin LAN.
- When the same cloning image is deployed to multiple servers, IGMP snooping should be enabled on admin LAN switches. If IGMP snooping is not enabled, transfer performance may deteriorate when ports with different speeds co-exist in the same network, or multiple image operations are run simultaneously.
- For PRIMERGY BX900/BX400 LAN switch blades operating in IBP mode, the admin LAN should not be included in the ServiceLAN or the ServiceVLAN group configuration.

- iSCSI LAN

  The iSCSI LAN is designed for communication between managed servers and storage devices.
  The number of network interfaces required for managed servers is as follows:

  For a non-redundant configuration: one network interface
  For a redundant configuration: two network interfaces

  The iSCSI LAN must be a different LAN from the public and admin LANs.

Note

Keep the following points regarding the iSCSI LAN in mind.

- Tagged VLANs cannot be used.
- Teaming is not available.
- Use is not possible in cluster configurations.
- The STP of connected switches must be turned off.
- DHCP cannot be used for iSCSI LAN IP addresses. Fixed IP addresses should be configured.

Refer to the hardware manual for details on other points.

- Public LAN

  The public LAN is the network used by managed servers to provide services over internal or external networks (such as intranets or the Internet).
  On managed servers, use a NIC for other than that for the admin LAN.
  Regarding advisory notes for network settings used by VM guests, refer to "Configuration Requirements for Each Server Virtualization Product" of "D.2 Configuration Requirements".
  A network interface can be shared between multiple public LANs by using a redundant configuration and tagged VLAN.

Information

For blade servers, depending on the model of LAN switch blade used in the same chassis, the network interfaces whose index numbers are between 3 and 6 (NIC3 - NIC6) cannot be used.
Instead, it is possible to use two more interfaces for the public LAN by adding expansion cards (NIC7 and NIC8) and a LAN switch blade, or by sharing the NIC used for the admin LAN.
All network interfaces shared between the admin LAN and the public LAN for managed servers should be configured with tagged VLAN IDs.

- Network configuration of LAN switch blades (when using PRIMERGY BX servers)

  In a blade system environment, multiple subnets can be consolidated onto LAN switch blades by using VLANs.
  For PRIMERGY BX900/BX400 LAN switch blades operating in IBP mode, the above can also be achieved by using port group settings for IBP instead of VLAN settings.
  Each port of a LAN switch blade can be set with VLAN IDs.
  Only those ports set with a same VLAN ID can communicate with each other.
  Setting up different VLAN IDs then results in multiple subnets (one per VLAN ID) co-existing within the same switch.

  Define the VLANs to set on both the internal (server blade side) and external ports of each LAN switch blade.

  - Internal Ports

    Ensure that port VLANs are configured for the ports corresponding to the NICs (refer to "Admin LAN") connected to the admin LAN.
    If NICs connected to the admin LAN are used for public LANs, configure tagged VLANs.
    For the ports corresponding to the NICs (refer to "Public LAN") connected to the public LAN, assign a VLAN ID (port or tagged VLAN) other than VLAN ID1 (the default VLAN ID) for each subnet.
    Using tagged VLANs on LAN switch ports also requires configuring the network interfaces of managed servers with tagged VLANs. As Resource Orchestrator cannot set tagged VLANs to network interfaces on managed servers, this must be done manually.

  - External Ports

    Choose the LAN switch blade ports to connect to external LAN switches, and the VLAN IDs to use for both the admin and public LANs.
    When choosing a tagged VLAN configuration, the VLAN ID chosen for a LAN switch blade's external port must be the same as that used on its adjacent port on an external LAN switch.

Note

- To change the VLAN ID for the admin LAN, perform the following.

  1. Enable communications between the admin server and the LAN switch blade.
     Manually change the following two settings.

     - Change the VLAN ID of the external port(s) used for the admin LAN.

     - Change the VLAN ID used by the admin IP address of the LAN switch blade.

  2. Change the VLAN ID used by the managed server on the admin LAN.

- VLAN settings for LAN switch blades are not included in cloning images. Configure VLAN settings for the target servers before deploying a cloning image.

- In the following cases, VLANs cannot be configured using the ROR console.

  Configuring VLANs on external ports

  - Link state group

  - Port backup function

  Configuring VLANs on external and internal ports

- Link aggregation

  However, the following models are excluded.

  - LAN switch blade PY CB Eth Switch/IBP 10Gb 18/8
  - LAN switch blade PY CB Eth Switch/IBP 1Gb 36/8+2
  - LAN switch blade PY CB Eth Switch/IBP 1Gb 36/12
  - LAN switch blade PY CB Eth Switch/IBP 1Gb 18/6

- Deactivated (depends on LAN switch blade model)

Choose VLAN IDs as well as VLAN types (port or tagged VLAN) for the ports on LAN switch blades that are connected to each server blade's network interfaces. For each of a physical server's network interfaces, choose:

- Physical server name
- NIC index
- VLAN ID
- VLAN type (port or tagged VLAN)

Note

On servers, operating systems associate each physical network interface with a connection name (Local area connection *X* in windows and eth*X* in Linux).
If more than one network interface is installed, depending on the OS type and the order of LAN driver installation, the index numbers (*X*) displayed in their connection name may differ from their physically-bound index (defined by each interface's physical mount order).
The relations between physically-bound indexes and displayed connection names can be confirmed using OS-provided commands or tools.
For details, refer to network interface manuals.
Also, note that Resource Orchestrator uses the physical index of a network interface (based on physical mount order).

[Windows] [Hyper-V]
When using the backup, restore, or cloning functions, enable the managed server's NetBIOS over TCP/IP.
Note that the managed server should be restarted after enabling NetBIOS over TCP/IP.

Example of VLAN Network Configuration (with PRIMERGY BX600)

Figure 7.1 With Port VLANs

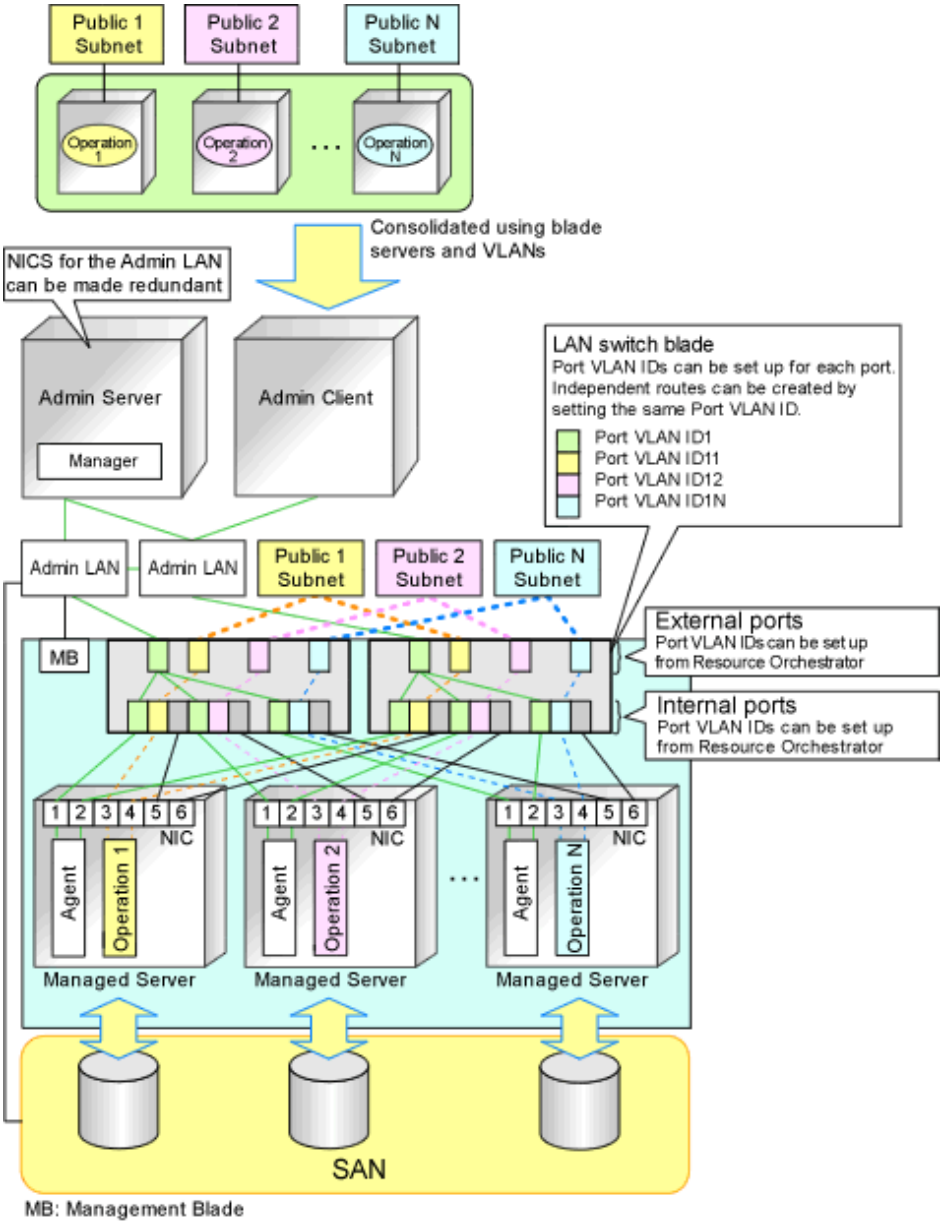
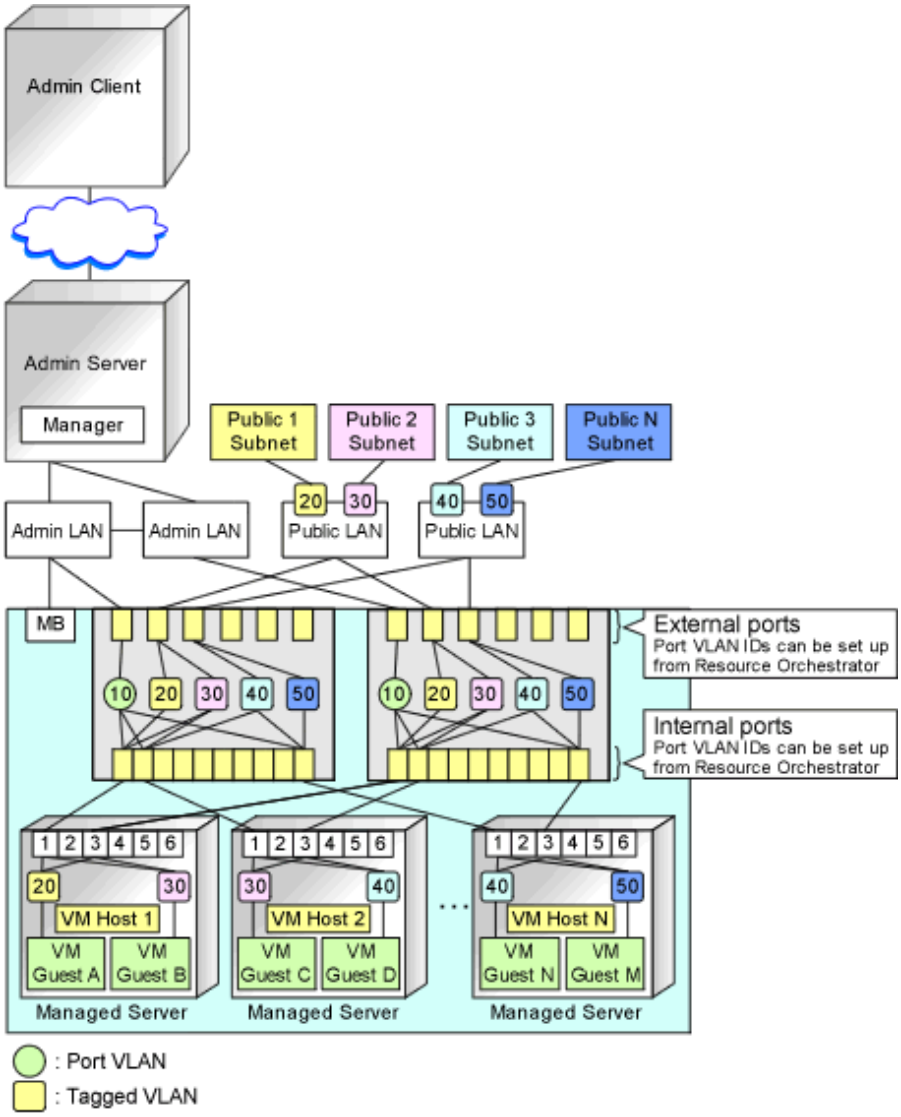


Figure 7.2 With Tagged VLANs



Information

It is recommended that a dedicated admin LAN be installed as shown in "Example of VLAN network configuration (with PRIMERGY BX600)".
If you need to use the following functions, a dedicated admin LAN is required in order to allocate admin IP addresses to the managed servers using the DHCP server included with Resource Orchestrator.

- Backup and restore
- Collection and deployment of cloning images
- HBA address rename

In a configuration using a LAN switch blade, a VLAN has to be configured if the LAN switch blade is shared by an admin and public LANs where a dedicated admin LAN is required.

Required Network Configuration when Using HBA address rename

At startup a managed server set with HBA address rename needs to communicate with the Resource Orchestrator manager. To enable startup of managed servers even when the manager is stopped, Resource Orchestrator should be set according to one of the following configurations.

- Manager cluster configuration with admin LAN redundancy using the redundant line control function of PRIMECLUSTER GLS

  For details, refer to "Appendix D Manager Cluster Operation Settings and Deletion" in the "Setup Guide VE". Dedicated HBA address rename server

This section describes the network configuration that is required for an environment with a dedicated HBA address rename server.

For details of setting for the HBA address rename setup service, refer to "Chapter6 HBA address rename setup service" in the "Setup guide VE".

- This service must be placed in an admin LAN in the same segment as the admin server.
- Only one HBA address rename setup service operates on the admin LAN. Do not start more than one instance of this service.
- This service uses NIC2 (Index2).
  Connect NIC2 of the managed server to the admin LAN.

  NIC2 is the default value, and it can be changed when registering managed servers.

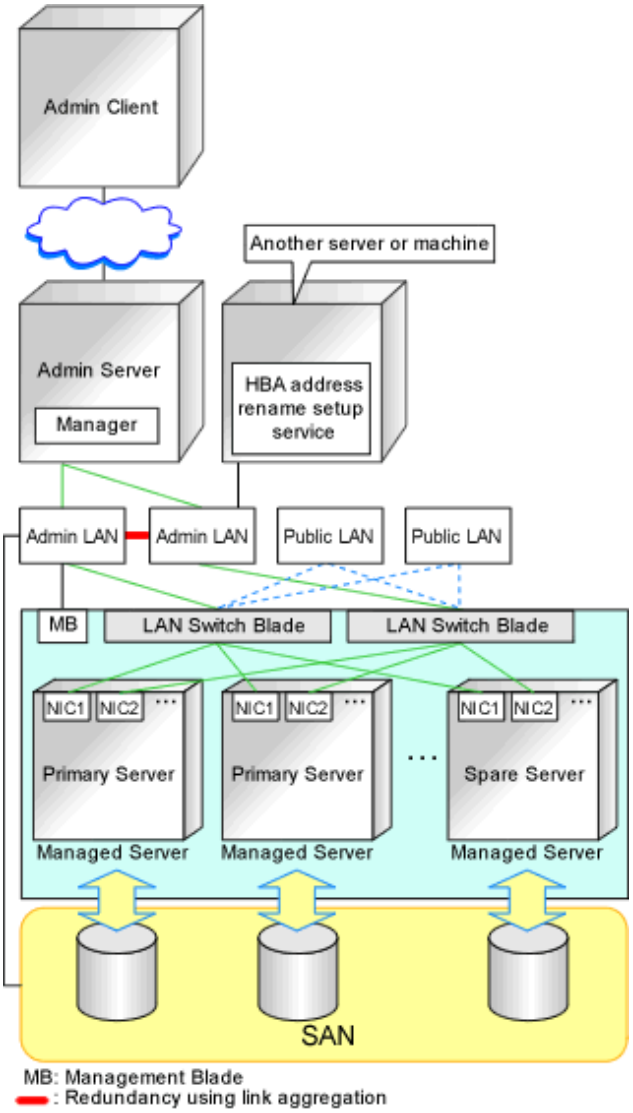
  For details, refer to "7.3.2 Registering Blade Servers" or "7.4.1 Registering Rack Mount or Tower Servers" in the "User's Guide VE".
- This service periodically obtains information about managed servers from the admin server and operates using this information. For this reason, it should be installed on a server that can be left active all the time.
- There must be two LAN cables between LAN switches (cascade connection) on the admin server and on the managed server.

Note

The HBA address rename setup service cannot operate on the same server as ServerView Deployment Manager, or on a server where any other DHCP or PXE service is running.

The following diagram shows an example of how the HBA address rename setup service can be configured.

Figure 7.3 Sample Configuration Showing the HBA address rename Setup Service (with PRIMERGY BX600)



- Connections between LAN switches on the admin LAN can be made redundant using link aggregation.
- Connect NIC2 (Index2) to the admin LAN (when it is the default).
- Configure the HBA address rename setup service on a server connected to the admin LAN. This server must be different from the admin server.
- Ensure that the server or personal computer that is used to operate the HBA address rename setup service is always on when the managed servers are active.

Network Configuration Required for VIOM Integration

When integrating with VIOM, the network configuration is defined by LAN switch blade and Intelligent Blade Panels.
For details, refer to the ServerView Virtual-IO Manager manual.
For details on how to configure VIOM coordination settings, refer to "7.1 Registering VIOM Coordination" in the "User's Guide VE".
The following diagram shows an example of how the HBA address rename setup service can be configured.

Figure 7.4 Sample Configuration for VIOM Integration (on PRIMERGY BX900 Servers Using a SAN)

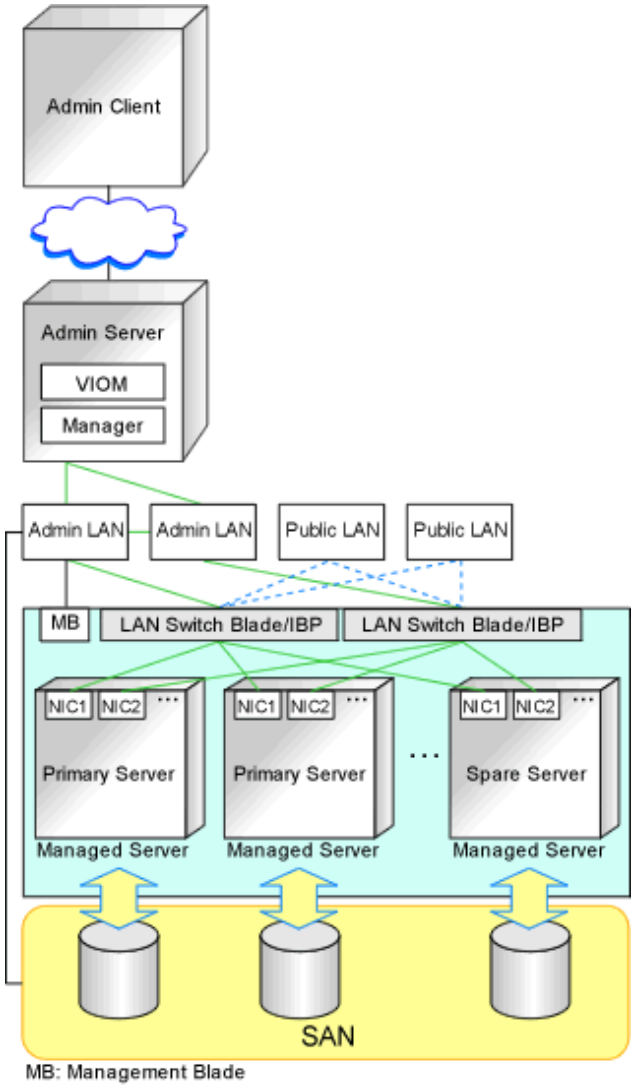
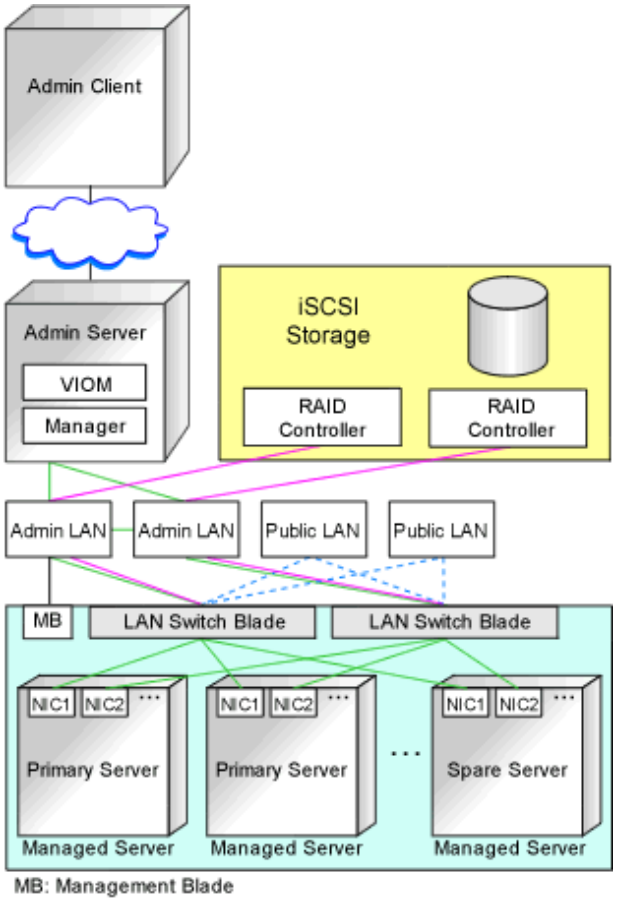


Figure 7.5 Sample Configuration for VIOM Integration (on PRIMERGY BX900 Servers Using iSCSI)



When using IBPs, the first IBP port should be connected to the admin LAN.
On the adjacent admin LAN switch, the Spanning Tree Protocol (STP) should be disabled on the port connected to that first IBP port.

Functions Provided by Resource Orchestrator

Resource Orchestrator provides the following VLAN and port group management functions for PRIMERGY BX LAN switch blades.

- VLAN configuration using the GUI

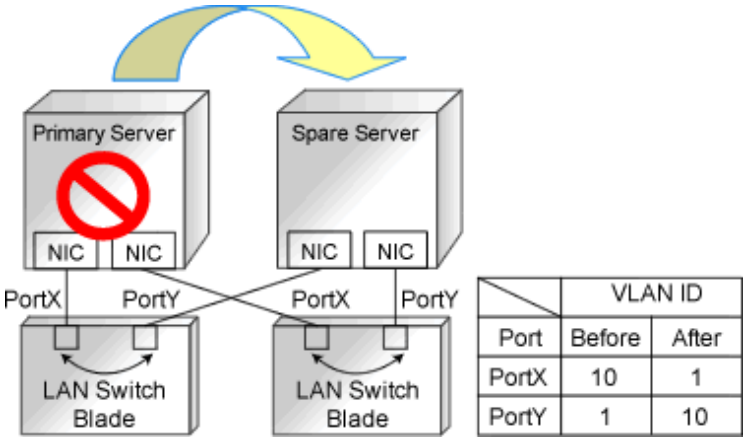
  VLAN IDs of LAN switch blade ports can be configured from the ROR console.

- Exchange of VLAN IDs within each LAN switch blade in conjunction with server switchovers

  When a server switchover occurs, the VLAN ID configuration of related LAN switch blades is automatically adjusted to preserve the network connectivity of applications.
  VLAN IDs that were set on the LAN switch blade ports connected to the original server are exchanged with the VLAN IDs set on the

ports connected to the spare server, as shown in "Figure 7.6 VLAN Exchange Mechanism for Auto-Recovery, Server Switchover, and Server Failback".

Figure 7.6 VLAN Exchange Mechanism for Auto-Recovery, Server Switchover, and Server Failback



	VLAN ID	
Port	Before	After
PortX	10	1
PortY	1	10

- Exchange of port groups in LAN switch blades during server switchovers

  When a server switchover occurs, the port group configuration of related LAN switch blades (if in IBP mode) is automatically adjusted to preserve the network connectivity of applications.

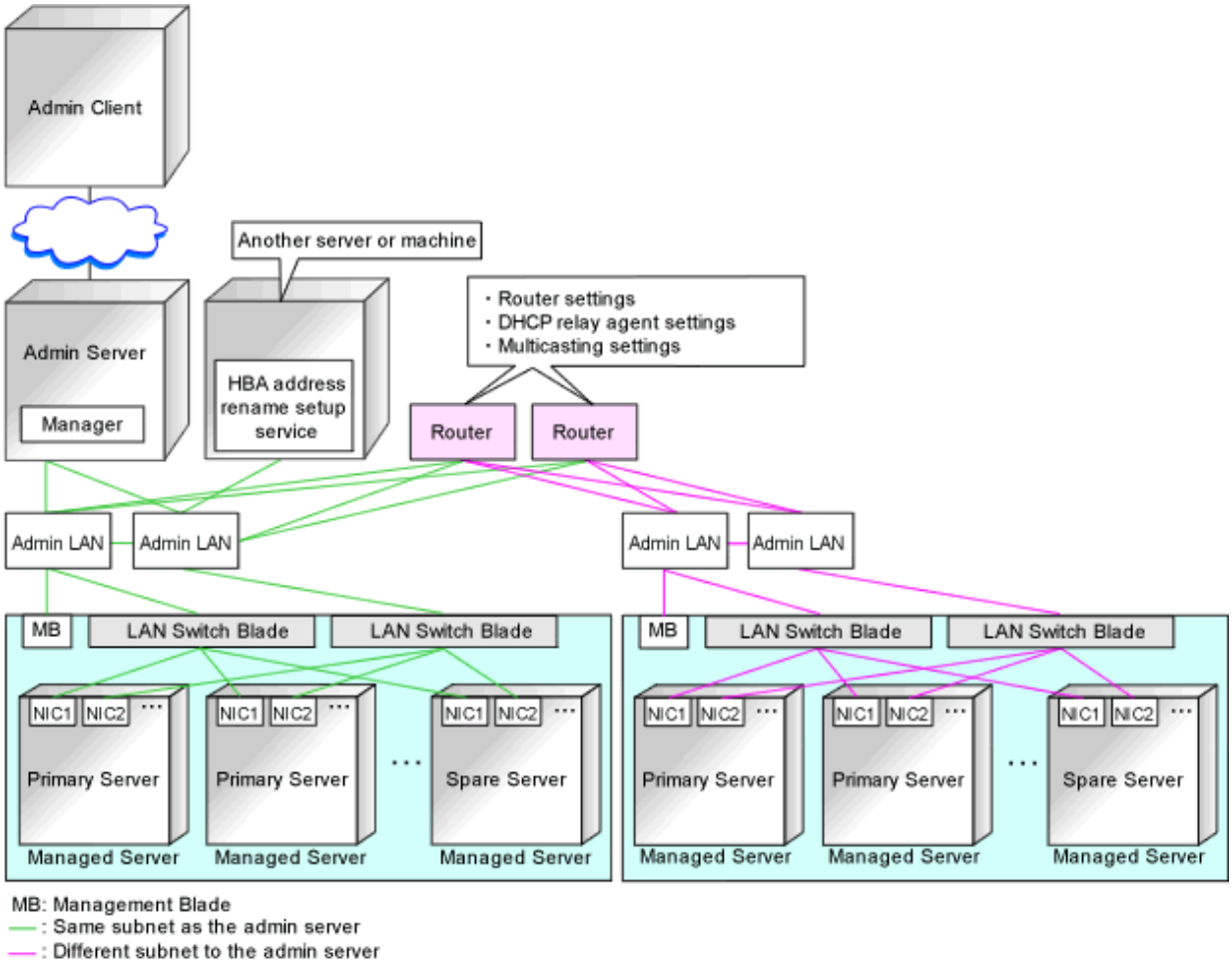
Note

The targets of such VLAN ID and port group exchanges are the LAN switch blade ports connected to the switched over managed servers. If the switched over servers are connected to different LAN switch blades (e.g. when switching over managed servers in different chassis) the external ports of those LAN switches should be set with the same VLAN or port group configuration, and the switch blades placed in the same network.

Network Configuration in Cases with Multiple Admin LAN Subnets [Windows]

In cases with multiple admin LAN subnets, configure the router settings.
For details on how to configure these settings, refer to "7.6 Configuring the Network Environment".
The following diagram shows an example of how configuring the network environment can be performed.

Figure 7.7 Network Configuration Example Involving Multiple Admin LAN Subnets



7.2 IP Addresses (Admin LAN)

This section describes how to choose IP addresses for devices to be set on the admin LAN.

- IP address used by the admin server for management purposes

  Choose an IP address for the network interface used to communicate with managed servers.
  This IP address will be asked during the manager's installation.
  Note that clients can also access the manager via IP addresses other than this admin LAN IP address, as long as those addresses were set within the admin server operating system.

- IP addresses used by managed servers for management purposes

  These are IP addresses that are used to communicate with the admin server.
  They are specified when a managed server is registered.
  For details on how to register managed servers, refer to "7.3.2 Registering Blade Servers" and "7.4.1 Registering Rack Mount or Tower Servers" in the "User's Guide VE".
  When registering a server that will be used as a spare server, assign an IP address that does not conflict with IP addresses of other managed servers.
  Configure routing or gateway settings to enable communication with the admin server when placing the admin server in the different subnet.

- IP addresses used by other devices for management purposes

  Configure routing or gateway settings to enable communication with the admin server when placing the admin server in the different subnet.

  - LAN switch blades

- Server management units such as management blades or IPMI controllers
- Power monitoring devices

A management IP address must also be chosen for each of the following devices if they are to be registered into Resource Orchestrator. For the following components, IP addresses can be chosen either within or outside of the admin LAN.

- VM management software

  IP address of the server which was installed using VM management software.

- LAN switches other than LAN switch blades

  IP address used by the admin server to track network connections (topology) between managed servers (PRIMERGY BX) and their adjacent LAN switches, and display them in the Network Map.

7.3 IP Addresses (iSCSI LAN)

This section describes how to choose IP addresses for devices to be set on the iSCSI LAN.

Ensure that all of the IP addresses chosen here are on the same subnet.

- IP Address of iSCSI Initiator

  Choose an IP address for the network interface to use for communication with managed servers.

- IP Address of iSCSI Target

  The IP address of the storage devices with which the iSCSI initiator will communicate.

Note

- IP addresses chosen for iSCSI should be static and do not used DHCP.
- When using a multi-path configuration, separate the networks using different ports.

7.4 Public LAN Settings for Managed Servers

The network parameters for the NIC of the managed server will be configured automatically when a cloning image is deployed. Refer to "17.6 Network Parameter Auto-Configuration for Cloning Images" in the "User's Guide VE", and define the settings.

7.5 Network Device Management Settings

Choose the following settings for network devices that will be managed by Resource Orchestrator.

- Telnet Login User Name

  This user name can contain up to 64 alphanumeric characters (upper or lower case), underscores ("_"), and hyphens ("-").

- Telnet Password

  This password can contain up to 80 alphanumeric characters (upper or lower case) and symbols (ASCII characters 0x20, 0x21, and 0x23 to 0x7e) with the exception of double quotation marks (").

- Administrator Password

  This password can contain up to 80 alphanumeric characters (upper or lower case) and symbols (ASCII characters 0x20, 0x21, and 0x23 to 0x7e) with the exception of double quotation marks (").

- SNMP community name

  This user name can contain up to 32 alphanumeric characters (upper or lower case), underscores ("_"), and hyphens ("-").

- SNMP trap destination

  This must be the admin IP address of the admin server.

Note

Depending on the network device used, setting an SNMP trap destination may restrict SNMP access to that device.
In a clustered manager configuration, when managing network devices, set the physical IP addresses of both the primary and secondary nodes as SNMP trap destinations.
If the network device is set to only grant access from known IP addresses, be sure to give permissions to the physical IP addresses of both the primary and secondary cluster nodes, as is done with SNMP trap destination settings.
For details, refer to network device manuals.

Information

Character limitations vary depending on the network device used.
For details, refer to network device manuals.

In order to track the network connections between managed servers (PRIMERGY BX) and adjacent LAN switches, and display them in the Network Map, the following protocols should be first enabled on each LAN switch blade and network device.

- LLDP (Link layer Discovery Protocol)
- CDP (Cisco Discovery Protocol)

If the VLAN settings are to be performed on the ports with link aggregation set on the following LAN switch blades, set the apparatuses as follows.

LAN switch blades

- PY CB Eth Switch/IBP 10Gb 18/8
- PY CB Eth Switch/IBP 1Gb 36/8+2
- PY CB Eth Switch/IBP 1Gb 36/12
- PY CB Eth Switch/IBP 1Gb 18/6

Configuration

- LLDP

Note

- Adjacent network devices should be set to use the same protocol.
  For details, refer to network device manuals.
  If a network device adjacent to a LAN switch blade does not support either LLDP or CDP, it should be set up to use the supported protocol.
- Resource Orchestrator cannot detect the network connections between a LAN switch blade set in IBP mode and its adjacent network devices.
- For the following LAN switch blades, the settings described below should be set to the same values in order to enable proper detection of network links.

  LAN Switch Blades:

  - PY CB Eth Switch/IBP 1Gb 36/12
  - PY CB Eth Switch/IBP 1Gb 36/8+2

- PY CB Eth Switch/IBP 1Gb 18/6

Expected Values:

- hostname set from the hostname command
- system name set from the snmp-server sysname command

Example

When setting both the hostname and system name to "swb1".

```
# hostname swb1
# snmp-server sysname swb1
```

- For the following LAN switch blade, the settings described below should be set to the same value to enable proper detection of network links.

  LAN Switch Blades

  - PY CB Eth Switch/IBP 10Gb 18/8

  Configuration

  - Using the snmp agent address command, set the admin IP address of the LAN switch blade for the agent address.
- Network connections may not be displayed properly if two or more network devices are set with a conflicting system name (sysName).

7.6 Configuring the Network Environment

This section explains how to configure the network environment.

Configurations for LAN Switch Blades

Refer to the LAN switch blade manual to apply the following settings.

- VLAN IDs for the admin LAN ports used to communicate with the admin server, as chosen in "7.1 Network Configuration"
- Settings chosen in "7.5 Network Device Management Settings"

Information

VLAN settings for switch blade ports not used for the admin LAN can also be set from the ROR console.
For details, refer to "7.3.4 Configuring VLANs on LAN Switch Blades" in the "User's Guide VE".

Note

- After setting up a LAN switch blade, perform a backup of the LAN switch blade's configuration definition information. For details how to backup the configuration definition information of a switch blade, refer to the manual of the LAN switch blade.
- Resource Orchestrator uses telnet to log into LAN switch blades and automate settings.
  When telnet connection is disabled, enable it.
  Refer to the manual of the relevant product.
  Some models of LAN switch blades may restrict the number of simultaneous connections. In this case, log out from other telnet connections.
- If telnet is unavailable, the following features are also unavailable.
  - Registration of LAN switch blades
  - Changing of LAN switch blade settings

  - Changing and setting the VLAN for LAN switch blades (internal and external ports)
  - Restoration of LAN switch blades
  - Server switchover (changing network settings while a server is switched over)
- For PY CB Eth Switch/IBP 10Gb 18/8, the maximum unregistered VLAN ID is used for the "oob" port in the LAN switch blade. When the maximum VLAN ID, "4094", is set in the LAN switch blade and the "oob" port is used to connect the telnet, the following functions cannot be used.
  - Changing and setting the VLAN for LAN switch blades (internal and external ports)
  - Restoration of LAN switch blades
  - Server switchover (changing network settings while a server is switched over)
- When using end host mode, use the default pin-group and do not create new pin-groups.

However, settings other than VLAN settings should be made directly on the LAN switch blade.

Setting Network Devices Other Than LAN Switch Blades

Refer to the manuals of the network devices to manage with Resource Orchestrator to apply the settings chosen in "7.5 Network Device Management Settings".

Router Settings

For the router connections between different subnets, configure the following router settings.

- For managed servers, configure routing to enable communication with the admin LAN IP address of the admin server.
- On the admin server, configure the following multicast routing settings for the resources to manage.

  225.1.0.1 - 225.1.0.8
- When using the following functions, configure DHCP relay agents to enable the manager to receive DHCP requests from managed servers belonging to different subnets.
  - Backup and restoration of managed servers
  - Collection and deployment of cloning images
  - SAN boot using HBA address rename
- When using the HBA address rename setup service, configure DHCP relay agents to enable the HBA address rename setup service to receive DHCP requests from managed servers belonging to different subnets.
- When setting firewalls, etc. for the router, permit connections for the ports used by Resource Orchestrator.
  Refer to "Appendix A Port List", for details on the ports used by Resource Orchestrator.

Chapter 8 Defining and Configuring the Storage Environment

This section explains how to define and configure the storage environment.

8.1 Defining the Storage Environment

This section explains how to define the storage environment settings required for a Resource Orchestrator setup.

8.1.1 Storage Configuration

Decide the storage configuration necessary for the system.

The storage configurations supported by Resource Orchestrator are as follow:

Table 8.1 Supported Storage Configurations

Configuration	System disk	Data disk(s)
1	SAN storage	SAN storage
2	Local disk (*1)	Local disk (*1), NAS
3	Local disk (*1)	SAN storage
4	iSCSI storage	iSCSI storage (*2)
5 (*3)	Local disk (*1)	iSCSI storage

*1: A local disk refers either to a server's internal disk, or to one stored in a storage blade.
*2: When using data disks, use the hardware initiator. As there is a chance that data will be damaged, do not perform collection or distribution of a cloning image using a software initiator.
*3: When using this configuration, use a combination of the settings for the VLAN settings for LAN switch ports connected to the software initiator and the LAN for iSCSI disks. Configure the VLAN settings for LAN switch ports connected to primary servers and iSCSI storage. Do not configure the settings for ports connected to spare servers and servers that are the target of cloning image deployment.

Information

- Configurations 1, 3, and 4 support I/O virtualization.
- When using HBA address rename, server switchover can only be performed on servers that are connected to a single SAN/iSCSI storage system.
  Resource Orchestrator does not support a server's switchover when it is connected to multiple SAN storage systems.
- When performing server switchover using VIOM, multiple storage devices can be connected to a single server.
  This is because the storage startup order for BIOS settings can be taken over during server switchover.
- A SAN storage system can be used as a shared cluster disk.
  However, a server that is defined in a cluster cannot be switched over.
- Resource Orchestrator supports both single path and multi-path storage connections for SAN/iSCSI.
- When server switchover is performed in configuration 5, the settings to automatically change VLAN settings during server switchover are necessary.
- The following operations are necessary when collecting cloning images in configuration 5.

  [Windows]
  After completing collection of cloning images, restart the server or mount the iSCSI disks.

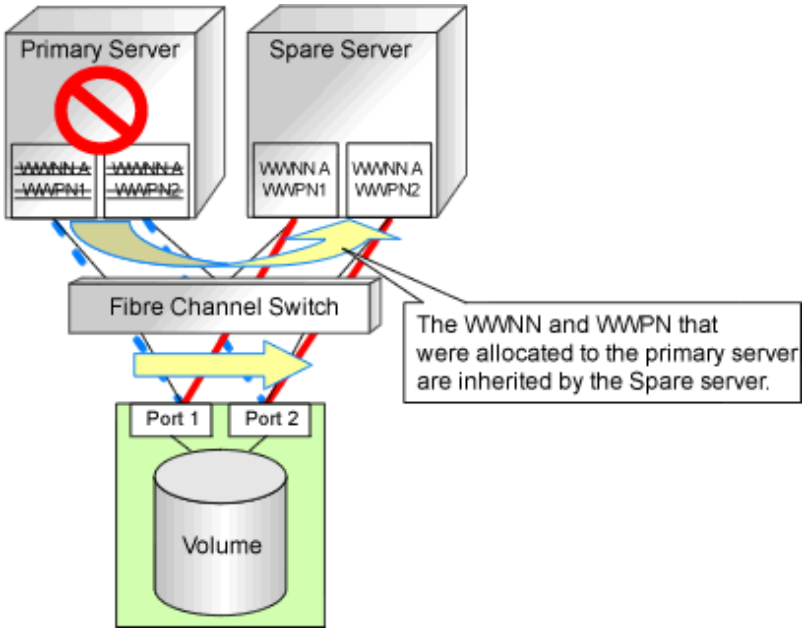
[Linux]
Before collecting cloning images, remove the fsck check on OS startup, for the mounting settings of iSCSI disks. Also, after completing collection of cloning images, restart the server or mount the iSCSI disks.

- When deploying cloning images in configuration 5, after completing deployment, change the software initiator settings before configuring VLAN settings of LAN switch ports connected to the LAN for iSCSI disks on the destination server. When there are multiple servers with the same software initiator settings, check if there are any problems in the modified settings, as there is a chance that data may be damaged.
- In configurations where the system disk is SAN storage and the data disk is a local disk, the settings can be used in the range excluding use of the backup and restore, server switchover and cloning functions.

Functions Provided by Resource Orchestrator

The I/O virtualization features available with Resource Orchestrator allow spare servers to inherit the WWN of primary servers, the MAC address of NICs, and boot and network configurations. As a result, there is no longer any need to reconfigure the storage devices connected to the involved servers. In environments where I/O virtualization cannot be used, the server can be switched, by changing the configurations of the Fibre Channel Switch and storage unit connected to the servers.
Note that WWN is a general term for both WWNN and WWPN. WWNN stands for node name and WWPN stands for port name.
The following example shows how server switchovers occur.

Figure 8.1 Example of a Server Switchover Based on I/O Virtualization (When WWNs are Switched)



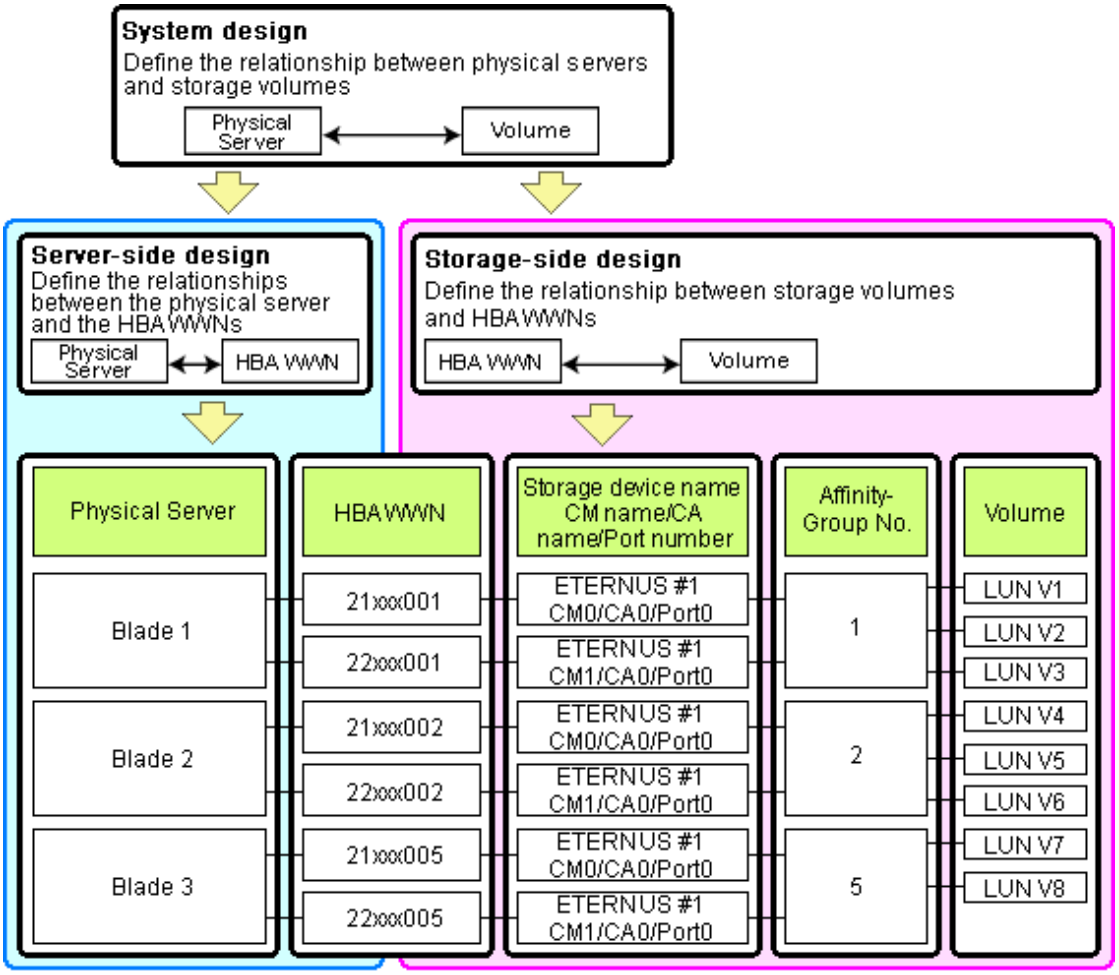
8.1.2 HBA and Storage Device Settings

System configuration requires that the relationship between physical servers and HBA WWNs from the perspective of the server, and the relationship between storage volumes and HBA WWNs from the perspective of storage devices be defined clearly.
An example where blades connect to storage devices via multiple paths using two HBA ports is shown below.
Refer to the storage device manual of each storage device for details.

Note

Resource Orchestrator does not support configurations where managed servers are mounted with three or more HBA ports.

Figure 8.2 WWN System Design



Choosing WWNs

Choose the WWNs to use with the HBA address rename or VIOM function.
After WWNs have been chosen, associate them with their corresponding operating systems (applications) and physical servers (on the server side), and with corresponding volume(s) (on the storage side).
Using HBA address rename or VIOM, storage-side settings can be defined without prior knowledge of the actual WWN values of a server's HBAs. This makes it possible to design a server and storage system without having the involved physical servers on hand.

When HBA address rename is used, the value provided by the "I/O virtualization option" is used as the WWN.
When VIOM is used, set the WWN value with either one of the following values:

- The value provided by the "I/O virtualization option"
- The value selected automatically from the address range at VIOM installation

To prevent data damage by WWN conflict, you are advised to use the value provided by "I/O virtualization option".

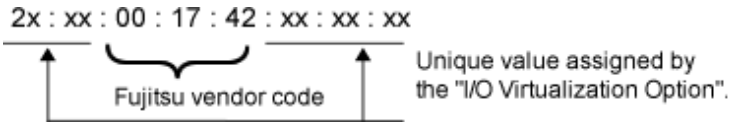
Information

Specify the unique WWN value provided by the "I/O virtualization option". This can prevent unpredictable conflicts of WWNs.

Note

Do not use the same WWN for both HBA address rename and VIOM. If the same WWN is used, there is a chance data will be damaged.

The WWN format used by the HBA address rename and VIOM functions are as follows:



The "2x" part at the start of the provided WWN can define either a WWNN or a WWPN. Define and use each of them as follows.

- 20: Use as a WWNN
- 2x: Use as a WWPN

With HBA address rename, x will be allocated to the I/O addresses of HBA adapters in descending order.
I/O addresses of HBA adapters can be confirmed using the HBA BIOS or other tools provided by HBA vendors.

Note

With HBA address rename, as WWNs are allocated to the I/O addresses of HBAs in descending order, the order may not match the port order listed in the HBA.

For details, refer to "C.2 WWN Allocation Order during HBA address rename Configuration".

The WWN chosen here would be used for the system design of the servers and storage.

- Server-side Design

  WWNs are used in server-side design by assigning one unique to each server.

- Storage-side Design

  One or more volumes are chosen for each server, and the corresponding WWN assigned to each server in the server-side design is configured on the storage-side for those volumes.

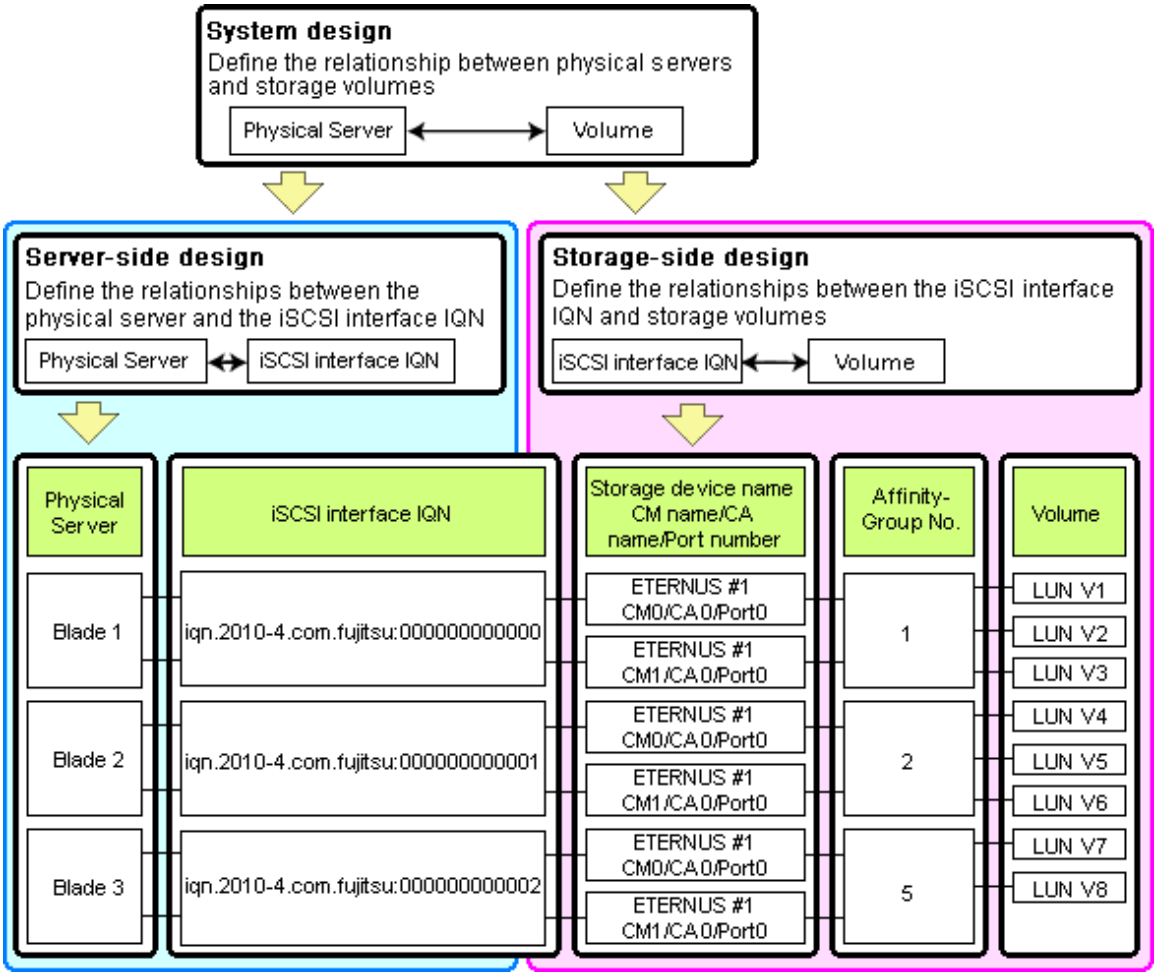
Defining WWN settings for VIOM

VIOM should be configured first. Then, storage devices should also be configured in accordance with the WWN settings that were defined within VIOM.

8.1.3 iSCSI Interface and Storage Device Settings (iSCSI)

System configuration requires that the relationship between physical servers and the IQN of the iSCSI adapter from the perspective of the server, and the relationship between storage volumes and the IQN of iSCSI from the perspective of storage devices, be defined clearly.
An example where blades connect to storage devices via multiple paths using two iSCSI interface ports is shown below.
Refer to the storage device manual of each storage device for details.

Figure 8.3 IQN System Design



Choosing IQNs

Choose the IQNs to use with the iSCSI.
After IQNs have been chosen, associate them with their corresponding operating systems (applications) and physical servers (on the server side), and with corresponding volume(s) (on the storage side).
IQNs are made up of the following:

- Type identifier "iqn."
- Domain acquisition date
- Domain name
- Character string assigned by domain acquirer

IQNs must be unique.
Create a unique IQN by using the server name, or the MAC address provided by the "I/O virtualization option" that is to be allocated to the network interface of the server, as part of the IQN.
If IQNs overlap, there is a chance that data will be damaged when accessed simultaneously.
An example of using the virtual MAC address allocated by the "I/O virtualization option" is given below.

Example

When the MAC address is 00:00:00:00:00:FF

IQN iqn.2010-04.com.fujitsu:0000000000ff

The IQN chosen here would be used for the system design of the servers and storage.

- Server-side Design

  IQNs are used in server-side design by assigning one unique to each server.

- Storage-side Design

  One or more volumes are chosen for each server, and the corresponding IQN assigned to each server in the server-side design is configured on the storage-side for those volumes.

8.2 Configuring the Storage Environment

This section describes how to configure storage devices for Resource Orchestrator.

Storage Unit Configuration

Using the HBA address rename function, VIOM, or ESC integration requires adequate preparation of storage environment settings (as described below).
When using VIOM, configure storage devices according to the WWN assigned to each server.
SAN storage settings can be configured using storage management software (such as ETERNUSmgr, ETERNUS SF Storage Cruiser or others). For details, refer to the manual of the relevant product.
If storage settings (zoning, LUN masking or any other security setting) were already made for SAN, those settings should be canceled and re-defined using the server-side WWN settings chosen in "8.1.2 HBA and Storage Device Settings".

Setting up Logical Volumes and Affinity Groups

The logical volumes for storage devices and affinity groups allocated for servers must be configured.
These settings can be configured easily using either storage management software (such as ETERNUSmgr or the Storage Volume Configuration Navigator feature of ETERNUS SF Storage Cruiser).

Access Path Settings

For ESC integration, no preparation is required.
Using the HBA address rename function or VIOM integration requires adequate preparation.
Access paths between servers and storage devices must be made by applying the WWPN values chosen in "8.1.2 HBA and Storage Device Settings" to each server HBA. This will allow servers to access storage devices.
To configure storage devices and Fibre Channel switches on SAN, use the appropriate storage management software.
Note that these configurations are best performed using the ETERNUS SF Storage Cruiser's storageadm zone command.

- Using the ETERNUS SF Storage Cruiser's storageadm zone command for SAN settings

  After registering the storage for management in the ETERNUS SF Storage Cruiser manager, set up access paths using the "add" parameter of the storageadm zone command, based on the storage-side designs that were chosen in "8.1.2 HBA and Storage Device Settings".
  The WWPN of the target storage device CA port must be specified with the storageadm zone command.
  As it is necessary to specify the WWPN of the CA port of the relevant storage, do so using either storage management software (such as ETERNUSmgr) or ETERNUS SF Storage Cruiser after the storage device has been configured.
  Refer to the ETERNUS SF Storage Cruiser manual for details on the storageadm zone command, configurable storage devices, and the graphical interface used to check access path settings.

Note

For access paths, point-to-point WWPN zoning is required.
Zoning (or port zoning) is required for configuring access paths.

Chapter 9 Defining and Configuring Server Virtualization Software

This section explains how to decide and configure server virtualization software.

9.1 Deciding Server Virtualization Software

This section explains how to decide the settings for server virtualization software.

For details, refer to "D.3 Functional Differences between Products".

- Select the server virtualization software to use

  Select the server virtualization software.
  Resource Orchestrator can perform resource management using the server virtualization software indicated below.

  - VMware
  - Hyper-V
  - Xen
  - RHEL-KVM
  - Solaris containers

- Available functions by server virtualization software

  The functions that can be used differ depending on the server virtualization software.
  Refer to "D.3 Functional Differences between Products" for details on the functions that can be used for each server virtualization software.

Note

[VMware] [Hyper-V] [Oracle VM]
When registering managed servers to the manager, the password for the administrative privilege user of the managed server is required.
Configure the password for the administrator account of managed server in advance.

9.2 Settings for Server Virtualization Software

Server virtualization software must be configured appropriately for Resource Orchestrator.

Refer to "D.2 Configuration Requirements" for details on the required server virtualization software settings.

Chapter 10 Installing and Defining Single Sign-On

This section explains the function to perform Single Sign-On in coordination with ServerView Operations Manager.

External Software

Resource Orchestrator can be coordinated with ServerView Operations Manager V5.0 or later and Single Sign-On.

Function Overview

Single Sign-On coordination makes the following operations possible:

- When logged in to ServerView Operations Manager using Single Sign-On

  Login to Resource Orchestrator is possible without entering the user ID and password.

- When logged in to Resource Orchestrator using Single Sign-On

  Login to ServerView Operations Manager is possible without entering the user ID and password.

Note

- In order to use Single Sign-On, Resource Orchestrator and ServerView Operations Manager must be installed on the same server.
- It is not possible to use this function when executing cluster operations.
- If you cannot log in to the ROR console after installation, the environment setup may have failed.

  For details, refer to "10.4 When Reconfiguring Single Sign-On"

The procedure differs depending on whether you are configuring Single Sign-On during or after installation.

When Configuring Single Sign-On during Installation

1. Decide the Directory Service to Use

   Refer to "10.1 Decide the Directory Service to Use".

2. Set up ServerView Operations Manager and the Directory Service Environment

   For details, refer to "10.2 Set up ServerView Operations Manager and the Directory Service Environment".

3. Register Administrators

   For details, refer to "10.3 Register Administrators".

When Configuring Single Sign-On after Installation

1. Decide the Directory Service to Use

   Refer to "10.1 Decide the Directory Service to Use".

2. Set up ServerView Operations Manager and the Directory Service Environment

   For details, refer to "10.2 Set up ServerView Operations Manager and the Directory Service Environment".

3. Registering Certificates

   For details, refer to "10.4.1.2 Registering Certificates".

4. Register User Information

   Register a user to the directory service.

   For details on the user registration method, refer to the example in "10.3 Register Administrators".

5. Register the Directory Service

   Use the following procedure to register the directory service used in the ServerView Operations Manager with Resource Orchestrator.

   a. Stop the manager.

   b. Execute the rcxadm authctl register command and register the directory service.

      [Windows Manager]

      >"*Installation_folder*\SVROR\Manager\bin\rcxadm" authctl register -host *hostname* -port *port* -base *base_dn* -bind *bind_dn* -method SSL -passwd *password* <RETURN>

      [Linux Manager]

      # /opt/FJSVrcvmr/bin/rcxadm authctl register -host *hostname* -port *port* -base *base_dn* -bind *bind_dn* -method SSL -passwd *password* <RETURN>

      Example

      >"C:\Fujitsu\ROR\SVROR\Manager\bin\rcxadm" authctl register -host myhost.fujitsu.com -port 1474 -base dc=fujitsu,dc=com -bind "cn=Directory Manager" -method SSL -passwd admin <RETURN>

   c. Start the manager.

   For details on the rcxadm authctl register command, refer to "5.3 rcxadm authctl" of the "Reference Guide (Command) VE".

10.1 Decide the Directory Service to Use

Decide a directory service to use for performing Single Sign-On.

- OpenDS provided with ServerView Operations Manager
- Individually configured directory services
  - OpenDS
  - Active Directory

Note

The only directory server which can be used by Resource Orchestrator is the one that was specified during installation.

10.2 Set up ServerView Operations Manager and the Directory Service Environment

Set up ServerView Operations Manager and the Directory Service Environment.
For details on how to set up the environment, refer to the manual of the relevant product.

Note

Do not modify the LDAP port number of OpenDS.

When Using a User already Registered with Active Directory as a Resource Orchestrator User

When using Active Directory for directory service, select the attributes to search the user ID for logging in to Resource Orchestrator, "User Search Filter" using directory service settings during ServerView Operations Manager installation. When using the application process, set the sAMAccountName attributes for "User Search Filter".

When performing Single Sign-On using Active Directory and when using a user already registered to Active Directory as a Resource Orchestrator user, it is possible to change the User Search Area from the Default location. To change the User Search Area from the Default, it is necessary to change the "User Search Base" in the "Directory Service Configurations" which was specified when installing ServerView Operations Manager.
For details on "Use Search Filter" and "User Search Base" in "Directory Service Configurations", refer to the following manual.

- "Menu-Driven Installation of the Operations Manager Software" in the "ServerView Suite ServerView Operations Manager Installation Guide"

The information specified for "User Search Base" is stated in the file explained in the following manual. For details on how to change the user search base, refer to the following manual.

- "Configuring directory service access" in "ServerView Suite User Management in ServerView"

For setting up Resource Orchestrator, it is necessary to establish communication beforehand, since communication between the manager and the directory service requires LDAP (Lightweight Directory Access Protocol) of the TCP/IP protocol protected by SSL.
Use tools or commands to check communications.

When the directory server is Microsoft Active Directory

For details, refer to the Microsoft web site below.

How to enable LDAP over SSL with a third-party certification authority

URL: http://support.microsoft.com/kb/321051/en/

When Installing ServerView Operations Manager Again

When using the OpenDS bundled with ServerView Operations Manager, back up the user information before uninstalling ServerView Operations Manager, if it becomes necessary to install ServerView Operations Manager again.
Restore the user information in OpenDS, after installing ServerView Operations Manager again.
For details on the backup and restore of OpenDS, refer to the ServerView Operations Manager manual.

10.3 Register Administrators

Register a privileged user (an administrator) to be specified when installing Resource Orchestrator to the directory service.

Use the following object classes.

Table 10.1 Object Class

Directory Service	Object Class	Attribute used for the Login user ID
OpenDS	inetOrgPerson	uid or cn
Active Directory	user	sAMAccountName or cn (*1)

*1: Specify these either as the User Search Filter in the Directory Service Settings of ServerView Operations Manager. Specify the same value as the value of the attribute specified as the User Search Filter as the value of the User ID of all the users including the privilege user (an administrator) of Resource Orchestrator.

When using OpenDS, the user ID (uid attribute) must be unique in the directory service.

When using the OpenDS provided with ServerView Operations Manager, a predefined user exists when installing ServerView Operations Manager.
For details on predefined user information, refer to the following ServerView Operations Manager manual.

- "ServerView user management with OpenDS" in "ServerView Suite User Management in ServerView"

An example of how to register a privileged user of Resource Orchestrator in OpenDS is indicated below.

1. Create an ldif file.

```
dn: cn=manager,ou=users,dc=fujitsu,dc=com
changetype: add
objectclass: inetOrgPerson
cn: manager
sn: manager
uid: manager
userPassword: mypassword
```

2. Use the OpenDS client function to register the ldif file created in 1. with the directory service.

   Set the Java SE 6 path for the environment variable JAVA_HOME, before executing the ldapmodify command of OpenDS.

   For details on the command, refer to the OpenDS documentation.

   [Windows]

```
>"OpenDS_installation_folder\bat\ldapmodify.bat" -p Port_number -f ldif_file -D OpenDS_administrator_user_DN -w Password <RETURN>
```

   [Linux]

```
# "OpenDS_installation_folder/bin/ldapmodify" -p Port_number -f ldif_file -D OpenDS_administrator_user_DN -w Password <RETURN>
```

   SSL communications are not required when registering a user in OpenDS. The default value of the port number when not using SSL communications is "1473" in the OpenDS provided with ServerView Operations Manager.

   For details on how to configure connection settings of the OpenDS provided with ServerView Operations Manager, refer to README and the manuals of "ServerView Suite User Management in ServerView".

   Example

```
>"C:\Program Files\Fujitsu\ServerView Suite\opends\bat\ldapmodify.bat" -p 1473 -f manager.ldif -D "cn=Directory Manager" -w admin <RETURN>
```

10.4 When Reconfiguring Single Sign-On

This section explains how to reconfigure a Single Sign-On.

10.4.1 Reconfiguring Single Sign-On

If you cannot log in to the ROR console after installation, the environment setup may have failed. Stop the manager and then reconfigure the environment.

10.4.1.1 Confirming Certificates

Execute the keytool command, and check if the CA certificate has been correctly imported.

1. Check the content of the CA certificate (keystore) of ServerView Operations Manager.

   Specify the password of a keystore of ServerView Operations Manager as the password of a keystore. Refer to the following manual for the password of a keystore of ServerView Operations Manager.

   - "ServerView Suite User Management in ServerView"

   The CA certificate (keystore) of ServerView Operations Manager is stored in the following location:

   [Windows]
   ServerView Suite_Installation_folder\jboss\server\serverview\conf\pki\cacerts

   [Linux]
   /opt/fujitsu/ServerViewSuite/jboss/server/serverview/conf/pki/cacerts

    Example

   [Windows Manager]

   ```
   >C:\Fujitsu\ROR\SVROR\Manager\runtime\jre6\bin\keytool.exe -list -keystore "C:\Program Files\Fujitsu
   \ServerView Suite\jboss\server\serverview\conf\pki\cacerts" <RETURN>
   Enter keystore password:

   Keystore type: JKS
   Keystore provider: SUN

   Your keystore contains 1 entry

   svs_cms, 2011/10/01, trustedCertEntry,
   Certificate fingerprints (MD5): 02:68:56:4C:33:AF:55:34:87:CA:51:FD:BF:66:47:06
   ```

   [Linux Manager]

   ```
   # /opt/FJSVrcvmr/runtime/jre6/bin/keytool -list -keystore /opt/fujitsu/ServerViewSuite/jboss/server/
   serverview/conf/pki/cacerts <RETURN>
   Enter keystore password:

   Keystore type: JKS
   Keystore provider: SUN

   Your keystore contains 1 entry

   svs_cms, 2011/10/01, trustedCertEntry,
   Certificate fingerprints (MD5): 02:68:56:4C:33:AF:55:34:87:CA:51:FD:BF:66:47:06
   ```

2. Check whether the CA certificate of ServerView Operations Manager is imported correctly at keystore of this product.

   For the -alias option, specify the "alias" displayed in 1.
   When two or more aliases are displayed as a result of 1., check several minutes of the displayed alias.

   The password for the keystore of Resource Orchestrator is set to "changeit" by default.

   Check whether the fingerprints of the certificates displayed by 1. and the fingerprints of the certificates displayed in Resource orchestrator are in agreement.

    Example

   [Windows Manager]

   ```
   >C:\Fujitsu\ROR\SVROR\Manager\runtime\jre6\bin\keytool.exe -list -alias Another_name -keystore "C:
   \Fujitsu\ROR\SVROR\Manager\runtime\jre6\lib\security\cacerts" <RETURN>
   ```

```
Enter keystore password: changeit
svs_cms, 2012/04/10, trustedCertEntry,
Certificate fingerprints (MD5): 02:68:56:4C:33:AF:55:34:87:CA:51:FD:BF:66:47:06
```

[Linux Manager]

```
# /opt/FJSVrcvmr/runtime/jre6/bin/keytool -list -alias Another_name -keystore /opt/FJSVrcvmr/runtime/
jre6/lib/security/cacerts <RETURN>
Enter keystore password: changeit
svs_cms, 2012/04/10, trustedCertEntry,
Certificate fingerprints (MD5): 02:68:56:4C:33:AF:55:34:87:CA:51:FD:BF:66:47:06
```

When the information on the CA certificate is not displayed, or when the fingerprints of a credentials are not in agreement, that means that registration of the CA certificate has failed. In this case, register the CA certificate referring to "10.4.1.2 Registering Certificates".

10.4.1.2 Registering Certificates

Use the following procedure to register CA certificates to Resource Orchestrator.

1. Copy the keystore of Resource Orchestrator.

   [Windows Manager]

   - Files to Copy

     Installation_folder\SVROR\Manager\runtime\jre6\lib\security\cacerts

   - Copy Destination

     Installation_folder\SVROR\Manager\runtime\jre6\lib\security\cacerts.org

   [Linux Manager]

   - Files to Copy

     /opt/FJSVrcvmr/runtime/jre6/lib/security/cacerts

   - Copy Destination

     /opt/FJSVrcvmr/runtime/jre6/lib/security/cacerts.org

   Note

   Ensure that the keystore of Resource Orchestrator is copied, as it will be necessary when changing the directory service.

2. Copy the CA Certificate (keystore) of ServerView Operations Manager to the keystore of Resource Orchestrator.

   The CA certificate (keystore) of ServerView Operations Manager is stored in the following location:

   [Windows]
   ServerView Suite_Installation_folder\jboss\server\serverview\conf\pki\cacerts

   [Linux]
   /opt/fujitsu/ServerViewSuite/jboss/server/serverview/conf/pki/cacerts

   Example

   [Windows Manager]

```
>C:\Fujitsu\ROR\SVROR\Manager\runtime\jre6\bin\keytool.exe -importkeystore -srckeystore " C:
\Program Files\Fujitsu\ServerView Suite\jboss\server\serverview\conf\pki\cacerts" -destkeystore "C:
\Fujitsu\ROR\SVROR\Manager\runtime\jre6\lib\security\cacerts"<RETURN>
```

[Linux Manager]

```
# /opt/FJSVrcvmr/runtime/jre6/bin/keytool -importkeystore -srckeystore /opt/fujitsu/ServerViewSuite/
jboss/server/serverview/conf/pki/cacerts -destkeystore /opt/FJSVrcvmr/runtime/jre6/lib/security/cacerts
<RETURN>
```

After executing the command, enter the password.
The password for the keystore of Resource Orchestrator is set to "changeit" by default.

3. The following messages will be displayed when import is successfully completed.

   Check the "*Another name*" section.

```
Enter destination keystore password: changeit
Enter source keystore password: changeit
Entry for Another name successfully imported.
Import command completed: 1 entries successfully imported. 0 entries failed or cancelled.
```

4. Execute the keytool command, and check if the CA certificate has been correctly imported.

   Perform the Procedure of "10.4.1.1 Confirming Certificates" and check whether the CA certificates has been imported correctly.

10.4.1.3 Checking Directory Service Connection Information

Check if the connection information of the directory service to be used has been correctly registered in Resource Orchestrator.

1. Execute the following command:

```
rcxadm authctl show <RETURN>
```

   The connection information registered in Resource Orchestrator is displayed.

2. Check the displayed connection information.

   The information is displayed as follows:

```
host: hostx.fujitsu.com
port: 1474
base: dc=fujitsu,dc=com
bind: cn=Directory Manager
method: SSL
```

   Check if the directory service settings and the displayed connection information are the same. In particular, note the following information:

   - If port is the port for SSL communications
   - If bind is the directory service administrator

     (Check if the administrator is a directory service administrator, not a privileged user of Resource Orchestrator)

   For details on how to check the connection settings of the OpenDS provided with ServerView Operations Manager, refer to the following manuals.

   - "Configuring directory service access" and "ServerView user management with OpenDS" in "ServerView Suite User Management in ServerView"

3. When there is an error in the connection information, use the following procedure to register the correct information:

   a. Stop the manager.

b. Execute the rcxadm authctl modify command and configure the correct information.

c. Start the manager.

For details on the rcxadm authctl command, refer to "5.3 rcxadm authctl" of the "Reference Guide (Command) VE".

10.4.2 Changing Directory Service Connection Information

When a directory server's hostname, a coordinator name (connected user name), a password, etc. are changed, use the following procedure to reconfigure SingleSign-On.

1. Change a directory service settings of ServerView Operations Manager.

   For details on how to change the directory service settings of ServerView Operations Manager, refer to the manuals of ServerView Operations Manager.

   - "Configuring directory service access" in "ServerView Suite User Management in ServerView"

2. Check whether the fingerprints of the CA certificates of ServerView Operations Manager registered into the keystore of Resource Orchestrator are the same as the fingerprints of the CA certificates (keystore) of ServerView Operations Manager. For details on how to check the fingerprints, refer to "10.4.1.1 Confirming Certificates".

3. When fingerprints are not the same, register a certificates with reference to "10.4.1.2 Registering Certificates".

4. Execute the rcxadm authctl modify command and change the directory service connection information. For details on the rcxadm authctl command, refer to "5.3 rcxadm authctl" of the "Reference Guide (Command) VE".

If the directory service is OpenDS and the password of the user with administrator rights has been changed,perform the following procedure. It is not necessary if the directory service is Active Directory.

1. Stop the manager.

   Refer to "2.1 Starting and Stopping the Manager" in the "Operation Guide CE" for information on how to stop the manager.

2. Issue the command below.

   After a message asking about the user to modify is displayed, specify "3. LDAP administrator DN" and register the password.

   [Windows Manager]

   ```
   Installation_folder\SWRBAM\bin\swrba_regist_password
   ```

   [Linux Manager]

   ```
   /opt/FJSVswrbam/bin/swrba_regist_password
   ```

3. Start the manager.

   Refer to "2.1 Starting and Stopping the Manager" in the "Operation Guide CE" for information on how to start the manager.

10.4.3 When the Certificates Expired

When the CA certificates of ServerView Operations Manager or the directory server expired, re-register the CA certificates after getting new certificates. For details on how to register the CA certificates, refer to "10.4.1.2 Registering Certificates".

Chapter 11 Deciding and Configuring the Power Monitoring Environment

This section explains how to decide and configure the power monitoring environment.

11.1 Deciding the Power Monitoring Environment

This section explains how to define the power monitoring environment settings required for a Resource Orchestrator setup.

11.1.1 Settings for the Power Monitoring Environment

To monitor power consumption, choose values for the following settings.

Polling interval

This determines the time interval for collecting the power consumption data.
The possible values that can be set are any value (at one-minute intervals) between 1 and 6 minutes, or 10 minutes. The default is 5 minutes.

Data storage period

This defines the storage period for the collected environmental data.

Table 11.1 Storage Period Values for Power Monitoring Data

Data Sampling Rate	Lifespan (Unit: month)	
	Default Value	Maximum Value
Finest sampling (The most detailed data secured at the polling interval)	1	12
Hourly sampling	1	60
Daily sampling	12	120
Monthly sampling	60	300
Yearly sampling	60	600

11.1.2 Power Monitoring Device Settings

Choose values for the following power monitoring device (PDU or UPS) settings. If any of those settings have been already determined by other software, use those values.

Device name

This is the name that identifies the power monitoring device. Each device name should be unique within the system. The first character must be alphabetic, and the name can contain up to 15 alphanumeric characters and hyphens ("-").

Admin IP address

This IP address must be in the same subnet as the admin server.

SNMP community name

This community name can contain up to 32 alphanumeric characters, underscores ("_"), and hyphens ("-").

Voltage

This is the voltage (V) supplied to the power monitoring device.

Comments

These comments can be any description desired for the power monitoring device. The comments can contain up to 128 characters.

11.2 Configuring the Power Monitoring Environment

This section describes how to configure power monitor devices for Resource Orchestrator.

Apply the following settings to power monitoring targets. Refer to the manual of each power monitoring target for configuration instructions.

Admin IP address

This IP address is used by the admin server to communicate with a power monitoring target.

SNMP community name

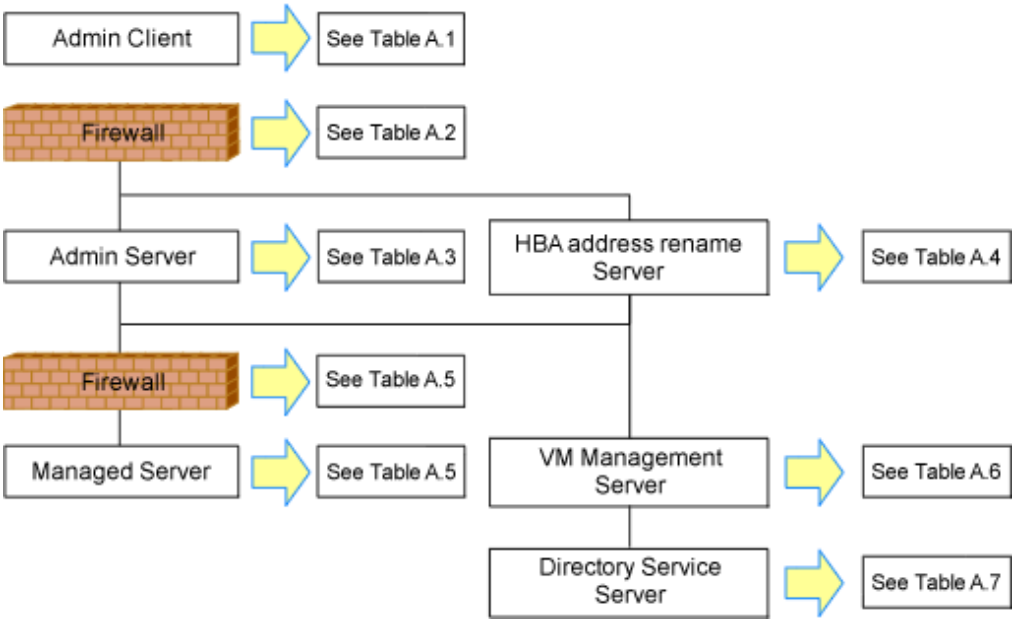
This SNMP community name is used by the admin server to collect power consumption data from a power monitoring target (via the SNMP protocol).

Appendix A Port List

This appendix explains the ports used by Resource Orchestrator.

The following figure shows the connection configuration of Resource Orchestrator components.

Figure A.1 Connection Configuration



Resource Orchestrator ports should be set up during the system configuration of each related server.
For details on how to configure the ports, refer to "8.2 Changing Port Numbers" or "9.1.6 Changing Port Numbers" of the "User's Guide VE".
If any of those ports is already used by another service, allocate a different port number.

The following tables show the port numbers used by Resource Orchestrator. Communications should be allowed for each of these ports for Resource Orchestrator to operate properly.

Table A.1 Admin Client

Function Overview	Source				Destination				Protocol
	Server	Service	Port	Modification	Server	Service	Port	Modification	
ROR console	Admin client	-	Variable value	Not possible	Admin server	rcxweb	23461	Possible	tcp
ServerView Operations Manager (*1)						http	3169	Not possible	
						https	3170		

*1: Required for PRIMERGY servers.

Table A.2 Firewall

Function Overview	Direction	Source		Destination		Protocol
		Server	Port	Server	Port	
ROR console	One-way	Admin client	Variable value	Admin server	23461	tcp
ServerView Operations Manager (*1)					3169	
					3170	

*1: Required for PRIMERGY servers.

Table A.3 Admin Server

Function Overview	Source				Destination				Protocol
	Server	Service	Port	Modification	Server	Service	Port	Modification	
ROR console	Admin client	-	Variable value	Not possible	Admin server	rcxweb	23461	Possible	tcp
ServerView Operations Manager (*1)						http	3169	Not possible	
						https	3170		
Internal control	Admin server	-	Variable value	-	Admin server (*2)	- (*3)	3172	Not possible	tcp
		-	Variable value	-		nfdomain	[Windows Manager] 23457 [Linux Manager] 23455	Possible	tcp
		-	Variable value	-		rcxmgr	23460	Possible	tcp
		-	Variable value	-		rcxtask	23462	Possible	tcp
		-	Variable value	-		rcxmongrel1	23463	Possible	tcp
						rcxmongrel2	23464	Possible	tcp
						rcxdb	23465	Possible	tcp
Monitoring and controlling resources	Admin server	-	Variable value	-	Managed server (Physical OS)	nfagent	23458	Possible	tcp
		-	Variable value	-	Server management unit (management blade)	snmp	161	Not possible	udp
		-	Variable value	-		snmptrap	162	Not possible	udp
		-	Variable value	-	Server management unit (Remote Management Controller)	ipmi	623	Not possible	udp
		-	Variable value	-		snmptrap	162	Not possible	udp

Function Overview	Source				Destination				Protocol
	Server	Service	Port	Modification	Server	Service	Port	Modification	
		-	Variable value	-		telnet	23	Not possible	tcp
		-	Variable value	-	Server management unit (Remote Management Controller(XSCF))	snmp	161	Not possible	udp
		-	Variable value	-		snmptrap	162	Not possible	udp
		-	Variable value	-		ssh	22	Not possible	tcp
ServerView Agents (*1)	Admin server	-	Variable value	-	Managed server	snmp	161	Not possible	tcp udp
	Managed server	-	Variable value	-	Admin server	snmptrap	162	Not possible	udp
Backup, restore, Cloning	Admin server	-	4972	Not possible	Managed server	-	4973	Not possible	udp
	Managed server	-	4973	Not possible	Admin server	-	4972	Not possible	udp
		bootpc	68	Not possible		bootps	67	Not possible	udp
		-	Variable value	-		pxe	4011	Not possible	udp
		-	Variable value	-		tftp	69	Not possible	udp
	Admin server	-	Variable value	-	Admin server	-	4971	Not possible	tcp
Backup, cloning (collection)	Managed server	-	14974 - 14989 (*4) 4974 - 4989 (*5)	-	Admin server	-	14974 - 14989 (*4) 4974 - 4989 (*5)	-	udp
Restore, cloning (deployment)	Managed server	-	Variable value	-	Admin server	-	14974 - 14989 (*4)	-	tcp udp

Function Overview	Source				Destination				Protocol
	Server	Service	Port	Modification	Server	Service	Port	Modification	
							4974 - 4989 (*5)		
Monitoring server power status	Admin server	-	-	-	Managed server	-	-	-	ICMP (*6)
VMware ESX/ ESXi, vCenter Server (*7)	Admin server	-	Variable value	-	Managed server, vCenter Server	-	443	Not possible	tcp
System Center Virtual Machine Manager	Admin server	-	Variable value	-	System Center Virtual Machine Manager	-	80	Not possible	tcp
						WinRM	443 5985		
OpenDS	Admin server	-	Variable value	-	OpenDS	ldaps	1474	Possible	tcp
		-	Variable value	-		ldap	1473	Not possible	tcp
Active Directory	Admin server	-	Variable value	-	Active Directory	ldaps	636	Possible	tcp
Discover LAN switches	Admin server	-	-	-	LAN switch	-	-	-	ICMP

*1: Required for PRIMERGY servers.
*2: For the port used by the ESC manager when coordinating with ETERNUS SF Storage Cruiser, refer to the ESC User's Guide.
*3: ServerView Remote Connector Service. This is necessary when using VIOM coordination or when running VMware ESXi on managed servers.
*4: Required when the OS of the admin server is Windows.
*5: Required when the OS of the admin server is Linux.
*6: ICMP ECHO_REQUEST datagram.
*7: Required when running VMware ESX/ESXi on managed servers.

Table A.4 HBA address rename Server

Function Overview	Source				Destination				Protocol
	Server	Service	Port	Modification	Server	Service	Port	Modification	
HBA address rename setup service	HBA address rename server	-	Variable value	Not possible	Admin server	rcxweb	23461	Possible	tcp
		bootps	67	Not possible	Managed server	bootpc	68	Not possible	udp

Function Overview	Source				Destination				Protocol
	Server	Service	Port	Modification	Server	Service	Port	Modification	
		pxe	4011	Not possible					
		tftp	69	Not possible		-	Variable value	-	udp

Table A.5 Managed Server or Firewall

Functional Overview	Source				Destination				Protocol
	Server	Service	Port	Modification	Server	Service	Port	Modification	
Monitoring and controlling resources	Admin server	-	Variable value	-	Managed server (Physical OS)	nfagent rcvat (*1)	23458	Possible	tcp
					Managed server (VMware)	https	443	Not possible	tcp
					Managed server (Xen, KVM, Solaris container)	ssh	22	Not possible	tcp
					Managed server (Hyper-V)	RPC	135	Not possible	tcp
						NETBIOS Name Service	137	Not possible	tcp udp
						NETBIOS Datagram Service	138	Not possible	udp
						NETBIOS Session Service	139	Not possible	tcp
						SMB	445	Not possible	tcp udp
ServerView Agents (*2)	Admin server	-	Variable value	-	Managed server	snmp	161	Not possible	tcp udp
	Managed server	-	Variable value	-	Admin server	snmptrap	162	Not possible	udp
Backup, restore, Cloning	Admin server	-	4972	Not possible	Managed server	-	4973	Not possible	udp

Functional Overview	Source				Destination				Protocol
	Server	Service	Port	Modification	Server	Service	Port	Modification	
	Managed server	-	4973	Not possible	Admin server	-	4972	Not possible	udp
		-	Variable value	-		tftp	69	Not possible	udp
HBA address rename setup service	Managed server	bootpc	68	Not possible	HBA address rename server	bootps	67	Not possible	udp
						pxe	4011	Not possible	udp
		-	Variable value	-		tftp	69	Not possible	udp
VMware ESX/ ESXi (*3)	Admin server	-	Variable value	-	Managed server	-	443	Not possible	tcp

*1: Required for SPARC Enterprise servers.
*2: Required for PRIMERGY servers.
*3: Required when running VMware ESX/ESXi on managed servers.

Table A.6 VM Management Server

Function Overview	Source				Destination				Protocol
	Server	Service	Port	Modification	Server	Service	Port	Modification	
vCenter Server	Admin server	-	Variable value	-	vCenter Server	-	443	Not possible	tcp
System Center Virtual Machine Manager	Admin server	-	Variable value	-	System Center Virtual Machine Manager	-	80	Not possible	tcp
						WinRM	443 5985		

Table A.7 Directory Service Server

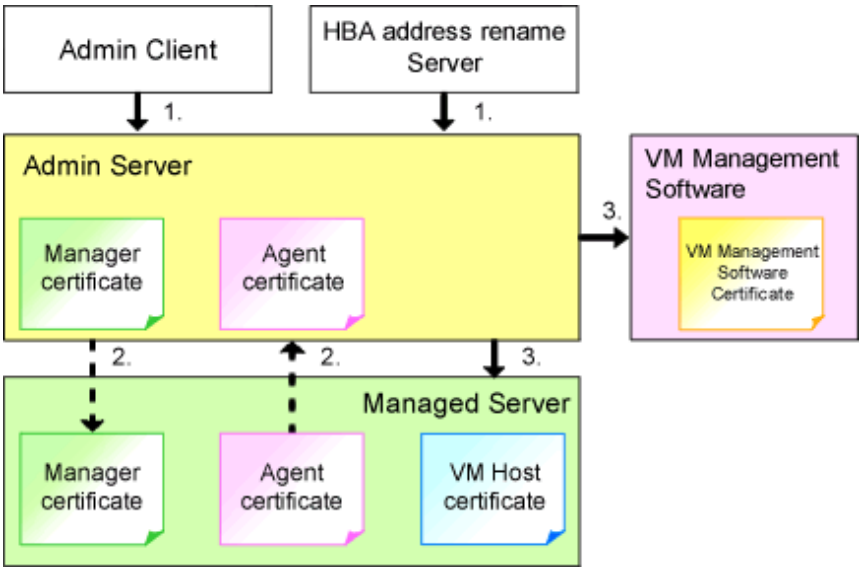
Function Overview	Source				Destination				Protocol
	Server	Service	Port	Modification	Server	Service	Port	Modification	
OpenDS	Admin server	-	Variable value	-	OpenDS	ldaps	1474	Possible	tcp
Active Directory	Admin server	-	Variable value	-	Active Directory	ldaps	636	Possible	tcp

Appendix B HTTPS Communications

This appendix explains the HTTPS communication protocol used by Resource Orchestrator and its security features.

Resource Orchestrator uses HTTPS communication for the three cases shown in the figure below. Certificates are used for mutual authentication and for encrypting communication data.

Figure B.1 HTTPS Communication



1. Between the Admin Client and the Admin Server, or Between the HBA address rename Server and the Admin Server

   The admin client and HBA address rename server automatically obtain a certificate from the admin server at each connection. This certificate is used to encrypt the communicated data.

2. Between the Admin Server and Managed Servers (Communication with Agents)

   Certificates are created on both the admin server and managed servers when Resource Orchestrator (manager or agent) is first installed. Certificates of other communication targets are stored at different timings, as described below (refer to "Certificate Creation Timing"). Those certificates are used for HTTPS communication based on mutual authentication.
   When re-installing the manager, its agent certificates (stored on the admin server) are renewed. Because the renewed certificates differ from those stored on the agent side (on managed servers), agents are not able to communicate with the admin server. To avoid such communication issues, it is recommended to backup agent certificates (on the admin server) before uninstalling the manager, and restore them after re-installation. When re-installing the manager, back up the certificates referring to "11.1 Uninstall the Manager" in the "Setup Guide VE". When restoring the certificates, refer to "2.1 Installing the Manager" in the "Setup Guide VE".

3. Between the Admin Server and Managed Servers (Communication with VM Hosts), or Between the Admin Server and VM Management Software [VMware]

   The admin server obtains and stores certificates for each connection with a managed server (VM host) or VM management software. Those certificates are used to encrypt communications.

Certificate Creation Timing

Between the Admin Client and the Admin Server, or Between the HBA address rename Server and the Admin Server

Certificates are automatically obtained each time HTTPS connections are established. They are not stored on the admin server.

Between the Admin Server and Managed Servers (Communication with Agents)

The certificates used for HTTPS communication are automatically exchanged and stored on the manager and agents on the following occasions:

- When registering a managed server

- Right after re-installing and starting an agent

Between the Admin Server and Managed Servers (Communication with VM Hosts), or Between the Admin Server and VM Management Software [VMware]

Certificates are automatically obtained each time HTTPS connections are established. They are not stored on the admin server.

Types of Certificates

Resource Orchestrator uses the following certificates.

Between the Admin Client and the Admin Server, or Between the HBA address rename Server and the Admin Server

The public keys included in the certificates are created using X.509-based RSA encryption. These keys are 1024 bits long.

Between the Admin Server and Managed Servers (Communication with Agents)

The public keys included in the certificates are created using X.509-based RSA encryption. These keys are 2048 bits long.

Between the Admin Server and Managed Servers (Communication with VM Hosts), or Between the Admin Server and VM Management Software [VMware]

The public keys included in the certificates are created using X.509-based RSA encryption. These keys are 1024 bits long.

Adding the Admin Server's Certificate to Client Browsers

Resource Orchestrator automatically generates a unique, self-signed certificate for each admin server during manager installation. This certificate is used for HTTPS communication with admin clients.
Use of self-signed certificates is generally safe within an internal network protected by firewalls, where there is no risk of spoofing attacks and communication partners can be trusted. However, Web browsers, which are designed for less-secure networks (internet), will see self-signed certificates as a security threat, and will display the following warnings.

- Warning dialog when establishing a connection

  When opening a browser and connecting to the admin server for the first time, a warning dialog regarding the security certificate received from the admin server is displayed.

- Address bar and Phishing Filter warning in Internet Explorer 8 or 9

  The background color of the address bar will become red and the words "Certificate Error" will be displayed on its right side of the address bar of the login screen, the ROR console, and BladeViewer.
  Furthermore, the Phishing Filter may show a warning on the status bar.

When using Internet Explorer 8 or 9, the above warnings can be disabled by creating a certificate for the admin server's IP address or host name (FQDN) that is specified in the address bar's URL, and installing it to the browser.
On the admin server, a certificate for "localhost" is automatically created during installation of the manager.
When using other servers as admin clients, use the following procedure to install the admin server's certificate on each client.
Therefore, the certificate creation step in the following procedure can be skipped when using the admin server as an admin client. In that case, use "localhost" in the URL and proceed to step 2.

1. Create a Certificate

   a. Open the command prompt on the admin server.

   b. Execute the following command to move to the installation folder.

      [Windows Manager]

      ```
      >cd "Installation_folder\SVROR\Manager\sys\apache\conf" <RETURN>
      ```

      [Linux Manager]

      ```
      # cd /etc/opt/FJSVrcvmr/sys/apache/conf <RETURN>
      ```

c. After backing up the current certificate, execute the certificate creation command bundled with Resource Orchestrator (openssl.exe).

   When using the -days option, choose a value (number of days) large enough to include the entire period for which you plan to use Resource Orchestrator. However, the certificate's expiration date (defined by adding the specified number of days to the current date) should not go further than the 2038/1/19 date.

Example

When the Manager is installed in the "C:\Fujitsu\ROR" folder, and generating a certificate valid for 15 years (or 5479 days, using the -days 5479 option)

[Windows Manager]

```
>cd "C:\Fujitsu\ROR\SVROR\Manager\sys\apache\conf" <RETURN>
>..\..\..\bin\rcxadm mgrctl stop <RETURN>
>copy ssl.crt\server.crt ssl.crt\server.crt.org <RETURN>
>copy ssl.key\server.key ssl.key\server.key.org <RETURN>
>..\bin\openssl.exe req -new -x509 -nodes -out ssl.crt\server.crt -keyout ssl.key\server.key -days 5479 -
config openssl.cnf <RETURN>
Loading 'screen' into random state - done
Generating a 1024 bit RSA private key
.................++++++
.................................++++++
writing new private key to 'ssl.key\server.key'
-----
You are about to be asked to enter information that will be incorporated
into your certificate request.
What you are about to enter is what is called a Distinguished Name or a DN.
There are quite a few fields but you can leave some blank
For some fields there will be a default value,
If you enter '.', the field will be left blank.
-----
Country Name (2 letter code) []: <RETURN>
State or Province Name (full name) []: <RETURN>
Locality Name (eg, city) [Kawasaki]: <RETURN>
Organization Name (eg, company) []: <RETURN>
Organizational Unit Name (eg, section) []: <RETURN>
Common Name (eg, YOUR name) [localhost]: IP_address or hostname (*1) <RETURN>
Email Address []: <RETURN>

>..\..\..\bin\rcxadm mgrctl start <RETURN>
```

[Linux Manager]

```
# cd /etc/opt/FJSVrcvmr/sys/apache/conf <RETURN>
# /opt/FJSVrcvmr/bin/rcxadm mgrctl stop <RETURN>
# cp ssl.crt/server.crt ssl.crt/server.crt.org <RETURN>
# cp ssl.key/server.key ssl.key/server.key.org <RETURN>
# /opt/FJSVrcvmr/sys/apache/bin/openssl req -new -x509 -nodes -out ssl.crt/server.crt -keyout ssl.key/
server.key -days 5479 -config /opt/FJSVrcvmr/sys/apache/ssl/openssl.cnf <RETURN>
Generating a 1024 bit RSA private key
.................++++++
.................................++++++
writing new private key to 'ssl.key/server.key'
-----
You are about to be asked to enter information that will be incorporated
into your certificate request.
What you are about to enter is what is called a Distinguished Name or a DN.
```

```
There are quite a few fields but you can leave some blank
For some fields there will be a default value,
If you enter '.', the field will be left blank.
-----
Country Name (2 letter code) []: <RETURN>
State or Province Name (full name) []: <RETURN>
Locality Name (eg, city) [Kawasaki]: <RETURN>
Organization Name (eg, company) []: <RETURN>
Organizational Unit Name (eg, section) []: <RETURN>
Common Name (eg, YOUR name) [localhost]: IP_address_or_hostname (*1) <RETURN>
Email Address []: <RETURN>

# /opt/FJSVrcvmr/bin/rcxadm mgrctl start <RETURN>
```

*1: Enter the IP address to be entered in the Web browser or the host name (FQDN).

Example

IP address: 192.168.1.1
Host name: myhost.company.com

2. Add the Certificate to the Web Browser

   Open the Resource Orchestrator login screen, referring to "Chapter 3 Login to the ROR Console" in the "Setup Guide VE". When opening the ROR console, enter the same IP address or host name (FQDN) as that used to generate the certificate in the previous step. Once the login screen is displayed, perform the following operations.

   a. Open the [Certificate] dialog.

      For Internet Explorer 8 and 9, open the "Certificate is invalid dialog" by clicking the "Certificate Error" displayed in the address bar. This will open an "Untrusted Certificate" or "Certificate Expired" message.
      Click the "View certificates" link displayed at the bottom of this dialog.

   b. Confirm that the "Issued to" and "Issued by" displayed in the [Certificate] dialog are both set to the IP address or host name (FQDN) used to generate the certificate.

   c. In the [Certificate] dialog, click <Install Certificate>.

      The [Certificate Import Wizard] dialog is displayed.

   d. Click <Next>>.

   e. Select "Place all certificates in the following store".

   f. Click <Browse>.

      The [Select Certificate Store] dialog is displayed.

   g. Select "Trusted Root Certification Authorities".

   h. Click <OK>.

   i. Click <Next>>.

   j. Check that "Trusted Root Certification Authorities" is selected.

   k. Click <Finish>.

   l. Restart the Web browser.

   If multiple admin clients are used, perform this operation on each admin client.

Note

Enter the IP address or host name (FQDN) used to generate the certificate in the Web browser's URL bar. If the entered URL differs from that of the certificate, a certificate warning is displayed.

Example

A certificate warning is displayed when the following conditions are met.

- The entered URL uses an IP address while the certificate was created using a host name (FQDN)
- The admin server is set with multiple IP addresses, and the entered URL uses an IP address different from that used to generate the certificate

In environments where the admin server is Windows, and multiple IP addresses are used, when a login window with a different URL from the address bar's URL in which the IP address or host name (FQDN) is specified, the warning may not disappear.
As a corrective action, set a higher priority for binding of the network adapter used on the admin LAN than for other network adapters.

Example

When changing the order of priority of network adapter binding in Microsoft(R) Windows Server(R) 2008 R2 Enterprise

1. Click <Start>, and then click [Control Panel].
2. When [Network and Internet] is displayed, click this item.
   When [Network and Internet] is not displayed, proceed to the next step without clicking.
3. Click [Network and Sharing Center], and click [Change adapter settings] in the left side of the window.
4. Click [Advanced Settings] in the [Advanced] menu.
   When the [Advanced] menu is not displayed, push the [Alt] key.
5. From the list of [Connections] in the [Adapters and Bindings] tab, click the target network adapter, and the "Up" or "Down" buttons to change the order of priority of connections.
6. Click <OK>.

Appendix C Hardware Configuration

This appendix explains how to configure hardware.

C.1 Connections between Server Network Interfaces and LAN Switch Ports

Configuring VLAN settings on internal LAN switch ports requires an understanding of the network connections between LAN switches and physical servers (between LAN switch ports and the network interfaces mounted in each server).
This appendix shows which network interfaces (on PRIMERGY BX600 server blades) are connected to which LAN switch blade ports.
For servers other than PRIMERGY BX servers, refer to the server manual for details on the connections between server blades and LAN switch blades.
The connections between server blades and LAN switch blades are shown in the following table.

Table C.1 Connections between Server Blades and LAN Switch Blades (PG-SW107)

NIC index	NIC placement (on a server blade)	Connected port number (on a LAN switch blade)
Index 1	Onboard LAN1	NET1 port "3*N*-2"
Index 2	Onboard LAN2	NET2 port "3*N*-2"
Index 3	Onboard LAN3	NET1 port "3*N*-1"
Index 4	Onboard LAN4	NET2 port "3*N*-1"
Index 5	Onboard LAN5	NET1 port "3*N*"
Index 6	Onboard LAN6	NET2 port "3*N*"
Index 7	LAN expansion card LAN1	NET3 port "*N*"
Index 8	LAN expansion card LAN2	NET4 port "*N*"

N: Slot number of the connected server blade

PG-SW104/105/106 is mounted in NET3 and NET4.
For details, refer to the chassis hardware manual.

Table C.2 Connections between Server Blades and LAN Switch Blades (PG-SW104/105/106)

NIC index	NIC placement (on a server blade)	Connected port number (on a LAN switch blade)
Index 1	Onboard LAN1	NET1 port "*N*"
Index 2	Onboard LAN2	NET2 port "*N*"
Index 3	LAN expansion card LAN1	NET3 port "*N*"
Index 4	LAN expansion card LAN2	NET4 port "*N*"
Index 5	-	-
Index 6	-	-
Index 7	-	-
Index 8	-	-

-: None
N: Slot number of the connected server blade

Note

VLAN settings cannot be configured on the following devices.

- PRIMERGY BX600 Ethernet Blade Panel 1Gb 10/6 (IBP 10/6) and 30/12 (IBP 30/12)
- A LAN switch directly connected to a PRIMERGY BX 600 LAN pass-thru blade
- A LAN switch directly connected to servers other than PRIMERGY BX servers

LAN switch blade product names may differ between countries.
This appendix refers to the product names used in Japan.
The following table shows product references often used in other countries.

Reference	Product Name
PG-SW104	PRIMERGY BX600 Switch Blade (1Gbps) PRIMERGY BX600 Ethernet Switch 1GB 10/6(SB9)
PG-SW105	PRIMERGY BX600 Switch Blade (10Gbps) PRIMERGY BX600 Ethernet Switch 1GB 10/6+2(SB9)
PG-SW106	Cisco Catalyst Blade Switch 3040 PRIMERGY BX600 Ethernet Switch 1GB 10/6(Cisco CBS 3040)
PG-SW107	PRIMERGY BX600 Switch Blade (1Gbps) PRIMERGY BX600 Ethernet Switch 1GB 30/12(SB9F)

C.2 WWN Allocation Order during HBA address rename Configuration

This section explains the order in which WWNs are allocated during configuration of HBA address rename.

With HBA address rename, as WWNs are allocated to the I/O addresses of HBAs in descending order, the order may not match the port order listed in the HBA.
When specifying the locations for WWN allocation, check the I/O addresses of HBAs.
The I/O addresses of HBAs can be confirmed using tools provided by HBA vendors or FC-HBA BIOS.

- For blade servers

  Example

  For a blade server with an HBA with 2 ports, allocation is performed as follows:

```
WWN value provided by "I/O Virtualization Option": 20:00:00:17:42:51:00:00
WWNN value for ports 1 and 2 of the HBA          : 20:00:00:17:42:51:00:00
WWPN value for HBA port 1                        : 9:00:00 PM:17:42:51:00:00
WWPN value for HBA port 2                        : 10:00:00 PM:17:42:51:00:00
```

- For rack mount or tower servers

  For the PCI slots of rack mount or tower servers, WWNs are allocated in the following order:

```
PRIMERGY RX200 S4   slot2 -> slot1 -> slot3
PRIMERGY RX200 S5   slot1 -> slot2 -> slot3
PRIMERGY RX300 S4   slot5 -> slot6 -> slot1 -> slot7 -> slot4 -> slot2 -> slot3
PRIMERGY RX300 S5   slot2 -> slot3 -> slot4 -> slot5 -> slot6 -> slot7 -> slot1
PRIMERGY RX600 S4   slot6 -> slot3 -> slot4 -> slot1 -> slot2 -> slot7 -> slot5
PRIMERGY TX300 S4   slot5 -> slot6 -> slot1 -> slot7 -> slot4 -> slot2 -> slot3
```

  In a single PCI slot, allocate WWNs in the following order:

```
port 2 -> port 1
```

Example

When one port HBAs are mounted in slot 2 and slot 3 of an RX600 S4, WWNs are allocated in the following order:

```
slot 3 -> slot 2

WWN value provided by "I/O Virtualization Option": 20:00:00:17:42:51:00:00
WWNN value for slots 2 and 3 of the HBA          : 20:00:00:17:42:51:00:00
WWPN value for HBA slot 2                        : 22:00:00:17:42:51:00:00
WWPN value for HBA slot 3                        : 21:00:00:17:42:51:00:00
```

When two port HBAs are mounted in slot 2 of an RX600 S4, WWNs are allocated in the following order:

```
slot 2 (port 2) -> slot 2 (port 1)

WWN value provided by "I/O Virtualization Option": 20:00:00:17:42:51:00:00
WWNN value for ports 1 and 2 of the HBA          : 20:00:00:17:42:51:00:00
WWPN value for HBA port 1                        : 10:00:00 PM:17:42:51:00:00
WWPN value for HBA port 2                        : 9:00:00 PM:17:42:51:00:00
```

Appendix D Server Virtualization Products

This appendix details the functions available for each server virtualization product managed in Resource Orchestrator.

D.1 Common Functions of Server Virtualization Software

Resource Orchestrator provides the following functions for managed servers running server virtualization software.

Functions Related to Server Virtualization Software

Table D.1 Functions Related to VM Hosts

Function	Server Virtualization Product				
	VMware	Hyper-V	Xen	KVM	Solaris Containers
Monitoring	Yes	Yes (*1)	Yes	Yes	Yes
Power control	Yes	Yes	Yes	Yes	Yes
Server switchover, failback, takeover (based on backup and restore)	Yes (*2, *3)	Yes (*4)	Yes	Yes	No
Server switchover, failback and takeover (based on I/O virtualization)	Yes	Yes (*4)	Yes	Yes	No
Server switchover, failback, and takeover (based on storage affinity methods)	No	No	No	No	Yes
Sharing of spare servers between physical OS's and VM guests (based on I/O virtualization) (*5)	Yes	No	Yes (*6)	Yes (*6)	No
Backup and Restore	Yes (*2, *3)	Yes	Yes	Yes	No
Cloning	No	No	No	No	No
VM maintenance mode settings (*7)	Yes	Yes (*8)	Yes (*6, *9)	No	No
Launch of VM management console	Yes	Yes	Yes (*9)	No	No
VM Home Position (*8)	Yes	Yes	Yes	Yes	No
Network Map	Yes	Yes	No	No	No

*1: Must be set to allow remote management. For details, refer to "D.2 Configuration Requirements".
*2: Not supported for VMware vSphere 4 or later.
*3: Not supported for VMware ESXi.
*4: Do not share the networks of VM hosts and VM guests. For details, refer to "D.2 Configuration Requirements".
*5: Spare servers can only be shared between physical OS's and VM guests when using the I/O virtualization switchover method.
*6: Not available for the pool master when using Citrix XenServer.
*7: Only available from the command-line.
*8: A VM management software (such as System Center Virtual Machine Manager) must be registered.
*9: Not supported with Red Hat Enterprise Linux 5 Linux Virtualization (Xen-based).

Table D.2 Functions Related to VM Guests

Function	Server Virtualization Product				
	VMware	Hyper-V	Xen	KVM	Solaris Containers
Monitoring (*1)	Yes (*2)	Yes	Yes (*2, *5)	Yes (*2, *5)	Yes
Power control (*2)	Yes	Yes	Yes (*3)	Yes (*3)	Yes

Function	Server Virtualization Product				
	VMware	Hyper-V	Xen	KVM	Solaris Containers
Migration between physical servers	Yes (*4, *7)	Yes (*4, *7)	Yes (*7)	Yes (*7)	No
Launch of VM management console	Yes	Yes	Yes (*6)	No	No

*1: VM guests are automatically detected after VM host registration. The result of further VM guest creation, modification, removal, or migration is also automatically reflected in Resource Orchestrator.
*2: Depending on the virtualization software used, this function may require specific settings. For details, refer to "D.2 Configuration Requirements".
*3: An error may happen when using the high-availability function of a server virtualization software. For details, refer to "D.3 Functional Differences between Products".
*4: A VM management software (such as VMware vCenter Server, System Center Virtual Machine Manager) must be registered.
*5: Not supported with Red Hat Enterprise Linux 5 Linux Virtualization (Xen-based). To register VM guests, they should be powered on first.
*6: Not supported with Red Hat Enterprise Linux 5 Linux Virtualization (Xen-based).
*7: When migrating VM guests between different storage, perform the migration using VM management software.

Attributes of VM Hosts and VM Guests

Table D.3 General Area

Content Displayed	Server Virtualization Product				
	VMware	Hyper-V	Xen	KVM	Solaris Containers
Server name	Yes	Yes	Yes	Yes	Yes
Admin LAN (IP address) (*1)	Yes	Yes	Yes	Yes	Yes
Status	Yes	Yes	Yes	Yes	Yes
Type	Yes	Yes	Yes	Yes	Yes
OS	Yes	Yes	Yes (*2)	Yes (*2)	Yes
Physical server name (*1)	Yes	Yes	Yes	Yes	Yes

*1: Not displayed for VM guests.
*2: Not supported with Red Hat Enterprise Linux 5 Linux Virtualization (Xen-based).

Table D.4 VM Host Information Area

Content Displayed	Server Virtualization Product				
	VMware	Hyper-V	Xen	KVM	Solaris Containers
VM type	Yes	Yes	Yes	Yes	Yes
VM software name	Yes	Yes	Yes	Yes	Yes
VM software VL	Yes	Yes	Yes	Yes	Yes
Number of VM guests	Yes	Yes	Yes	Yes	Yes
VM management software	Yes	No	No	No	No
VM guests	Yes	Yes	Yes	Yes	Yes

Table D.5 VM Guest Information Area

Content Displayed	Server Virtualization Product				
	VMware	Hyper-V	Xen	KVM	Solaris Containers
VM type	Yes	Yes	Yes	Yes	Yes
VM host name	Yes	Yes	No	No	Yes
VM name	Yes	Yes	Yes	Yes	Yes
VM management software	Yes	No	No	No	No

D.2 Configuration Requirements

This section describes the settings required to properly configure each different server virtualization product for use with Resource Orchestrator.

Configuration Requirements for Each Server Virtualization Product

The required configuration differs with each server virtualization product. For details on the configuration of each virtualization product, refer to the manual of each product.

[VMware]
Installation of VMware Tools is required to properly display the host names of guest OS's and enable their remote shutdown via the power control functions of Resource Orchestrator.
Install VMware Tools after installing an operating system in a VM guest.

[Hyper-V]

- Use the following procedure to enable remote management.

  1. Enable remote control in WMI settings.

     a. In each VM host, access the Control Panel and open the [Administrative Tools]-[Computer Management].
     The [Computer Management] window is displayed.

     b. Open [Services and Applications], right-click on [WMI Control] and select [Properties] from the displayed menu.
     The [WMI Control Properties] dialog is displayed.

     c. Open the [Security] tab, select [Root]-[virtualization] and click <Security>.
     The [Security for ROOT\virtualization] window is displayed.

     d. Select the login user for the VM host, and check "Allow" from "Remote Enable".

     e. Click <OK>.

     The remote WMI settings are enabled.

  2. Configure the Windows firewall to enable remote WMI management.

     a. On each VM host, run the "GPedit.msc" command.
     The [Local Group Policy Editor] dialog is displayed.

     b. Select the following folder:
     [Computer Configuration]-[Administrative Templates]-[Network]-[Network Connections]-[Windows Firewall]

     c. If the VM host is a member of a domain, double-click [Domain Profile]; otherwise double-click [Standard Profile].
     Either one of the [Domain Profile] or [Standard Profile] screen is displayed.

     d. In the displayed screen, right-click [Windows Firewall: Allow inbound remote administration exception] and select [Properties] from the displayed menu.
     The [Windows Firewall: Allow inbound remote administration exception] dialog is displayed.

     e. Select [Enabled] and click <OK>.

3. Configure DCOM.

   a. On each VM host, run the "Dcomcnfg.exe" command.

   b. In the [Component Services] dialog, expand [Component Services]-[Computers], right-click [My Computer] and select [Properties] from the displayed menu.
   The [My Computer Properties] window is displayed.

   c. Select the [COM Security] tab.

   d. Click <Edit Limits> from "Launch and Activation Permissions".
   The [Launch and Activation Permission] window is displayed.

   e. Select the VM host's user name under [Groups or user names:], and select the [Allow] checkbox for [Remote Activation] and click <OK>.

   f. Click <Edit Limits> under "Access Permissions".
   The [Access Permission] window is displayed.

   g. Select [ANONYMOUS LOGON] under [Group or user names], and check the [Allow] checkbox for [Remote Access] and then click <OK>.

- Perform configuration so that the networks of VM hosts and VM guests are configured separately.

  1. Prepare two or more physical NICs.
  The physical NIC that the VM host uses for the admin LAN and communication with external servers should only be used for physical servers. Please do not configure it for virtual networks.

  2. Create a virtual network for the VM guests to use for communication.

     - For Hyper-V 2.0

       Open the Hyper-V Manager, then [Virtual Network Manager] to create the virtual network. Configure the [Allow management operating system to share this network adapter] checkbox as follows: (By default, the checkbox is unselected)

       - When using ping monitoring functions of PRIMECLUSTER GLS

       Check the checkbox.

       - When not using ping monitoring functions of PRIMECLUSTER GLS

       Clear the checkbox.

     - For Hyper-V 1.0

       On each VM host, access the Control Panel and open the [Network Connections]. Configure external virtual network connections for the VM host that are displayed as [Local Area Connection] as follows:

       - When using ping monitoring functions of PRIMECLUSTER GLS

       Enable all relevant virtual networks.

       - When not using ping monitoring functions of PRIMECLUSTER GLS

       Disable all relevant virtual networks.

     Information

     With NIC redundancy using GLS, "warning" is temporarily displayed for the managed server status after server switchover. No action is necessary, since the status returns to "normal" after a while.

- Installation of VMware Tools is required to properly display the host names of guest OS's and enable their remote shutdown via the power control functions of Resource Orchestrator.

  Install OS's on VM guests and then install the integration service on those OS's.

[Xen]
With Citrix XenServer, perform settings to enable remote shutdown of VM guests via the power control functions of Resource Orchestrator.
Install XenServer Tools after installing an operating system in a VM guest.

[Solaris Containers]
Set SSH access permission, and enable password authentication for accounts with administrator pivileges.

Note

When using multiple server virtualization software with the same manager, set differing names for the following on each server virtualization software.

- Port Groups
- Virtual Switches
- Virtual Network
- Virtual Bridges

[VMware]

When configuring a port group, for the name of port groups using the same VLAN ID, it is necessary to use a common name on all VM hosts.

[Hyper-V]

- When configuring a virtual network, it is necessary to use a common name on all VM hosts for the name of virtual networks using the same VLAN ID.
- If a VM host belongs to a domain, ensure that its host name can be properly resolved by the admin server (from the VM host IP address).
  If host name resolution fails, perform the necessary DNS (or hosts file) settings to enable host name resolution.

[Xen] [KVM]

- When configuring a virtual bridge, it is necessary to use a common name on all VM hosts for the name of virtual bridges using the same VLAN ID.
- Make sure that each VM host is able to resolve the host name of the admin server from its IP address (on the admin LAN).
  If host name resolution fails, perform the necessary DNS (or hosts file) settings to enable host name resolution.
- When using Citrix XenServer with a resource pool, confirm that a home server is set for each VM guest.
  If no Home server is set, Resource Orchestrator is only able to recognize active VM guests.
- When using Citrix Essentials for XenServer with a resource pool, high-availability should be enabled for that resource pool.
  If high-availability is not enabled, and the pool master become unreachable, Resource Orchestrator will not be able to control or get information from the VM hosts and VM guests placed in that resource pool. If VM guest statuses become out-of-date, or operations on VM hosts or VM guests fail, check the status of the pool master. If the pool master is not reachable, resolve any communication problem that may prevent the manager from communicating with it (if necessary, change the pool master to another VM host).
  For details, refer to the manual of server virtualization software.

Configuration Requirements for System Center Virtual Machine Manager

The following settings are required when registering and using System Center Virtual Machine Manager (hereafter SCVMM) as VM management software.

1. Install Windows PowerShell.

   When Windows PowerShell 2.0 or later has not been installed on the admin server, install it.

2. Configure Windows Remote Management settings.

   - VM management software

     Remote administration rights should be granted on the server where SCVMM is installed.

     a. Log in to the SCVMM server as the administrator.

     b. Execute the following command from the command prompt.

```
>winrm quickconfig <RETURN>
```

c. Reply "y" to the confirmation that follows execution of the above command.

- Admin server

  Configure Windows Remote Management authentication settings on the admin server.

  a. Log on to the admin server as the administrator.

  b. Execute the following command to record the configuration details for TrustedHosts.

  ```
  >winrm get winrm/config/client <RETURN>
  ```

  Record the displayed details in TrustedHosts.

  Example

  When multiple SCVMMs are registered

  ```
  ***.***.***.*** , ***.***.***.***
  ```

  When a single asterisk ("*") is displayed, the following procedure is unnecessary as all hosts will be trusted in the configuration.

  c. Execute the following command.

  Enter the result obtained from b. for *Recorded_content_in_b.*.

  ```
  >winrm set winrm/config/client @{TrustedHosts="Recorded_content_in_b." ,
  "Additionally_registered_SCVMM_address"} <RETURN>
  ```

  Example

  The command specification when multiple SCVMMs are registered

  ```
  >winrm set winrm/config/client @{TrustedHosts="***.***.***.*** , ***.***.***.*** ,
  Additionally_registered_SCVMM_address"} <RETURN>
  ```

  d. Execute the following command to check the details for TrustedHosts.

  ```
  >winrm get winrm/config/client <RETURN>
  ```

  If the address of the SCVMM additionally registered has been added to the details recorded in b., there are no problems.

Note

When registering multiple SCVMMs in Resource Orchestrator as VM management software, specify the IP addresses for multiple VM management software separated by commas (",") using the command registered in TrustedHosts.

3. Configure the settings to enable communication with the admin LAN addresses of managed VM hosts.

   From the server on which VM management software is operating, configure the settings to enable communication with the admin LAN IP addresses of the managed VM hosts to register in Resource Orchestrator. Even if a multi-homed VM host has multiple IP addresses, it is necessary to enable communication from SCVMM with the interface connected to the admin LAN of the VM host.

SCVMM Server MaxShellPerUser Settings

When registering SCVMM as VM management software, Resource Orchestrator controls SCVMM using PowerShell Web Services for Management (hereinafter WS-Management).

With standard Windows settings, the maximum number of processes that can start shell operations per user (MaxShellsPerUser) is set to "5". For Resource Orchestrator, change settings to enable a maximum of 31 sessions.
Since WS-Management is used for Windows administrator tools and Resource Orchestrator, set a value 31 or larger for MaxShellsPerUser.

Change the MaxShellsPerUser settings using the following procedure:

1. Execute Windows PowerShell as an administrator.
2. Change the current directory using the Set-Location commandlet.

   ```
   PS> Set-Location -Path WSMan:\localhost\Shell <RETURN>
   ```

3. Check the current MaxShellsPerUser configuration information using the Get-ChildItem commandlet.

   ```
   PS WSMan:\localhost\Shell> Get-ChildItem <RETURN>
   ```

   The content displayed in MaxShellsPerUser is the current setting.

   Example

   ```
   PS WSMan:\localhost\Shell> Get-ChildItem
    WSManConfig: Microsoft.WSMan.Management\WSMan::localhost\Shell

   Name                     Value           Type
   ----                     -----           ----
   AllowRemoteShellAccess   true            System.String
   IdleTimeout              180000          System.String
   MaxConcurrentUsers       5               System.String
   MaxShellRunTime          2147483647      System.String
   MaxProcessesPerShell     15              System.String
   MaxMemoryPerShellMB      150             System.String
   MaxShellsPerUser         5               System.String
   ```

4. Configure MaxShellsPerUser using the Set-Item commandlet.

   Example

   When setting MaxShellsPerUser "36"

   ```
   PS WSMan:\localhost\Shell> Set-Item .\MaxShellsPerUser 36 <RETURN>
   ```

Configuration Requirements for VM Guest Switchovers

Depending on the virtualization product being used, the following settings should be made to enable switchover of a newly created VM guest.

[VMware]
The VM guest's UUID must be changed.
Perform the following settings before switchover of a VM guest.

From the VM management client, add the following parameter to the VM guest's virtual machine configuration.

```
Name         Value
uuid.action  keep
```

For details on how to add parameters to a virtual machine configuration, refer to the help section of the VM management client.

Without this setting, a confirmation dialog is shown each time a virtual machine is started after being moved to a different VM host. Enabling this setting will prevent such confirmation dialogs from being shown, and the virtual machine will be set to always keep its UUID when moved between different servers.

[Hyper-V]
No specific configuration is required.

[Xen] [KVM]
No specific configuration is required.

Starting VM Management Software Clients

[VMware]
VMware Infrastructure Client or VMware vSphere Client should be installed on the Resource Orchestrator admin client.

[Hyper-V]
Hyper-V Manager or a VMM Administrator Console (*1) should be installed on the Resource Orchestrator admin client.

*1: When System Center Virtual Machine Manager (SCVMM) is registered, this VMM Administrator Console is used to control the VM hosts managed by SCVMM.

[Xen]
When using Citrix XenServer, XenCenter should be installed on the Resource Orchestrator admin client.

Configuring for Receiving SNMP Traps from VM Management Software (VMware vCenter Server)

Configure the following settings when receiving SNMP traps from VM management software (VMware vCenter Server).

- SNMP trap destination configuration

  Configure the IP address of the admin server as the SNMP trap destination on VM management software (VMware vCenter Server). For details on the configuration method, refer to the VM management software (VMware vCenter Server) manual.

- VM management software (VMware vCenter Server) alarm creation

  Create an alarm for VM management software (VMware vCenter Server), and configure the conditions to send SNMP traps. For details on the configuration method, refer to the VM management software (VMware vCenter Server) manual.

- VM management software (VMware vCenter Server) registration

  Register VM management software (VMware vCenter Server) on the admin server. At this point, register the SNMP trap source IP address of the VM management software (VMware vCenter Server).

  The SNMP trap source IP address can be checked and changed using the following procedure.

  1. Log in to the VM management software (VMware vCenter Server) server.
  2. Access the Control Panel and open the "Network Connections".
     The [Network Connections] window is displayed.
  3. From the menu, select [Advanced]-[Advanced Settings].
     The [Advanced Settings] window is displayed. The IP address in [Connections] on the [Adapters and Bindings] tab that has the highest priority and is allocated to an enabled network interface is the current SNMP trap source IP address.
  4. To change the SNMP trap source IP address, select the network interface with the IP address you want to change from [Connections], and move it to the top of the list.
  5. Click <OK>.
  6. Restart the server if necessary.

Note

- The traps received from VM management software (VMware vCenter Server) are always displayed as warning level for Resource Orchestrator. Therefore, configure an alarm for VM management software (VMware vCenter Server) in order to send SNMP traps when an event with a level higher than warning occurs.
- When the language of the VM management software (VMware vCenter Server) and the manager are different, received SNMP trap messages may turn into garbled characters.

D.3 Functional Differences between Products

This section describes the functional differences of each server virtualization product when used with Resource Orchestrator.

Display of VM Guest Names

The names of VM guests displayed in Resource Orchestrator vary according to the server virtualization product used.

[VMware]
The ROR console displays either a VM guest's VM name (as defined within VMware), or the hostname of its guest OS.
The guest OS hostname is displayed only after VMware Tools have been installed and the VM guest has been restarted once. The following conditions illustrate this behavior.

- VMware Tools were not installed yet: the *VM name* is displayed
- VMware Tools were installed, but the VM guest was not restarted yet: the *VM name* is displayed
- VMware Tools were installed, and the VM guest restarted: the *hostname of the guest OS* is displayed

If symbols were used in the VM name, those may be shown as percent signs ("%") or a pair of hexadecimal characters (example: "%5c"). Such behavior is similar to that of some parts of VMware's management console.

[Hyper-V]
The ROR console displays either a VM guest's VM name (as defined within Hyper-V), or the hostname of its guest OS.
The guest OS hostname is displayed after the VM guest has been started up at least once.

[Xen]
The ROR console displays the Xen VM names obtained at the time of VM host registration.
Once a VM guest is registered, VM name changes made from the Xen admin client will not be reflected in the ROR console.

[Solaris Containers]
The VM guest names displayed on the ROR console are the Solaris zone names set when creating Solaris containers.

Power Control of VM Guests [Xen] [KVM]

- When using Citrix XenServer in a high-availability configuration, VM guests cannot be shut down if the automatic reboot option (for VM guests) is enabled.
  For details, refer to the manual of server virtualization software.
- When using Red Hat Enterprise Linux 5 Virtualization (Xen-based), Resource Orchestrator cannot perform power operations on suspended VM guests. Suspended VM guests should first be resumed directly from the VM host console.

VM Guest Statuses [Solaris Containers]

The Solaris zone from before installation of the OS on a Solaris container is not displayed as the VM guest.

High-Availability Features of Each Product

Each server virtualization product provides its own high-availability feature. For details about such features, refer to the manual of each product.

Table D.6 High-availability Features of Each Product

Server Virtualization Product	High-availability Feature
VMware	VMware HA
Hyper-V	Failover clustering
Xen/KVM	HA
Solaris Containers	None

Sharing of spare servers between physical servers and VM guests

Resource Orchestrator allows sharing of spare servers between physical servers and VM guests by combining its own spare server functionality with the high-availability features available in each server virtualization product. This can be done using the following procedure.

a. Choose a VM host that is not running any VM guest, and set it as a VM guest recovery server using the high-availability feature of the virtualization product used

b. In Resource Orchestrator, set the server chosen in a. as the spare server of other physical servers

Refer to "D.1 Common Functions of Server Virtualization Software" for details on which server virtualization product can be used to share a common spare server with Resource Orchestrator.

Backup and restore of VM hosts when VM guests are stored on their boot disk

Depending on the virtualization product used, the behavior of backup and restore functions differs whether or not VM guests are stored on the VM host's boot disk.

[VMware]
VM guests are not included in the VM host's backup and restore.

[Hyper-V]
VM guests are included in the VM host's backup and restore. However, only the data stored on the VM host's boot disk is subject to backup and restore.

[Xen] [KVM]
VM guests are included in the VM host's backup and restore. However, only the data stored on the VM host's boot disk is subject to backup and restore.

[Solaris Containers]
Not supported.

Table D.7 Backup and Restore Behavior for each Virtualization Product

Disk	Partition	Backup and Restore Target				
		VMware	Hyper-V	Xen	KVM	Solaris Containers
First disk	VM Host	Yes	Yes	Yes	Yes	No
	swap	No (*1)	-	No (*1)	No (*1)	No
	VM Guest	No (*2)	Yes	Yes	Yes	No
	Data	Yes	Yes	Yes	Yes	No
Second disk	VM Guest	No	No	No	No	No
	Data	No	No	No	No	No

*1: During backup, data cannot be collected from the swap area. During restoration, the partition settings of the swap area are restored.
*2: VMFS partitions are not subject to backup and restore.

VM Guest Migration

For VMware or Hyper-V environments, VMware vCenter Server or System Center Virtual Machine Manager should be registered as VM management software to enable VM guest migrations.
Depending on the server virtualization software used, the following remarks apply. For details, refer to the manual of server virtualization software.

[VMware]
The source and destination VM hosts should be registered as part of the same cluster on the VM management software.
For details on clusters on VM management software, refer to the server virtualization software manual.

[Hyper-V]
The source and destination VM hosts should be part of the same Windows 2008 failover cluster.
For details on failover clusters, refer to the Windows operating system manual.

[Xen]
With Citrix XenServer, a migrated VM guest may be temporarily suspended before migration. Refer to the Citrix XenServer manual for details on the migration process for VM guests and the conditions behind this behavior.

[Solaris Containers]
Not supported.

The terminology used to describe different types of VM guest migration may differ depending on each virtualization vendor. For unification purposes, Resource Orchestrator uses the following terminology.

Table D.8 Migration Terminology

Resource Orchestrator terminology	VMware Terminology	Meaning
Live migration	VMotion	Migration of an active virtual machine (without interruption)
Cold migration	Cold migration	Migration of a powered off virtual machine

VM Guest Statuses

Displayed VM guest statuses may differ depending on the configuration of its server virtualization environment.

[VMware]

- If no VM management software was registered in Resource Orchestrator

  VM guest statuses can be one of the following: "normal", "unknown", or "stop".

- If a VM management software was registered in Resource Orchestrator

  VM guest statuses can be one of the following: "normal", "warning", "error", "unknown", or "stop".

[Hyper-V]

- If no VM management software was registered in Resource Orchestrator

  VM guest statuses can be one of the following: "normal", "unknown", or "stop".

- If a VM management software was registered in Resource Orchestrator

  VM guest statuses can be one of the following: "normal", "stop", "unknown", or "error".

[Xen] [KVM]
VM guest statuses can be one of the following: "normal", "stop", "unknown", or "error".

[Solaris Containers]
VM guest statuses can be one of the following: "normal", "unknown", or "stop".

VM Maintenance Mode

The terminology used to describe VM maintenance mode may differ depending on each virtualization vendor. For details on VM maintenance mode settings and their requirements, refer to the manual of each product.

Table D.9 VM Maintenance Mode Terminology

Server Virtualization Product	Vendor Terminology
VMware	Maintenance mode
Hyper-V	Maintenance mode (*1)
Xen	Maintenance mode (*2)
Solaris containers	None

*1: Only available with System Center Virtual Machine Manager (SCVMM). Maintenance mode for Hyper-V is made available in Resource Orchestrator by integrating directly with SCVMM.
*2: Only available with Citrix XenServer. Red Hat Enterprise Linux 5 Virtualization (Xen-based) does not provide similar functionality.
Moreover, the following restrictions may apply depending on the server virtualization product used.

[VMware]
When a VM host is set to maintenance mode, VM guest on the VM host will migrate automatically.
To set VM host to maintenance mode without migrating the VM guests, perform the setting from VMWare vCenter Server.
The behavior after the setting will depend on VM guests status as shown below.

Table D.10 VM Maintenance Mode Behavior

	vSphere DRS enabled	vSphere DRS disabled
Powered on VM guest exists	VM guest migrates and VM host will be set to maintenance mode	VM guest does not migrate and VM host maintenance setting will fail.
Powered on VM guest does not exist	VM guest migrates and VM host will be set to maintenance mode	VM guest migrates and VM host will be set to maintenance mode

[Hyper-V]
Target VM hosts should be registered in SCVMM and SCVMM in turn properly registered in Resource Orchestrator.

[Xen]
With Citrix XenServer, a VM host assigned as a pool master cannot be put into maintenance mode.
To put such a VM host into maintenance mode, the pool master role should first be assigned to a different VM host (within the same resource pool).

Migration Conflicts

A VM guest migration may fail if another migration was already launched from outside (*1) or Resource Orchestrator. In such cases, select [Operation]-[Update] from the ROR console menu to refresh the screen and check that the VM guest is not already being migrated.

[Xen]
With Citrix XenServer, "Home server" should be set for VM guests running on the VM hosts registered in the resource pool. Otherwise, powered off VM guests will no longer be recognized by Resource Orchestrator. If a VM guest is no longer displayed in the ROR console after a screen update, confirm that "Home server" is set.

*1: This may happen when using an automatic migration feature within the server virtualization software, or when a migration was run directly from a VM management console. Refer to the virtualization software manual for details on automatic migration features.

Notes on Resource Pool Usage [Xen]

When using Citrix XenServer with a resource pool, if the pool master becomes inaccessible from the Resource Orchestrator manager the statuses of VM hosts and VM guests belonging to that resource pool will change to "unknown", and the affected VM guests will no longer be manageable from Resource Orchestrator. In such cases, check the status of the pool master, and resolve any communication problem that may prevent the manager from communicating with it (if necessary, change the pool master to another VM host that is accessible from the manager). If the pool master is not reachable, resolve any communication problem that may prevent the manager from communicating with it (if necessary, change the pool master to another VM host).

When using Citrix XenServer in a high-availability configuration, the pool master is automatically changed to another VM host if it becomes unreachable. As a result, VM guests can then be controlled normally from Resource Orchestrator.

For details on the resource pool and high availability configurations, refer to the Citrix XenServer manual.

Regarding VM Host Names when VM Management Software has been Registered

Explains the names of VM hosts displayed in Resource Orchestrator according to the server virtualization product used, when registering VM management software.

When registering VM management software, the host name displayed in the ROR console will be the name of the VM host acquired from VM management software.

[VMware]
The host name of the VM host that vCenter Server recognizes will be the VM host name displayed when selecting [View]-[Inventory]-[Hosts and Clusters] by connecting to Center Server using vSphere Client.

[Hyper-V]
The host name of the VM host that SCVMM recognizes will be the host name shown when displaying hosts in the SCVMM administrator console.

Glossary

access path

A logical path configured to enable access to storage volumes from servers.

active mode

The state where a managed server is performing operations.
Managed servers must be in active mode in order to use Auto-Recovery.
Move managed servers to maintenance mode in order to perform backup or restoration of system images, or collection or deployment of cloning images.

active server

A physical server that is currently operating.

admin client

A terminal (PC) connected to an admin server, which is used to operate the GUI.

admin LAN

A LAN used to manage resources from admin servers.
It connects managed servers, storage, and network devices.

admin server

A server used to operate the manager software of Resource Orchestrator.

affinity group

A grouping of the storage volumes allocated to servers. A function of ETERNUS.

Equivalent to the LUN mapping of EMC.

agent

The section (program) of Resource Orchestrator that operates on managed servers.

Auto-Recovery

A function which continues operations by automatically switching over the system image of a failed server to a spare server and restarting it in the event of server failure.
This function can be used when managed servers are in a local boot configuration, SAN boot configuration, or a configuration such as iSCSI boot where booting is performed from a disk on a network.

- When using a local boot configuration

  The system is recovered by restoring a backup of the system image of the failed server onto a spare server.

- When booting from a SAN or a disk on a LAN

  The system is restored by having the spare server inherit the system image on the storage.
  Also, when a VLAN is set for the public LAN of a managed server, the VLAN settings of adjacent LAN switches are automatically switched to those of the spare server.

BACS (Broadcom Advanced Control Suite)

An integrated GUI application (comprised from applications such as BASP) that creates teams from multiple NICs, and provides functions such as load balancing.

Basic Mode

A function that can be used by configuring a Cloud Edition license after installing ROR VE.

BASP (Broadcom Advanced Server Program)

LAN redundancy software that creates teams of multiple NICs, and provides functions such as load balancing and failover.

blade server

A compact server device with a thin chassis that can contain multiple server blades, and has low power consumption.
As well as server blades, LAN switch blades, management blades, and other components used by multiple server blades can be mounted inside the chassis.

blade type

A server blade type.
Used to distinguish the number of server slots used and servers located in different positions.

BladeViewer

A GUI that displays the status of blade servers in a style similar to a physical view and enables intuitive operation.
BladeViewer can also be used for state monitoring and operation of resources.

BMC (Baseboard Management Controller)

A Remote Management Controller used for remote operation of servers.

boot agent

An OS for disk access that is distributed from the manager to managed servers in order to boot them when the network is started during image operations.

CA (Channel Adapter)

An adapter card that is used as the interface for server HBAs and fibre channel switches, and is mounted on storage devices.

chassis

A chassis used to house server blades and partitions.
Sometimes referred to as an enclosure.

cloning

Creation of a copy of a system disk.

cloning image

A backup of a system disk, which does not contain server-specific information (system node name, IP address, etc.), made during cloning.
When deploying a cloning image to the system disk of another server, Resource Orchestrator automatically changes server-specific information to that of the target server.

Cloud Edition

The edition which can be used to provide private cloud environments.

Domain

A system that is divided into individual systems using partitioning. Also used to indicate a partition.

DR Option

The option that provides the function for remote switchover of servers or storage in order to perform disaster recovery.

end host mode

This is a mode where the uplink port that can communicate with a downlink port is fixed at one, and communication between uplink ports is blocked.

environmental data

Measured data regarding the external environments of servers managed using Resource Orchestrator.
Measured data includes power data collected from power monitoring targets.

ESC (ETERNUS SF Storage Cruiser)

Software that supports stable operation of multi-vendor storage system environments involving SAN, DAS, or NAS. Provides configuration management, relation management, trouble management, and performance management functions to integrate storage related resources such as ETERNUS.

Express

The edition which provides server registration, monitoring, and visualization.

FC switch (Fibre Channel Switch)

A switch that connects Fibre Channel interfaces and storage devices.

fibre channel switch blade

A fibre channel switch mounted in the chassis of a blade server.

global zone

The actual OS that is used for a Solaris container.

A Solaris environment that has been installed on a physical server.

GLS (Global Link Services)

Fujitsu network control software that enables high availability networks through the redundancy of network transmission channels.

GSPB (Giga-LAN SAS and PCI_Box Interface Board)

A board which mounts onboard I/O for two partitions and a PCIe (PCI Express) interface for a PCI box.

GUI (Graphical User Interface)

A user interface that displays pictures and icons (pictographic characters), enabling intuitive and easily understandable operation.

HA (High Availability)

The concept of using redundant resources to prevent suspension of system operations due to single problems.

hardware initiator

A controller which issues SCSI commands to request processes.
In iSCSI configurations, NICs fit into this category.

hardware maintenance mode

In the maintenance mode of PRIMEQUEST servers, a state other than Hot System Maintenance.

HBA (Host Bus Adapter)

An adapter for connecting servers and peripheral devices.
Mainly used to refer to the FC HBAs used for connecting storage devices using Fibre Channel technology.

HBA address rename setup service

The service that starts managed servers that use HBA address rename in the event of failure of the admin server.

HBAAR (HBA address rename)

I/O virtualization technology that enables changing of the actual WWN possessed by an HBA.

host affinity

A definition of the server HBA that is set for the CA port of the storage device and the accessible area of storage.
It is a function for association of the Logical Volume inside the storage which is shown to the host (HBA) that also functions as security internal to the storage device.

Hyper-V

Virtualization software from Microsoft Corporation.

Provides a virtualized infrastructure on PC servers, enabling flexible management of operations.

I/O virtualization option

An optional product that is necessary to provide I/O virtualization.
The WWNN address and MAC address provided is guaranteed by Fujitsu Limited to be unique.
Necessary when using HBA address rename.

IBP (Intelligent Blade Panel)

One of operation modes used for PRIMERGY switch blades.
This operation mode can be used for coordination with ServerView Virtual I/O Manager (VIOM), and relations between server blades and switch blades can be easily and safely configured.

ILOM (Integrated Lights Out Manager)

The name of the Remote Management Controller for SPARC Enterprise T series servers.

image file

A system image or a cloning image. Also a collective term for them both.

IPMI (Intelligent Platform Management Interface)

IPMI is a set of common interfaces for the hardware that is used to monitor the physical conditions of servers, such as temperature, power voltage, cooling fans, power supply, and chassis.
These functions provide information that enables system management, recovery, and asset management, which in turn leads to reduction of overall TCO.

IQN (iSCSI Qualified Name)

Unique names used for identifying iSCSI initiators and iSCSI targets.

iRMC (integrated Remote Management Controller)

The name of the Remote Management Controller for Fujitsu's PRIMERGY servers.

iSCSI

A standard for using the SCSI protocol over TCP/IP networks.

LAN switch blades

A LAN switch that is mounted in the chassis of a blade server.

license

The rights to use specific functions.
Users can use specific functions by purchasing a license for the function and registering it on the manager.

link aggregation

Function used to multiplex multiple ports and use them as a single virtual port.
With this function, if one of the multiplexed ports fails its load can be divided among the other ports, and the overall redundancy of ports improved.

logical volume

A logical disk that has been divided into multiple partitions.

LSB (Logical System Board)

A system board that is allocated a logical number (LSB number) so that it can be recognized from the domain, during domain configuration.

maintenance mode

The state where operations on managed servers are stopped in order to perform maintenance work.
In this state, the backup and restoration of system images and the collection and deployment of cloning images can be performed.
However, when using Auto-Recovery it is necessary to change from this mode to active mode. When in maintenance mode it is not possible to switch over to a spare server if a server fails.

managed server

A collective term referring to a server that is managed as a component of a system.

management blade

A server management unit that has a dedicated CPU and LAN interface, and manages blade servers.
Used for gathering server blade data, failure notification, power control, etc.

Management Board

The PRIMEQUEST system management unit.
Used for gathering information such as failure notification, power control, etc. from chassis.

manager

The section (program) of Resource Orchestrator that operates on admin servers.
It manages and controls resources registered with Resource Orchestrator.

virtual switch

A function provided by server virtualization software to manage networks of VM guests as virtual LAN switches.
The relationships between the virtual NICs of VM guests and the NICs of the physical servers used to operate VM hosts can be managed using operations similar to those of the wiring of normal LAN switches.

VLAN (Virtual LAN)

A splitting function, which enables the creation of virtual LANs (seen as differing logically by software) by grouping ports on a LAN switch.
Using a Virtual LAN, network configuration can be performed freely without the need for modification of the physical network configuration.

VLAN ID

A number (between 1 and 4,095) used to identify VLANs.
Null values are reserved for priority tagged frames, and 4,096 (FFF in hexadecimal) is reserved for mounting.

VM (Virtual Machine)

A virtual computer that operates on a VM host.

VM guest

A virtual server that operates on a VM host, or an OS that is operated on a virtual machine.

VM Home Position

The VM host that is home to VM guests.

VM host

A server on which server virtualization software is operated, or the server virtualization software itself.

VM maintenance mode

One of the settings of server virtualization software, that enables maintenance of VM hosts.
For example, when using high availability functions (such as VMware HA) of server virtualization software, by setting VM maintenance mode it is possible to prevent the moving of VM guests on VM hosts undergoing maintenance.
For details, refer to the manuals of the server virtualization software being used.

VM management software

Software for managing multiple VM hosts and the VM guests that operate on them.
Provides value adding functions such as movement between the servers of VM guests (migration).

VMware

Virtualization software from VMware Inc.
Provides a virtualized infrastructure on PC servers, enabling flexible management of operations.

Web browser

A software application that is used to view Web pages.

WWN (World Wide Name)

A 64-bit address allocated to an HBA.
Refers to a WWNN or a WWPN.

WWNN (World Wide Node Name)

The WWN set for a node.
The Resource Orchestrator HBA address rename sets the same WWNN for the fibre channel port of the HBA.

WWPN (World Wide Port Name)

The WWN set for a port.
The Resource Orchestrator HBA address rename sets a WWPN for each fibre channel port of the HBA.

WWPN zoning

The division of ports into zones based on their WWPN, and setting of access restrictions between different zones.

Xen

A type of server virtualization software.

XSB (eXtended System Board)

Unit for domain creation and display, composed of physical components.

XSCF (eXtended System Control Facility)

The name of the Remote Management Controller for SPARC Enterprise M series servers.

zoning

A function that provides security for Fibre Channels by grouping the Fibre Channel ports of a Fibre Channel switch into zones, and only allowing access to ports inside the same zone.