



Systemwalker Runbook Automation



Technical Guide

Windows/Linux

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Preface

Purpose of This Document

This document provides a functional overview of Systemwalker Runbook Automation V15.1.1

Intended Readers

This document is intended for people who are considering installing Systemwalker Runbook Automation and people who use Systemwalker Runbook Automation to operate or manage systems.

This document assumes that readers already have basic knowledge about ITIL(R), as well as basic knowledge about the operating system and general GUI operations.

Abbreviations and Generic Terms Used

- The term "Windows(R) 8" refers to the following products:
 - Windows(R) 8 Pro(x86)
 - Windows(R) 8 Enterprise(x86)
 - Windows(R) 8 Pro(x64)
 - Windows(R) 8 Enterprise(x64)
- The term "Windows(R) 7" refers to the following products:
 - Windows(R) 7 Home Premium(x86)
 - Windows(R) 7 Professional(x86)
 - Windows(R) 7 Ultimate(x86)
 - Windows(R) 7 Enterprise(x86)
 - Windows(R) 7 Home Premium(x64)
 - Windows(R) 7 Professional(x64)
 - Windows(R) 7 Ultimate(x64)
 - Windows(R) 7 Enterprise(x64)
- The term "Windows Vista (R)" refers to the following products:
 - Windows Vista(R) Home Basic(x86)
 - Windows Vista(R) Home Premium(x86)
 - Windows Vista(R) Business(x86)
 - Windows Vista(R) Ultimate(x86)
 - Windows Vista(R) Enterprise(x86)
 - Windows Vista(R) Business(x64)
 - Windows Vista(R) Ultimate(x64)
- The term "Windows(R) XP" refers to the following products:
 - Microsoft(R) Windows(R) XP Professional x64 Edition
 - Microsoft(R) Windows(R) XP Professional
 - Microsoft(R) Windows(R) XP Home Edition

- The term "Windows Server 2012" refers to the following products:
 - Microsoft(R) Windows Server(R) 2012 Standard(x64)
 - Microsoft(R) Windows Server(R) 2012 Datacenter(x64)
- The term "Windows Server 2008" refers to the following products:
 - Microsoft(R) Windows Server(R) 2008 R2 Standard(x64)
 - Microsoft(R) Windows Server(R) 2008 R2 Enterprise(x64)
 - Microsoft(R) Windows Server(R) 2008 R2 Datacenter(x64)
 - Microsoft(R) Windows Server(R) 2008 Standard(x86)
 - Microsoft(R) Windows Server(R) 2008 Enterprise(x86)
 - Microsoft(R) Windows Server(R) 2008 Standard(x64)
 - Microsoft(R) Windows Server(R) 2008 Enterprise(x64)
 - Microsoft(R) Windows Server(R) 2008 Datacenter(x64)
 - Microsoft(R) Windows Server(R) 2008 Standard without Hyper-V(x86)
 - Microsoft(R) Windows Server(R) 2008 Enterprise without Hyper-V(x86)
 - Microsoft(R) Windows Server(R) 2008 Datacenter without Hyper-V(x64)
- The term "Windows Server 2003" refers to the following products:
 - 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
 - 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
- The Oracle Solaris Operating System may be referred to as Solaris, Solaris Operating System or Solaris OS.
- Microsoft (R) Cluster Server and Microsoft (R) Cluster Service are referred to as MSCS.
- The versions of Systemwalker Runbook Automation that run on Windows systems are referred to as the Windows version.
- The versions of Systemwalker Runbook Automation that run on Linux systems are referred to as the Linux version.

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This guide uses screenshots in accordance with Microsoft Corporation's guidelines.

February 2013

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Chapter 1 Overview

This chapter provides an overview of Systemwalker Runbook Automation.

1.1 What is Systemwalker Runbook Automation?

Corporate ICT departments are increasingly consolidating their servers in corporate data centers, with the aim of improving cost competitiveness.

Server consolidation reduces both the cost of procuring hardware and software and the costs associated with facilities and installation locations, but at the same time the administration costs for increasingly complicated ICT (information communication technology) systems are becoming more expensive.

For example, for many administrative tasks the procedures and administrative tools differ from system to system, and so administrators need to be always aware of which system they are operating on. Also, in real-life situations where ICT systems are managed, numerous visual checks and judgments are made on the ICT system, so operating costs cannot be reduced easily. Furthermore, there are also problems that cannot be simply measured in terms of cost, such as missed business opportunities due to human error and operating mistakes.

Resolving the problems with administration tasks in this kind of situation requires the following kinds of responses:

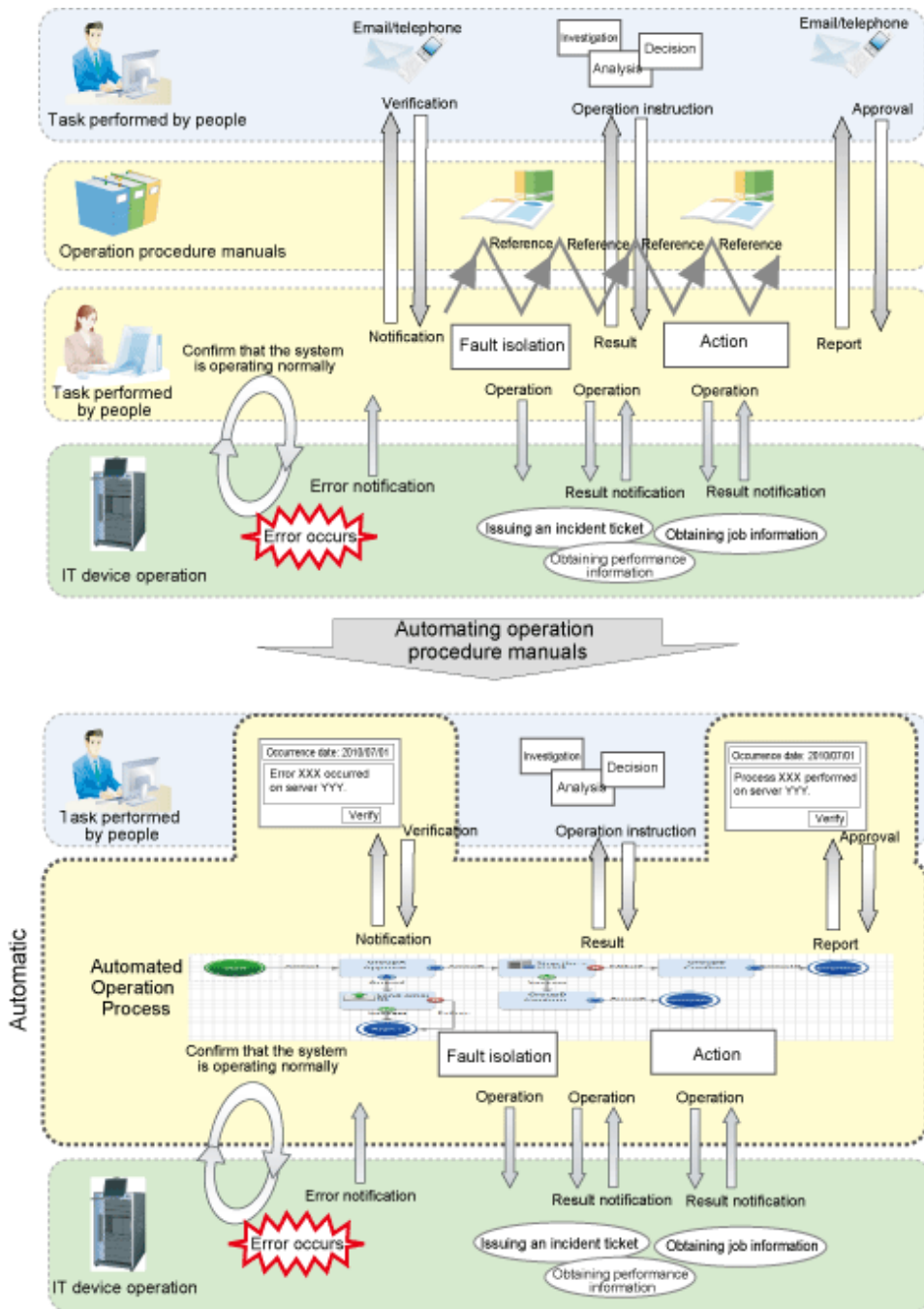
- There is a need to unify the tasks and operations that vary from system to system, due to platform differences and differences in system configurations.
- There is a need to be able to perform tasks appropriately even without detailed knowledge about technical subjects such as how to operate system management tools, or the parameter specifications for operating system commands.
- There is a need to be able to systemize all work, not only for "operations for ICT" such as operating system management tools, but also for "tasks that need to be performed by humans" such as confirming task results and determining the execution of tasks.

Systemwalker Runbook Automation provides functions to achieve these responses.

Systemwalker Runbook Automation provides an environment for developing Automated Operation Processes that make it possible to define operation procedures that combine human tasks such as checking and decision making, as well as tasks that are performed on ICT devices, such as executing commands and operating management tools. Systemwalker Runbook Automation also provides an environment for performing actual operations by executing these Automated Operation Processes. This makes it possible to automate all administration work in a way that integrates the tasks performed by people and the tasks performed by ICT devices, including storage devices, the network and linked external systems.

Also, by using logical operation components for each work objective that absorb the differences between systems (such as platform differences), Automated Operation Processes allow the same operations to be performed on different operating systems, making it possible to perform high-level operation tasks in a way that does not depend on the skill of the operator.

Systemwalker Runbook Automation supports operation tasks for large-scale, diverse systems by automating most of the operation tasks that until now have been performed by people following operation procedure manuals.

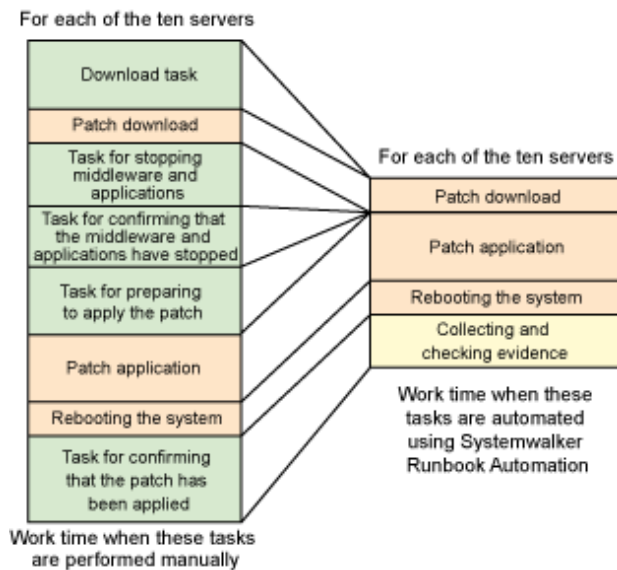


The following benefits can be expected from installing Systemwalker Runbook Automation.

Reduced operating costs

By automating the regular operations that are performed on a daily basis on systems made up of a large number of ICT devices consolidated in a place like a data center, it is possible to perform administration tasks with significantly less people and time. As well as automating operations on ICT systems that have been performed manually until now, it is also possible to automate the process of checking the results of these operations.

The following example shows how work time can be reduced significantly by automating most of the tasks involved in applying operating system patches to 10 servers. In this example, Systemwalker Runbook Automation can also be used to check the results of applying the patches and collect evidence.



Systemwalker Runbook Automation makes it possible to speed up service delivery, by reducing the administrative costs of people and time.

Improving work quality

Automated Operation Processes can be executed from a Web browser through only a few operation steps. Also, detailed knowledge is no longer required because the operations can be performed without being aware of the target system. Automated Operation Processes that have already been created can be modified or corrected using a GUI in the development environment, allowing similar operations to be automated easily without any need for advanced programming skills.

By making it easier to automate work that has been done manually till now, human error can be eliminated and work quality can be improved.

Systemwalker Runbook Automation does not fully automate all work procedures into a kind of "black box". Instead, tasks can be automated in such a way as to allow for human confirmation and decisions at various critical points. This makes it possible to manage almost all operation tasks systematically, resulting in improvement in the quality of operation tasks.

Highly reliable work procedures

Highly reliable work procedures can be achieved by developing, accumulating and reusing work know-how (such as knowledge about how to investigate problems using various tools and operating system commands, and what kind of primary action to take) as workflows.

Work evidence management

Access logs and work logs for administration tasks can be stored automatically, and these logs can be used as evidence for administration tasks.

Also, the results and track record of operation tasks can be aggregated easily, which is useful for making improvements to the operation by reviewing tasks that fail often, and tasks that take a long time.

1.2 Overview of Systemwalker Runbook Automation Operations

This section presents an overview of operations automated using Systemwalker Runbook Automation by giving a few operation examples.

Operation examples

The following automated operation examples are explained below.

- Automating operations for tasks performed daily in a data center
- Automating operations for troubleshooting tasks performed when problems occur
- Automating operations that include tasks performed by people
- Automating operations for application release tasks

Actors

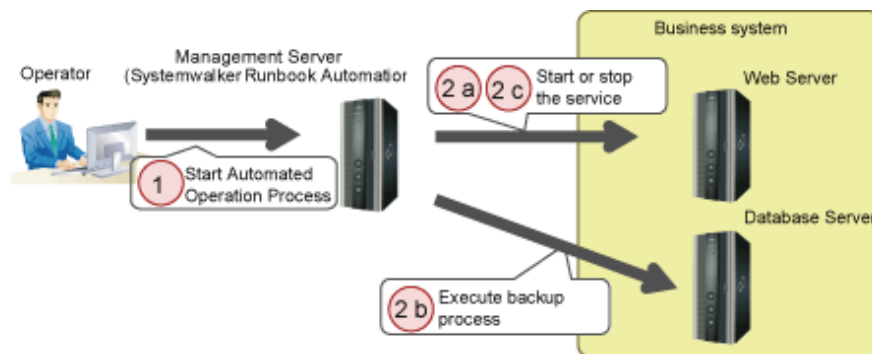
- Operator
Operators perform operations on business systems.
- Helpdesk
The helpdesk manages problems and investigates problems that operators cannot resolve on their own.
- Operation Administrator
System administrators manage operators. They check the results and status of work done by operators.

1.2.1 Automating Operations for Tasks Performed Daily in a Data Center

The following example shows how to automate data backup tasks for business systems.

Operation procedure:

1. An operator starts the Automated Operation Process for the backup task.
2. The following processing is executed automatically, and then the backup task completes.
 - a. Stop the web service for the business system to be backed up. If there are multiple web servers, stop the web service for each server.
 - b. Execute the backup command for the database server to back up the data to the specified location.
 - c. Restart the web services that were stopped in Step a.



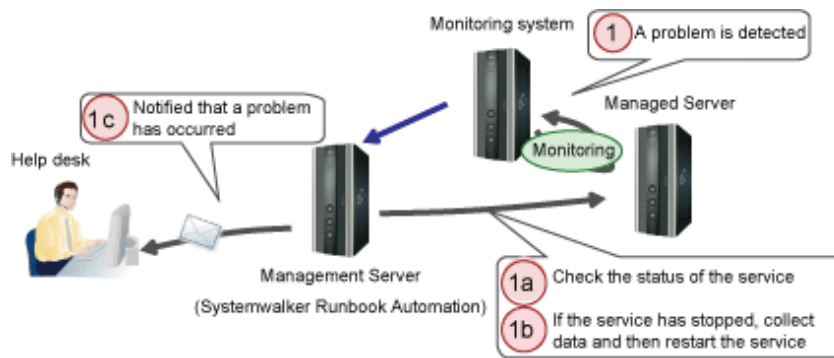
1.2.2 Automating Operations for Troubleshooting Tasks Performed when Problems Occur

The following example shows how to automate initial troubleshooting tasks that are triggered when a problem occurs with a business system.

Operation procedure:

1. When the monitoring software detects that a problem has occurred on a business system, the following troubleshooting processing is executed automatically.
 - a. Check the status of the service where the problem occurred.
 - b. If the service is not running, collect data for investigating the problem, and then start the service.

- c. Send an email to the helpdesk to inform them that a problem has occurred.

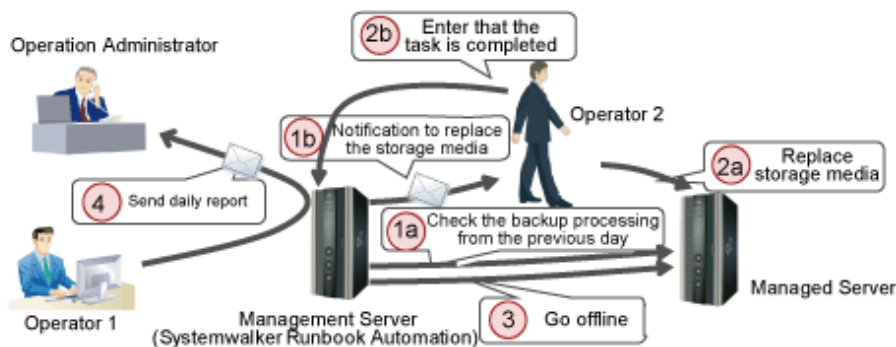


1.2.3 Automating Operations that Include Tasks Performed by People

In the following example, the task of manually replacing the storage media has been included in the task of backing up data for a business system.

Operation procedure:

1. The following processing is executed before the business service starts.
 - a. Check the results of the data backup processing that was performed by an automated operation after the business service stopped the day before.
 - b. If the backup processing completed normally, send an email to an operator asking him or her to replace the storage media.
2. The operator performs the following tasks:
 - a. Replaces the storage media.
 - b. Reports this action in a Systemwalker Runbook Automation window.
3. At business close time, the online stop processing for the business service is performed automatically.
4. The operator checks offline stop and sends a daily report to the Operation Administrator.



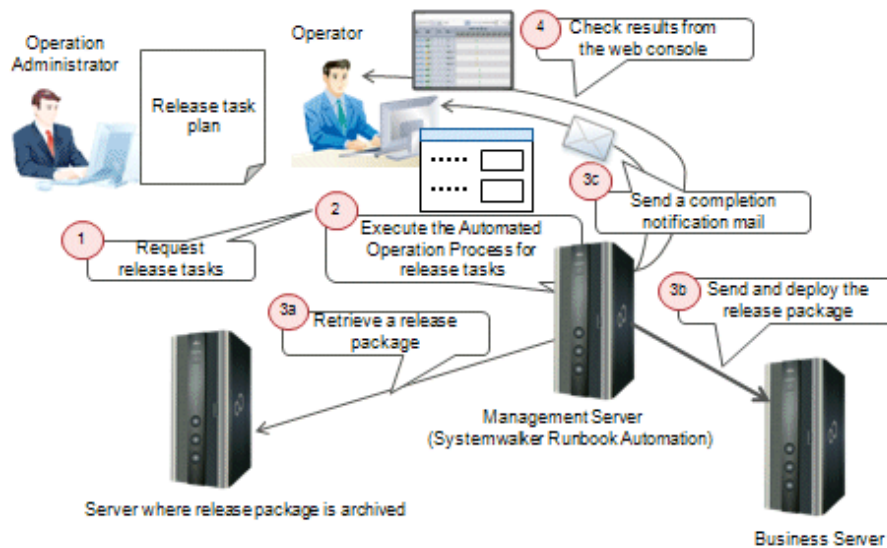
1.2.4 Automating Operations for Application Release Tasks

An example of the automation of an application release task is displayed below.

Operation procedure

1. The Operation Administrator sends a request to the operator based on the release task plan.
2. The operator starts the release task Automated Operation Process according to the release task plan.
3. The following processes are executed automatically, and the release tasks are performed.
 - a. The release package specified for the Automated Operation Process is retrieved.

- b. The release package retrieved in (a) is sent to the Business Server and then deployed.
 - c. When the release is completed, the release task process sends a termination notification email to the operator.
4. The operator checks the Automated Operation Process result from the Web console.



1.3 System Configuration

This section explains the system configuration for Systemwalker Runbook Automation.

The following are elements making up the Systemwalker Runbook Automation system.

Management Server

The machine in which the Manager for a Systemwalker Runbook Automation Management Server is installed. It is used to execute Automated Operation Processes that automate operation tasks, as well as to manage execution results.

The Management Server also manages information about the target servers (such as host names, IP addresses and administrator passwords) that is required to execute Automated Operation Processes. It manages this information as configuration information and executes Automated Operation Processes based on this information.

It is also possible to use the Web browser provided by the Management Server in order to check the execution status of Automated Operation Processes, or perform operations such as starting or stopping Automated Operation Processes.

It is recommended to have a dedicated server for the Management Server.

Business Server

Server on which operations are actually performed by executing Automated Operation Processes from the Management Server. All of the operation instructions from the Management Server are issued using standard communications protocols such as SSH, HTTP and HTTPS.

It is also possible to choose either with or without Agents according to operation.

Linked Server

Server in which a product linked to Systemwalker Runbook Automation is running, such as a Systemwalker Centric Manager Operation Management Server, which is required for this product to take action automatically when events occur on business systems.

Relay Server

Distribute the load of automatically collecting configuration information to the Systemwalker Runbook Automation Management Server. For large-scale systems, it is recommended to install Relay Servers under the Management Server - as a rough guide, Relay Servers are required when more than 300 Business Servers are managed.

Development Computer

Development environment in which Systemwalker Runbook Automation Studio is installed to create Automated Operation Processes. Note that Systemwalker Runbook Automation Studio can also be installed on the Management Server, Business Server, Linked Server, or Relay Server.

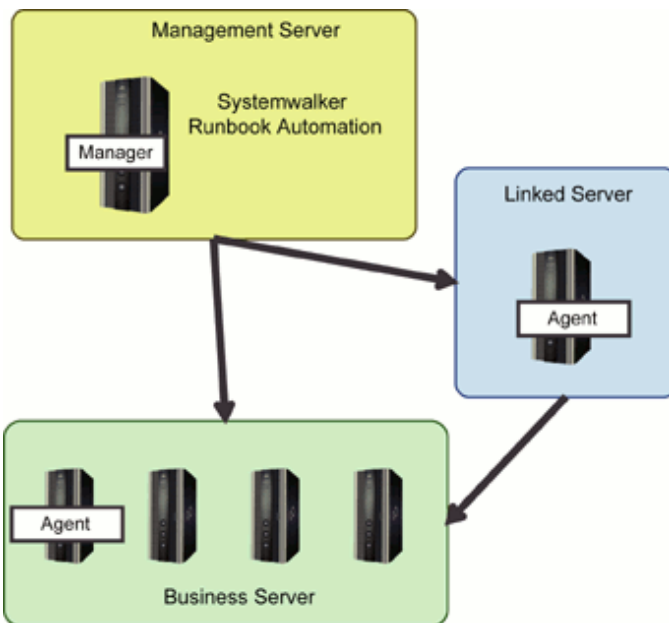
Operation tasks can be automated by registering on the Management Server the Automated Operation Processes that have been created on the Development Computer.

Web Console

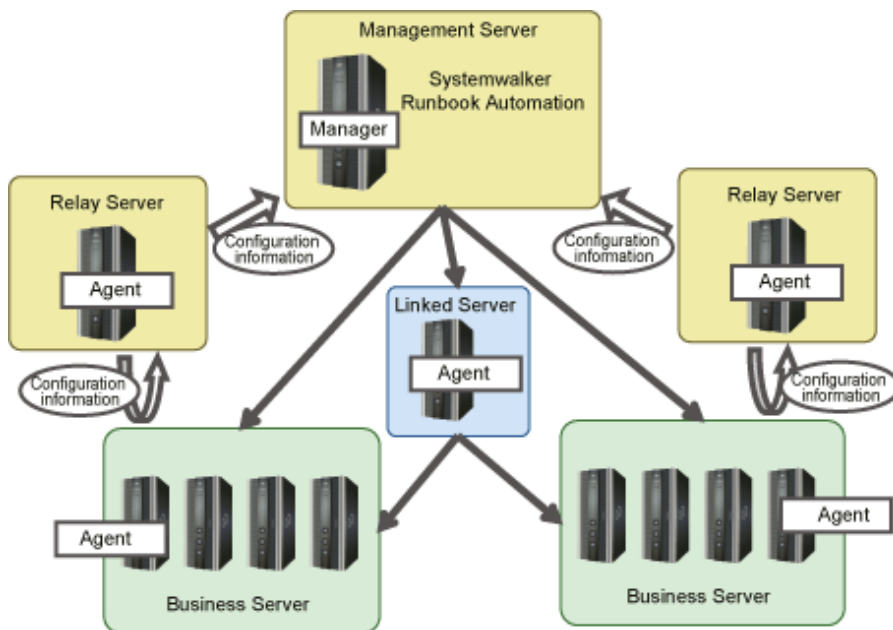
Web Console can execute and operate Automated Operation Processes and check operating conditions of Systemwalker Runbook Automation.

1.3.1 Basic system configuration

The basic system configuration is shown below.



If there are a large number of managed servers (Business Servers), then they can be divided into groups (according to subnets, for example) so that configuration information is collected for one group at a time. This will distribute the load of automatically collecting configuration information. Relay Servers can be installed to create a three-tier configuration (this is not necessary if configuration information is not collected automatically).

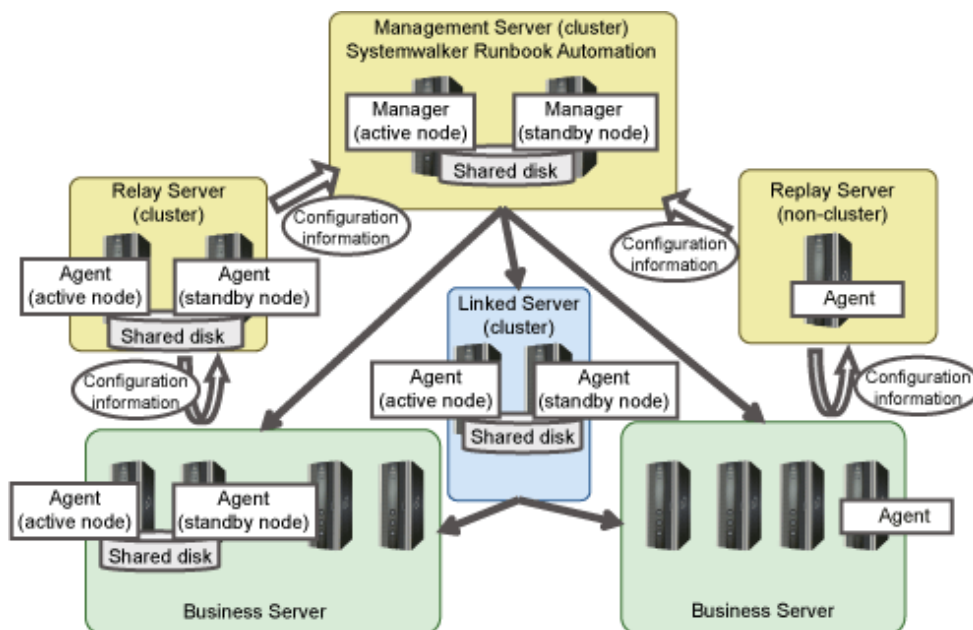


1.3.2 High-reliability system configuration

If the Management Server (where a Systemwalker Runbook Automation Manager runs) is configured as a cluster system, the Systemwalker Runbook Automation Manager can be operated as a high-reliability system with active and standby nodes. For Management Servers that manage ICT systems where important business applications are running, it is recommended that a cluster system be used to increase reliability in case a problem such as a hardware fault occurs.

If a cluster configuration is used for the Management Server, when a hardware fault occurs on the server where the Management Server is running, the other server in the cluster inherits the Management information so that business applications can continue running with minimum stoppage time.

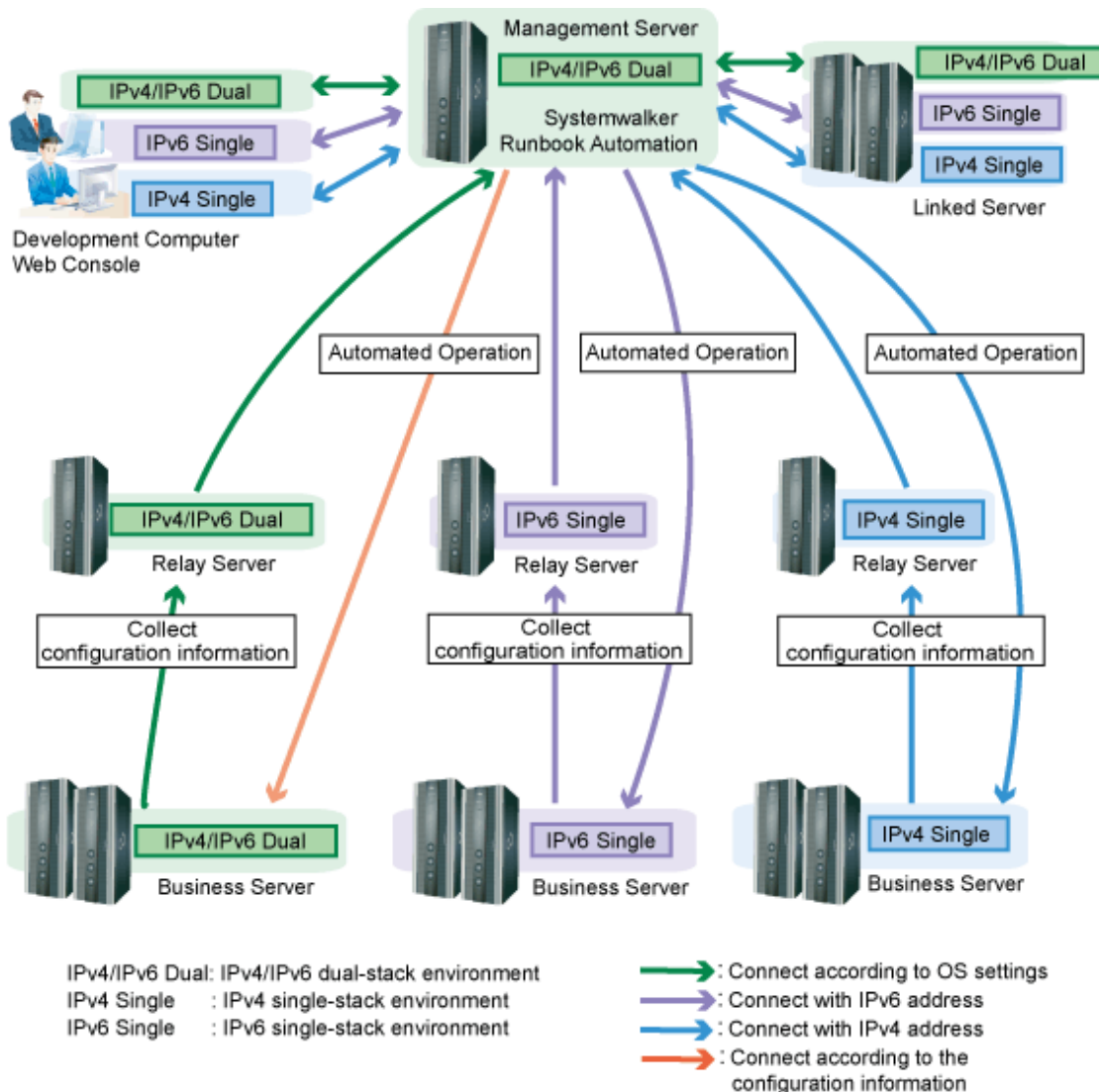
If the servers where Systemwalker Runbook Automation Agents are running (Business Servers, Linked Servers and Relay Servers) have cluster configurations, the Systemwalker Runbook Automation Agents themselves do not have cluster configurations with active and standby nodes.



1.3.3 System configuration that includes mixed IPv4/IPv6 environments

For its communications environment, Systemwalker Runbook Automation can operate in IPv4 and IPv6, as well as mixed IPv4 and IPv6 environments.

The following diagram shows the connections in a mixed environment system configuration.



Environments in which Systemwalker Runbook Automation can operate

Systemwalker Runbook Automation can operate in the following environments:

- IPv4 single-stack environment
- IPv6 single-stack environment
- IPv4/IPv6 dual-stack environment

Note that IPv6 single-stack environments are not supported by the Management Server. If you use Systemwalker Runbook Automation in an IPv6 environment, operate a Management Server in an IPv4/IPv6 dual-stack environment.

IPv4/IPv6 address selection

In an IPv4/IPv6 dual-stack environment, Systemwalker Runbook Automation determines the address to be used according to the settings of the operating system.

However, when the collected configuration information is to be used, Systemwalker Runbook Automation determines the address to be used according to the settings of definition file as a priority (By default, priority is given to used IPv4 addresses).

IPv6 addresses that can be used

The following addresses can be used in Systemwalker Runbook Automation:

- Global unicast addresses
- Unique local unicast addresses

1.3.4 Installation configuration of Agents

Information on the installation configuration of Agents for Managed Servers is provided below.

Linked Server/Relay Server

Agents can be automatically installed by the Systemwalker Runbook Automation installer.

Business Server

There are two installation configurations: with Agents and without Agents. The configuration selected will depend on the operational requirements.

In any case, you can do the same thing for controlling servers and operating system.

For Business Servers, the difference between the with Agents configuration and the without Agents configuration is shown below.

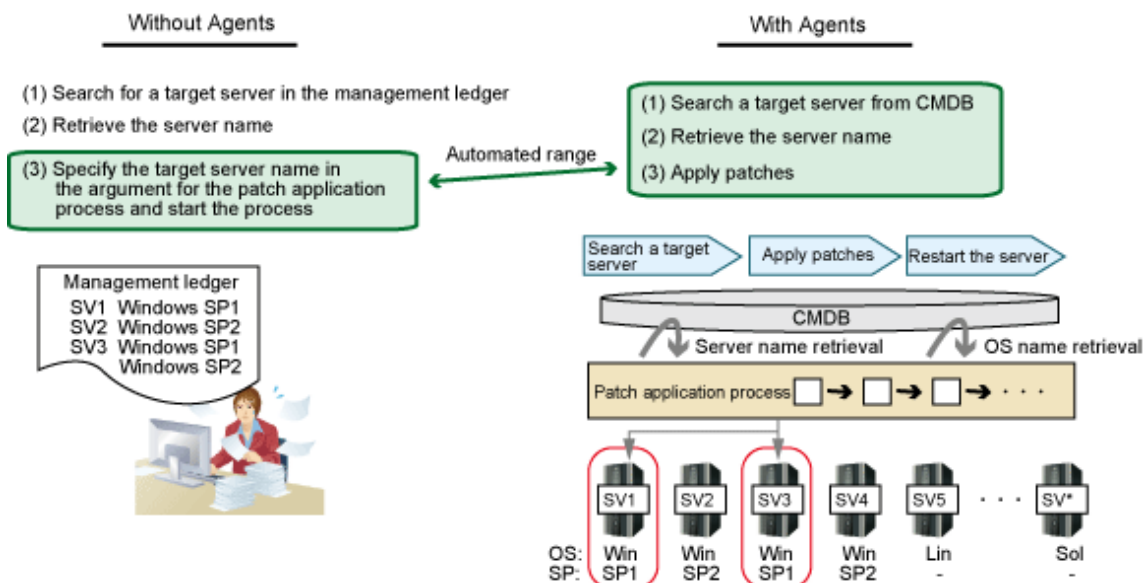
- There are differences in the information stored in the Configuration Management Database (CMDB).

	IP address	Host name	OS name LAN information	Logical server information	Installed software information	Hardware information (*1)
With Agents	Yes	Yes	Yes	Yes	Yes	Yes
Without Agents	Yes	Yes	Yes	No	No	No

*1: ServerView Agent is required.

In the case of the with Agents configuration, the range of operations that can be automated will increase because more information can be automatically collected in the CMDB.

For example, if a patch was to be applied to a server with a particular operating system out of a group of multiple servers, the range of operations that could be automated in both configurations would be different as shown below.



- There are differences in the available communication methods between the Management Server and the Business Server.
- If a file transfer infrastructure is used as a communication method, Agents are required.
- If the without Agents configuration is used, the SSH communication method will be used.
- The communication method requirements should be considered when determining whether or not to use Agents.

1.4 Basic Elements Associated with Operations

This section explains the following basic elements associated with operating Systemwalker Runbook Automation.

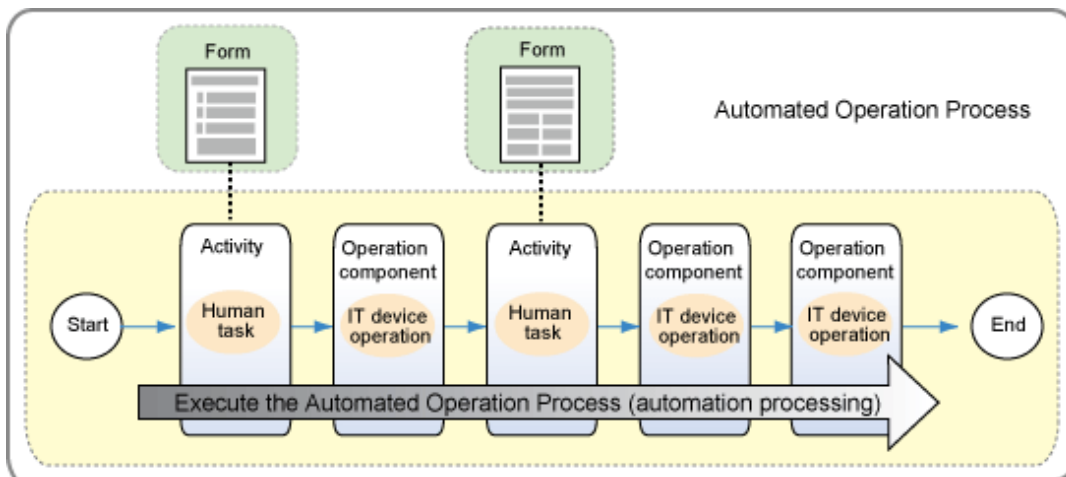
- Automated Operation Processes
- Users

1.4.1 Automated Operation Processes

This section explains Automated Operation Processes required to automate operations using Systemwalker Runbook Automation.

What is an Automated Operation Process?

An Automated Operation Process consists of Process Definitions (which define tasks performed by people and operations performed on ICT devices as a sequence of task procedures) and forms (for performing the data entry and confirmation tasks associated with the Process Definitions, and which are displayed in a Web Console).



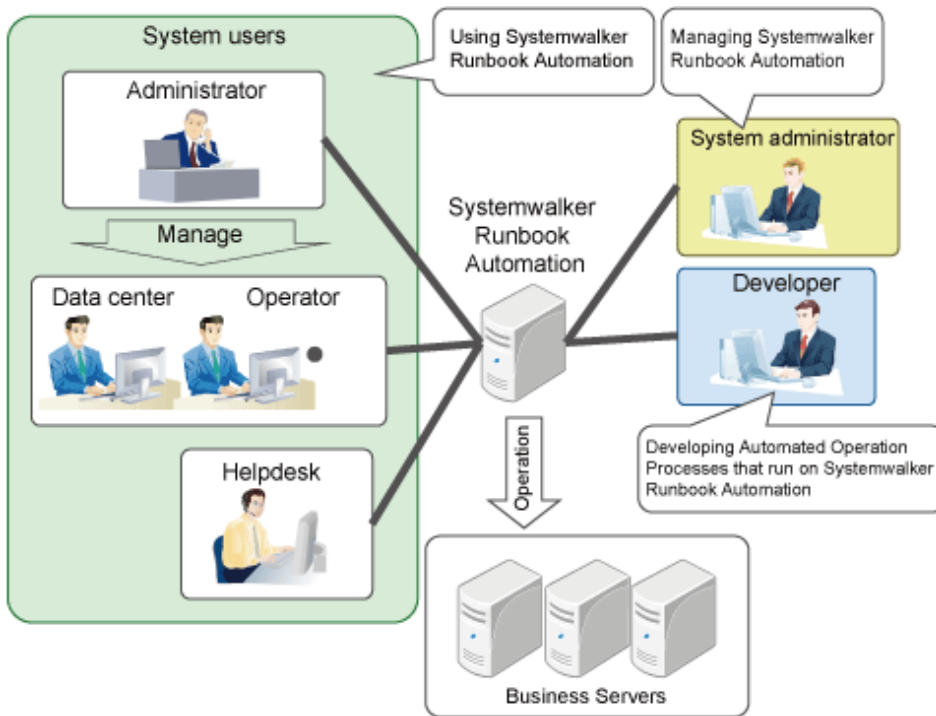
What is an Automated Operation Process Group?

Automated Operation Process Groups are units of management for Automated Operation Processes on the Management Server. Each Automated Operation Process must belong to one Automated Operation Process Group.

With Systemwalker Runbook Automation, Automated Operation Process Groups are the basic units for managing operations, and when Automated Operation Processes are registered on the Management Server or displayed in the Web Console, operations are performed on individual Automated Operation Process Groups rather than on individual Automated Operation Processes.

1.4.2 Users

This section explains Systemwalker Runbook Automation users.



System users

- Operators
Systemwalker Runbook Automation users that manage system operations as a team.
- Administrators
Systemwalker Runbook Automation users that manage operators and check the results and status of their work.
- Helpdesk
Systemwalker Runbook Automation users that determine and implement measures to address problems that operators cannot solve on their own.

System administrators

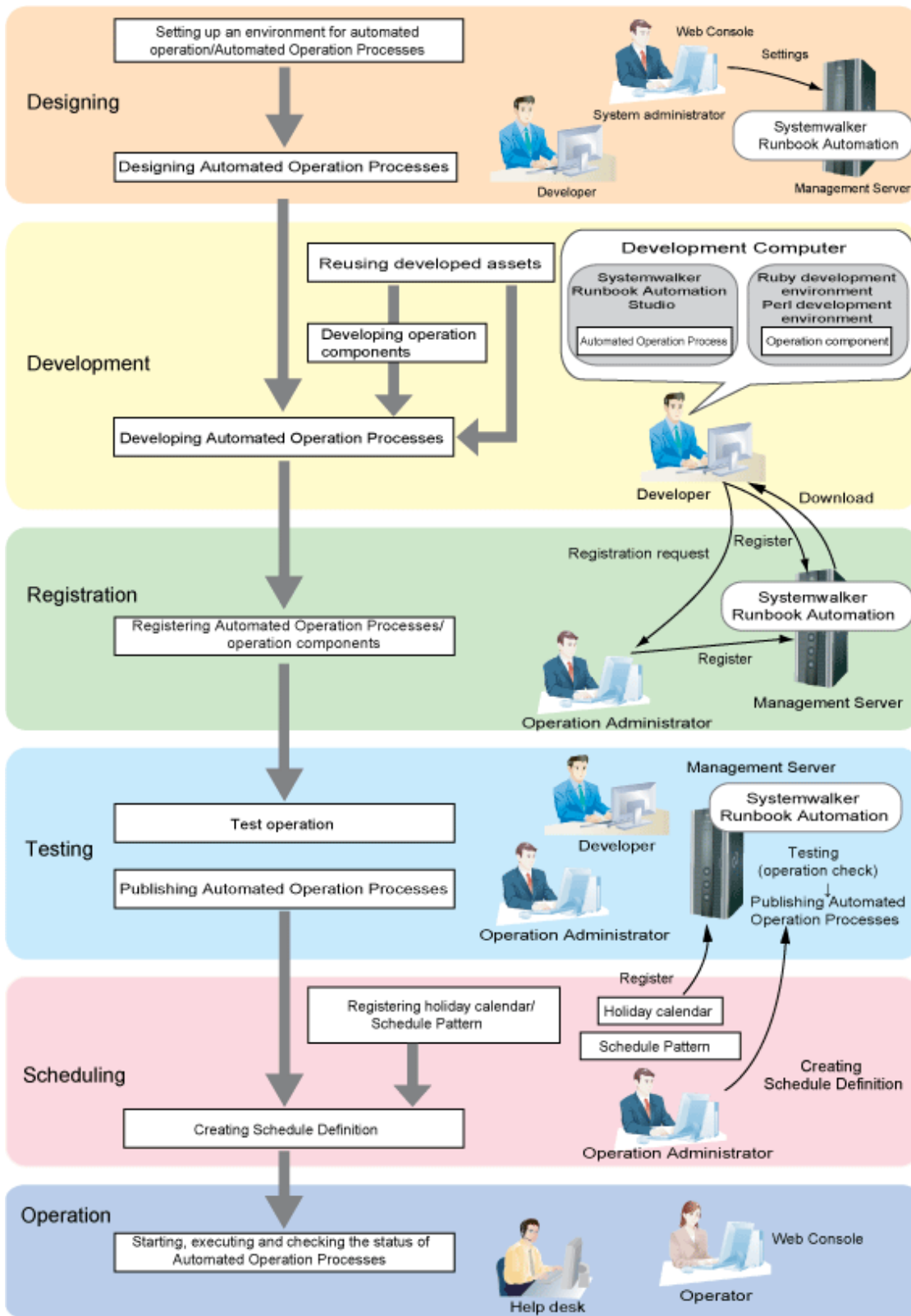
Systemwalker Runbook Automation administrators, responsible for making environment settings, such as registering accounts, as part of the preparation to use Automated Operation Processes.

Developers

Develop and test Automated Operation Processes that run on Systemwalker Runbook Automation and register them on the Systemwalker Runbook Automation Management Server.

1.5 Overall Procedure

The following figure shows the overall procedure, from designing Automated Operation Processes through to operating them.



Designing

Design tasks involve system administrators making environment settings for automated operations and Automated Operation Processes.

The developer analyzes the current operation procedure, decides which operations to automate using Systemwalker Runbook Automation, and designs Automated Operation Processes.

Development

The developer uses Systemwalker Runbook Automation Studio on a Development Computer to create definitions for Automated Operation Processes. Automated Operation Processes can also be created by reusing existing Automated Operation Processes or by using the templates that come with the product.

If necessary, develop operation components by using a text editor or an external Perl or Ruby development environment.

These tasks are performed by developers.

Registration

Registration tasks involve either an administrator or a developer registering the Automated Operation Processes or operation components that have been developed on the Management Server.

Testing

Testing tasks involve performing test operations for the Automated Operation Processes that have been created, and checking their behavior.

These tasks are performed by developers.

Once it has been confirmed that there are no problems with the test operations, the administrator publishes the Automated Operation Process so that it can be used by system users.

Scheduling

To start an Automated Operation Process on a pre-determined date or at a pre-determined time, set the Schedule Definition for the Automated Operation Process.

The Operation Administrator or operator configures the Schedule Definition settings.

Note that, to execute the Schedule Definition, the Schedule Definition settings can be configured easily using the following two definition types:

- Holiday Calendar

Holidays can be set. The holiday calendar is registered for the system, and can be used commonly from all Schedule Definitions.

The holiday calendar is registered by the Operation Administrator.

- Schedule Pattern

The date and time on which the Automated Operation Process will be started can be registered as a pattern. The Schedule Pattern is registered for a system or an Automated Operation Process Group.

The Schedule Pattern is registered by the Operation Administrator.

Operation

Operation tasks involve operators executing Automated Operation Processes.

The Web Console provided by the Management Server can be used to check the status of the Automated Operation Processes that have been executed, and to check task results.

Chapter 2 What can be Done with Systemwalker Runbook Automation

This chapter explains what can be done with Systemwalker Runbook Automation.

2.1 Executing Automated Operation Processes

With Systemwalker Runbook Automation, combinations of human tasks (such as checking and making decisions) and ICT system operations (such as commands and management tools) can be executed as workflows.

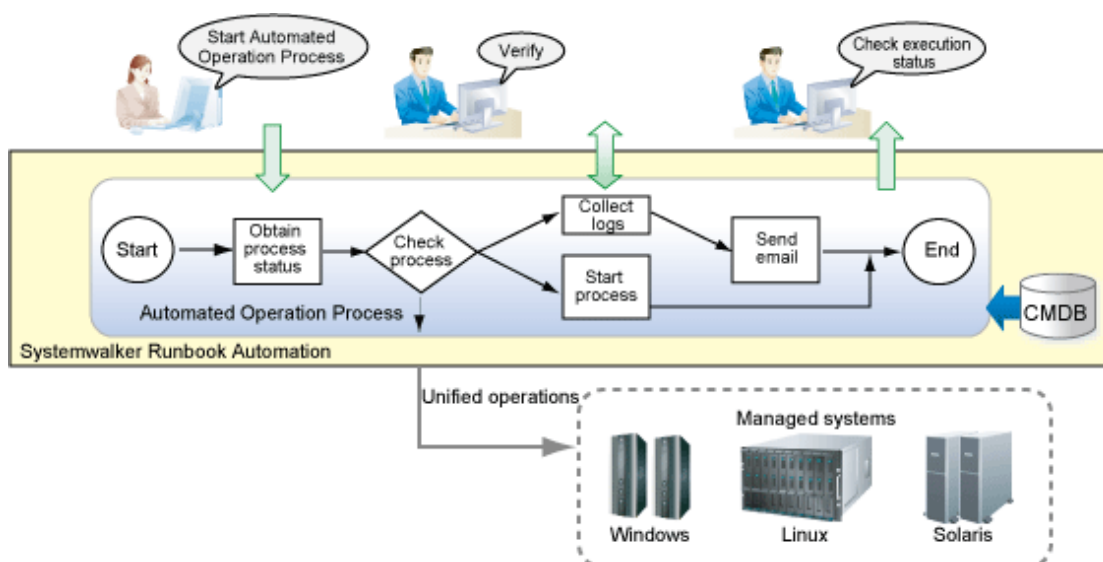
Operation tasks are processed automatically according to the definitions in Automated Operation Processes.

2.1.1 Starting Automated Operation Processes

Automated Operation Processes are executed on the Management Server.

In addition to being started according to a schedule, or manually, Automated Operation Processes can also be started automatically when a monitored event (such as an error with a Business Server) occurs.

Automated Operation Processes can be executed without having to be aware of system differences, because the operations that are performed absorb platform differences and system configuration differences by obtaining configuration information from the CMDB.

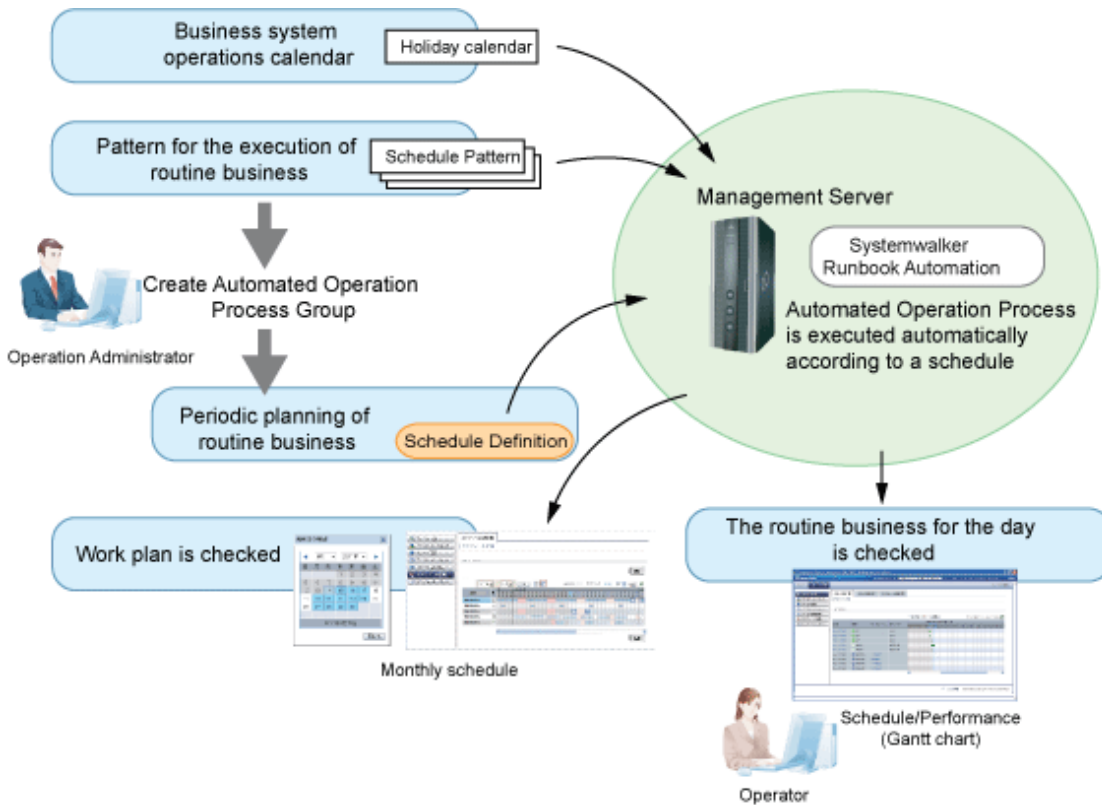


2.1.2 Starting Automated Operation Process Schedules

The Automated Operation Process can be executed automatically according to a pre-determined date and time.

When starting Automated Operation Processes according to a schedule, a holiday calendar, in which weekday and holiday operations are separated, and the startup day pattern, can be created and then used in order to create the Schedule Definition.

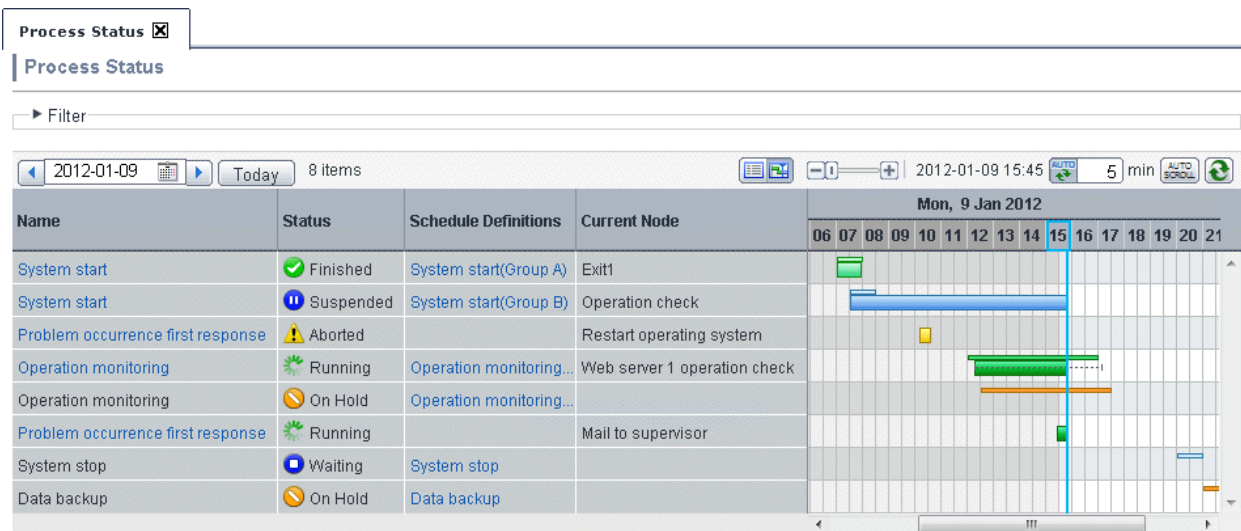
Additionally, since Automated Operation Process start schedules and performance can be monitored using a Gantt chart, task omissions and confirmation errors can be prevented and operations tasks can become more efficient.



2.1.3 Checking Automated Operation Processes

Note that the execution status and execution results of Automated Operation Processes can be checked using the Web console provided by the Management Server. It is also possible to perform operations such as starting, pausing, restarting, and canceling Automated Operation Processes from the Web console.

Additionally, Automated Operation Process performance can be monitored using a Gantt chart. In the Gantt chart, the current execution status is displayed using color coding along with the Automated Operation Process start schedule.



2.1.4 Output of Audit Log

A record of the operations for an Automated Operation Process can be output to the audit log file.

The audit log is output by executing the get audit information command. The audit log can be checked to determine "who" has executed "what type" of operation, and "when".

The audit log is output to the location that was specified on the Systemwalker Runbook Automation Management Server.

Refer to the *Systemwalker Runbook Automation Reference Guide* for information on the get audit information command and the audit log file.

2.2 Developing Automated Operation Processes

Systemwalker Runbook Automation provides Systemwalker Runbook Automation Studio (hereafter referred to as "Studio") as an environment for using a GUI to develop Automated Operation Processes, which define the procedures for automating operation tasks.

Developers use Studio to create, edit, debug and manage Automated Operation Processes.

The following methods can be used to develop Automated Operation Processes.

- Using an Automated Operation Process template

Standard templates are provided by Studio Note that additional templates may be provided from time to time. Contact Fujitsu technical support to obtain such templates.

Automated Operation Processes can be created by customizing the templates provided.

- Creating new Automated Operation Processes based on an existing one

If there are Automated Operation Processes already operating, new ones can be created by changing the existing ones.

- Creating new Automated Operation Processes from scratch

If it is not possible to create the required Automated Operation Process based on a template or an existing one, then create a new one from scratch.

Note that further steps are required to actually use the Automated Operation Process once it has been created - it must be exported to and registered on the Management Server and then published. The registration and publication tasks are performed by either an administrator or a developer.

2.2.1 Creating Automated Operation Processes

As part of developing an Automated Operation Process, it is necessary to create Automated Operation Processes that define the procedures for the operation tasks.

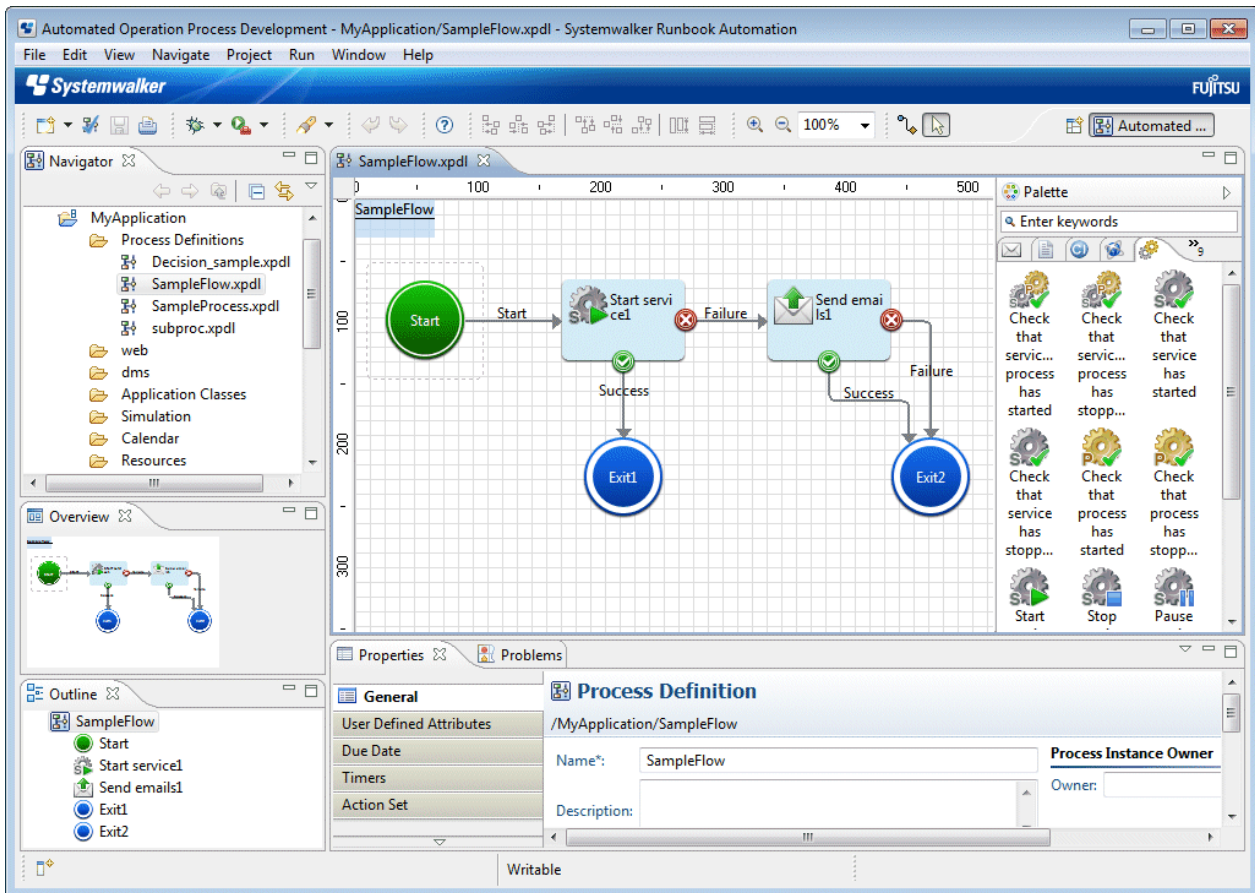
When creating Automated Operation Processes that involve human intervention, also create the forms (windows) that will be used to enter data and check results.

Defining Automated Operation Processes

Automated Operation Processes are defined using Studio.

They can be easily defined by selecting something necessary from activities displayed on pallet and Automated Operation Processes and arranging them. Associations can be established between these activities and Automated Operation Processes using arrows to indicate processing order and so on, and I/O information can be specified.

The following figure shows a screenshot of Studio.



Standard activities and operation components that can be used by operation automation processes are provided by Systemwalker Runbook Automation. If necessary, new activities and operation components can be developed from scratch or can be created by customizing existing activities and operation components.

Creating forms

The forms (windows) used to create Automated Operation Processes that involve human intervention (such as forms for entering data or forms for checking execution results) can be created by using QuickForm from Studio. There are two types of forms:

- Input forms (windows)

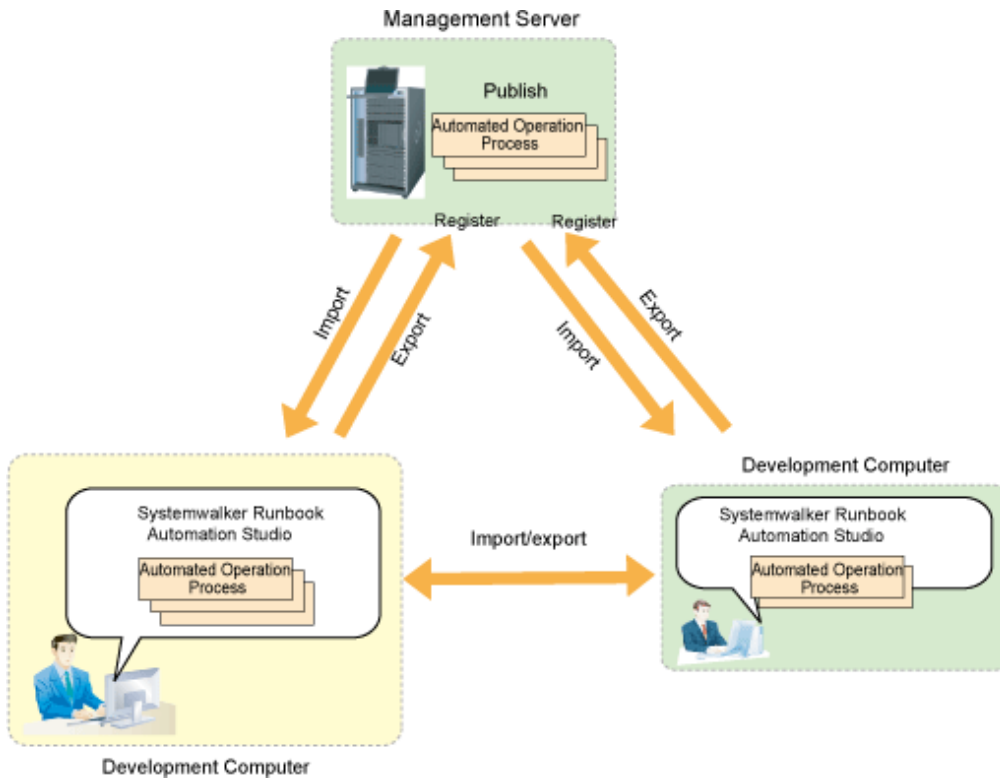
Allow users to input information for Automated Operation Processes. They are displayed when the Automated Operation Process starts.

- Confirmation forms (windows)

Allow users to check the progress or execution results of an Automated Operation Process. The Automated Operation Process defines when the confirmation form should be displayed. When a confirmation form is displayed, the Automated Operation Process stops until the user performs a confirmation operation in the confirmation form. Once a confirmation operation has been performed, processing continues.

2.2.2 Importing and Exporting Automated Operation Processes

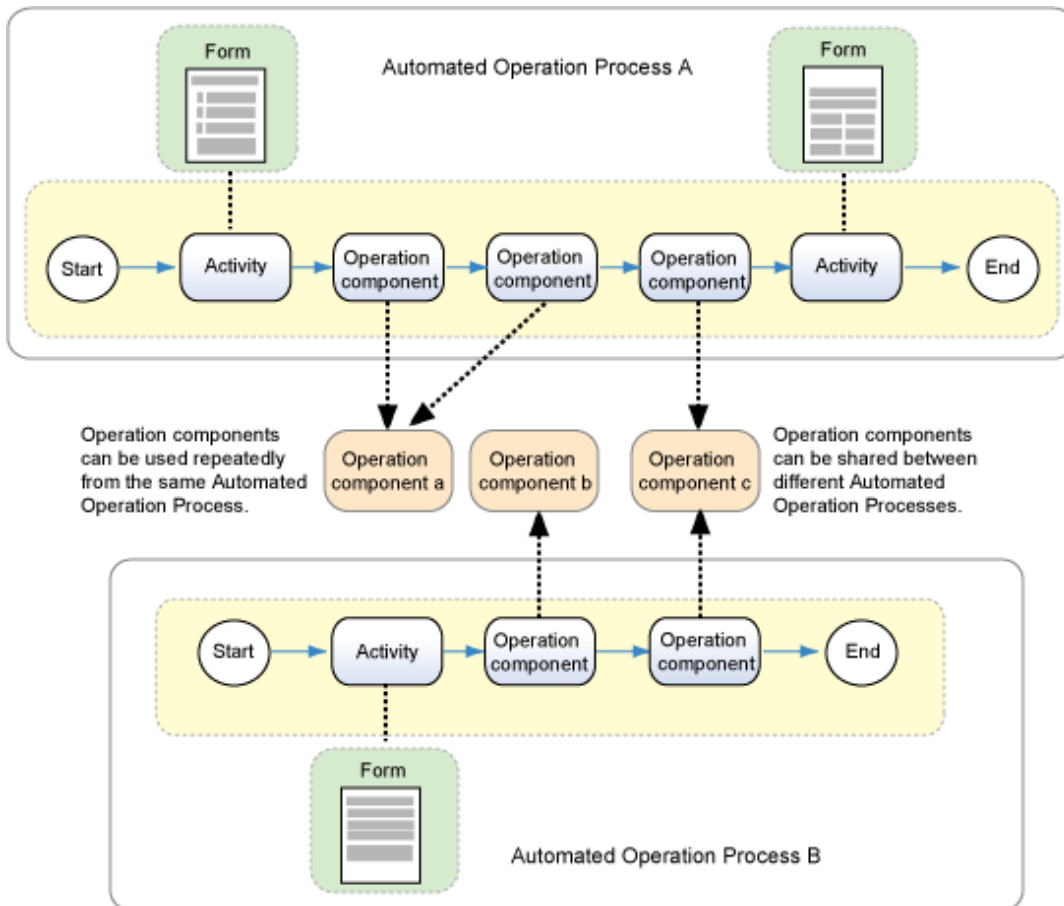
When developing an Automated Operation Process, it is also possible to import Automated Operation Processes that have been published by the Management Server, or existing Automated Operation Processes that have been exported from another development environment. Reusing existing Automated Operation Processes to create new ones reduces the development workload.



2.3 Developing Operation Components

Operation components are the Ruby or Perl script that are called from operation activities in Automated Operation Processes, in order to automate operations on ICT systems. Operation components issue instructions to servers and linked products, automating tasks that were previously performed manually, such as checking whether a service has started, or monitoring a process.

Operation components absorb differences between systems (such as platform differences) by obtaining configuration information from the CMDB. This means that operation components can be used without having to be aware of system differences, making them easy to use even without detailed knowledge about system management tools and operating system commands. Operation components can be used repeatedly from the same Automated Operation Process, or shared between different Automated Operation Processes.



If the standard operation components provided by Systemwalker Runbook Automation do not meet the requirements, Systemwalker Runbook Automation can be used to create the required operation components.

You can call the Ruby library that is provided as standard in Systemwalker Runbook Automation, and you can also reuse the library to create the operation component.

Refer to the *Systemwalker Runbook Automation Reference Guide* for information on the Ruby library.

Custom operation components that have been developed can be used in the same way as the standard operation components provided by Systemwalker Runbook Automation.

Note that further steps are required to actually use the operation component once it has been created. After it has been created, the operation component must be exported from the Development Computer and then registered on the Management Server using the Web console. The registration task is performed by either an administrator or a developer.

2.3.1 Creating Operation Components

Operation components can be created using the Ruby and Perl scripting languages.

To develop operation components, use an external development environment.

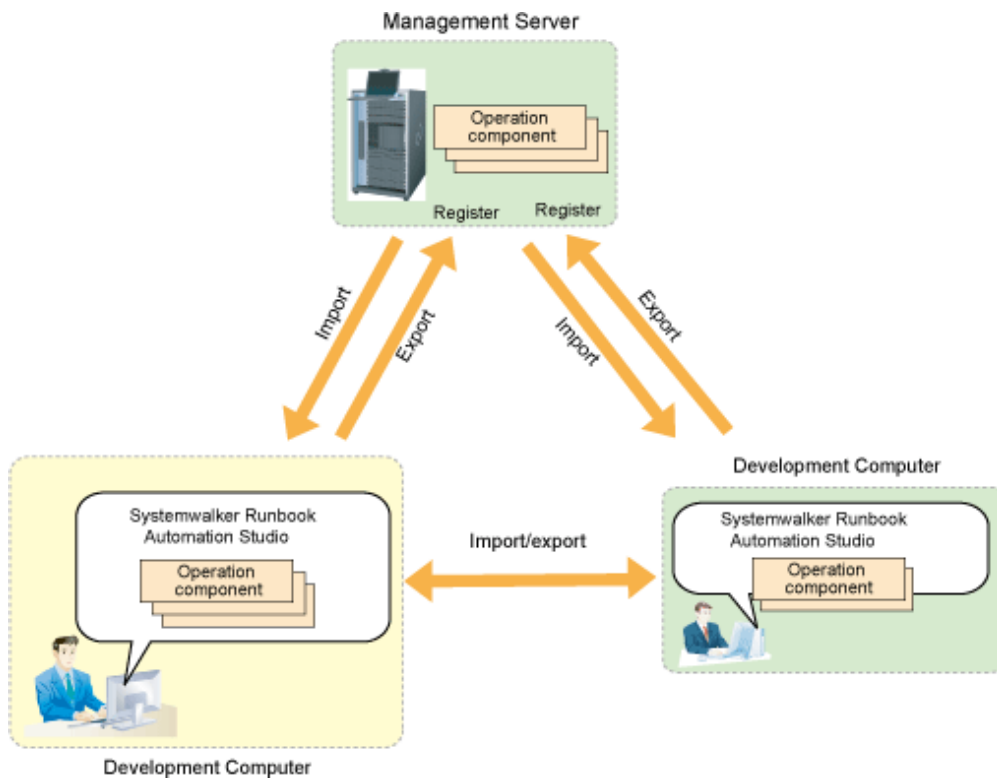
Creating operation components using an external development environment

Operation components can be created by using a text editor or an external Ruby or Perl development environment.

Operation components that have been created can be used by importing them into Systemwalker Runbook Automation.

2.3.2 Importing and Exporting Operation Components

When developing operation components, existing operation components that have been exported from another development environment can be imported in the same way as for Automated Operation Processes. Reusing existing operation components to create new ones reduces the development workload.



2.4 Using the Virtual System Template Management Function to Build the Systemwalker Runbook Automation Environment

Systemwalker Runbook Automation supports the template management function for virtual systems provided by Systemwalker Software Configuration Manager.

When servers need to be added because business has expanded or more servers are needed for the development environment, they can be quickly created by using server environment templates for Systemwalker Runbook Automation that have been created in advance.

For details on how to create and operate templates, refer to the Systemwalker Software Configuration Manager manuals.

Note that templates cannot be created for the Management Server.

- Creating templates for the Relay Server

New Relay Servers can be created quickly when required.

When Relay Servers are created from templates, the following parameters can be changed. By changing these parameters, new Relay Servers can be created for any Management Server even in environments with multiple Management Servers.

- Host name or IP address of the Management Server
- Port number of the Management Server

- Creating templates for the Linked Server

New Linked Servers can be created quickly in response to business requirements.

When Linked Servers are created from templates, the following parameters can be changed. By changing these parameters, new Linked Servers can be created for any Management Server even in environments with multiple Management Servers.

- Host name or IP address of the Management Server
- Port number of the Management Server

- Creating templates for the Business Server

Even when new Business Servers need to be added to a business operation, operations can be automated rapidly using a Management Server without having to install Systemwalker Runbook Automation.

Because Business Servers do not hold information about the Management Server, operations can also be automated from the Management Server in the development execution environment.

Chapter 3 Operating Environment

3.1 Hardware Environment

3.1.1 Recommended Hardware Resources

Management Servers

Type of hardware	Recommend specification
CPU	Intel(R) Xeon(R) 3GHz or higher
Number of CPUs	2 or more
Memory	4 GB or more (*1)

*1:

The required memory can be calculated using the formula below:

$$Z = x + y$$

Z: Memory required

x: Memory required during Systemwalker Runbook Automation startup = 3000 MB

y: Memory required to execute Automated Operation Processes (for details, refer to "[Appendix B Memory Estimation](#)")

Linked Servers/Relay Servers/Business Servers

Type of hardware	Recommend specification
CPU	Intel(R) Pentium 4 equivalent or higher
Memory	2 GB or more (*1)

*1:

The memory required by Systemwalker Runbook Automation is 400 MB

Using the operation component to direct the operation to each server

If the operation component is used to perform Business Server, Linked Server, or Relay Server operations with IPMI, the target server must support the following specification:

- IPMI V2.0

Development Computers

Type of hardware	Recommend specification
CPU	1 GHz or higher
Memory	512 MB or more

Web consoles

Type of hardware	Recommend specification
CPU	1 GHz or higher
Memory	1 GB or more

3.1.2 Disk Capacity

Management Servers

Static disk space

[Windows]

Product name	Disk space required for installation
Systemwalker Runbook Automation	Installation directory: 2.7 GB

Note: In addition, the following is required to manage and uninstall the software:

- %SYSTEMDRIVE%\FujitsuF4CR: 150 MB

[Linux]

Product name	Disk space required for installation
Systemwalker Runbook Automation	/opt 2.2 GB /var/opt 70 MB /etc/opt 200 MB

Note: In addition, the following is required to manage and uninstall the software:

- /opt: 150 MB

Dynamic disk space

Database areas for managing Automated Operation Processes

The database area for managing Automated Operation Processes is required to operate Systemwalker Runbook Automation.

Allocate a database area large enough for the environment to be created.

The formula below can be used to provide an estimate:

Database approximate size = 1.5 MB x Number of Automated Operation Processes (*1)

*1: Includes Automated Operation Processes retained (not deleted) after execution

For a better estimate use "tool\Estimate_RBADB.xls" in the Systemwalker Runbook Automation Media Pack (V15.1.2).

[Windows]



- For the properties of the drive where the database area is created, do not specify **Compress drive to save disk space**.

If the drive is compressed, more performance overhead will occur than for normal I/O processing. This is because access errors occur due to insufficient operating system resources, depending on the I/O load.

- Do not select either of the check boxes in the **Compress** or **Encrypt attributes** section in the **Advanced Attributes** dialog box for the folder where the database area is created (the **Advanced Attributes** dialog box can be displayed by clicking the **Advanced** button in the **General** tab of the **Properties** window for the folder).

If the folder is compressed, more performance overhead will occur than for normal I/O processing in the same way as when the drive is compressed. This is because access errors occur due to insufficient operating system resources, depending on the I/O load.

Similarly, if the folder is encrypted, the user that controls the database area will not be the same as the user used with Systemwalker Runbook Automation, and so it will not be possible to decrypt the data and an access error will occur.

Storage directory for operation components (Storage directory for inherited files)

An area for the operation component storage directory must be added to the estimate of the required disk capacity.

With cluster operations, this directory is allocated to the shared disk as the storage directory for inherited files. If cluster operations are not used, this directory will be the installation directory for the product.

Area name	Required size (MB)
Storage directory for operation components	100 MB

Database area for the CMDB Manager

The size of the database area for the CMDB Manager depends on the number of managed Business Servers. A rough estimate of the space required for the database area for the CMDB Manager can be obtained using the following list:

Number of Business Servers	Total amount of memory	Total amount of disk space used
100	1.2 GB	0.6 GB
200	1.6 GB	1.1 GB
500	2.6 GB	2.3 GB
1,000	3.6 GB	4.4 GB

Linked Servers/Relay Servers

Static disk space

[Windows]

Product name	Disk space required for installation
Systemwalker Runbook Automation	Installation directory: 565 MB

Note: In addition, the following is required to manage and uninstall the software:

- %SYSTEMDRIVE%\FujitsuF4CR: 150 MB

[Linux]

Product name	Disk space required for installation
Systemwalker Runbook Automation	/opt 350 MB /var/opt/ 50 MB /etc/opt/ 50 MB

Note: In addition, the following is required to manage and uninstall the software:

- /opt: 150MB

Business Servers

Static disk capacity

[Windows]

Product name	Disk space required for installation
Systemwalker Runbook Automation	Installation directory: 130 MB

Note: In addition, the following is required to manage and uninstall the software:

- %SYSTEMDRIVE%\FujitsuF4CR: 150MB

[Linux]

Product name	Disk space required for installation
Systemwalker Runbook Automation	/opt 70 MB /var/opt/ 8 MB /etc/opt/ 6 MB

Note: In addition, the following is required to manage and uninstall the software:

- /opt: 150MB

[Solaris]

Product name	Disk space required for installation
Systemwalker Runbook Automation	Program files directory (default: /opt) 70 MB Working files directory (default: /var/opt) 8 MB Configuration files directory (default: /etc/opt) 6 MB

Note: In addition, the following is required to manage and uninstall the software:

- /opt: 150 MB

Development Computers

Static disk space

Product name	Disk space required for installation
Systemwalker Runbook Automation Studio	1020 MB

Note: In addition to the above, the following disk space will be required in order to uninstall and manage the software:

- %SYSTEMDRIVE%\FujitsuF4CR: 150MByte

Web consoles

Static disk space

Refer to "Web console" under "[3.2.2 Required Software](#)", and make sure that there is sufficient disk space to run the software listed there.

3.2 Software Environment

3.2.1 Operating Systems

Management Servers

[Windows]

Operating system	Remarks (service pack)
Microsoft(R) Windows Server(R) 2012 Standard (x64) (*1)	
Microsoft(R) Windows Server(R) 2012 Datacenter (x64) (*1)	
Microsoft(R) Windows(R) Small Business Server 2011 Essentials (*1)	
Microsoft(R) Windows Server(R) 2008 R2 Standard (x64) (*1)	SP none/1

Operating system	Remarks (service pack)
Microsoft(R) Windows Server(R) 2008 R2 Enterprise (x64) (*1)	SP none/1
Microsoft(R) Windows Server(R) 2008 R2 Datacenter (x64) (*1)	SP none/1
Microsoft(R) Windows Server(R) 2008 Standard (x86)	SP none/2
Microsoft(R) Windows Server(R) 2008 Enterprise (x86)	SP none/2
Microsoft(R) Windows Server(R) 2008 Standard (x64) (*1)	SP none/2
Microsoft(R) Windows Server(R) 2008 Enterprise (x64) (*1)	SP none/2
Microsoft(R) Windows Server(R) 2008 Datacenter (x64) (*1)	SP none/2
Microsoft(R) Windows Server(R) 2008 Datacenter without Hyper-V (x64) (*1)	
Microsoft(R) Windows Server(R) 2003 R2, Standard Edition (*2)	SP2
Microsoft(R) Windows Server(R) 2003 R2, Enterprise Edition (*2)	SP2
Microsoft(R) Windows Server(R) 2003 R2, Standard x64 Edition (*1) (*2)	SP2
Microsoft(R) Windows Server(R) 2003 R2, Enterprise x64 Edition (*1) (*2)	SP2

SP: Service Pack

*1:

Systemwalker Runbook Automation runs as a 32-bit application on the WOW64 subsystem (Windows 32-bit On Windows 64-bit).

*2:

It is available in only IPv4 single stack environment.

It is not available in IPv6 single stack and IPv4/IPv6 dual stack environment, including the case of operating with IPv4.

[Linux]

Operating system	Remarks (service pack)
Red Hat Enterprise Linux 5 (for x86)	
Red Hat Enterprise Linux 5 (for Intel64) (*1)	
Red Hat Enterprise Linux 6 (for x86)	
Red Hat Enterprise Linux 6 (for Intel64) (*1)	

*1:

Systemwalker Runbook Automation runs in 32-bit compatibility mode.

Linked Servers/Relay Servers/Business Servers

[Windows]

Operating system	Remarks (service pack)
Microsoft(R) Windows Server(R) 2012 Standard (x64) (*1)	
Microsoft(R) Windows Server(R) 2012 Datacenter (x64) (*1)	
Microsoft(R) Windows(R) Small Business Server 2011 Essentials	
Microsoft(R) Windows Server(R) 2008 R2 Standard (x64)	SP none/1
Microsoft(R) Windows Server(R) 2008 R2 Enterprise (x64)	SP none/1
Microsoft(R) Windows Server(R) 2008 R2 Datacenter (x64)	SP none/1

Operating system	Remarks (service pack)
Microsoft(R) Windows Server(R) 2008 Standard (x86)	SP none/2
Microsoft(R) Windows Server(R) 2008 Enterprise (x86)	SP none/2
Microsoft(R) Windows Server(R) 2008 Standard without Hyper-V(TM) (x86)	SP none/2
Microsoft(R) Windows Server(R) 2008 Enterprise without Hyper-V(TM) (x86)	SP none/2
Microsoft(R) Windows Server(R) 2008 Standard (x64)	SP none/2
Microsoft(R) Windows Server(R) 2008 Enterprise (x64)	SP none/2
Microsoft(R) Windows Server(R) 2008 Datacenter (x64)	SP none/2
Microsoft(R) Windows Server(R) 2008 Datacenter without Hyper-V (x64)	
Microsoft(R) Windows Server(R) 2003, Standard Edition (*1)	SP none/1/2
Microsoft(R) Windows Server(R) 2003, Enterprise Edition (*1)	SP none/1/2
Microsoft(R) Windows Server(R) 2003, Standard x64 Edition (*1)	SP2
Microsoft(R) Windows Server(R) 2003, Enterprise x64 Edition (*1)	SP2
Microsoft(R) Windows Server(R) 2003 R2, Standard Edition (*1)	SP none/2
Microsoft(R) Windows Server(R) 2003 R2, Enterprise Edition (*1)	SP none/2
Microsoft(R) Windows Server(R) 2003 R2, Standard x64 Edition (*1)	SP2
Microsoft(R) Windows Server(R) 2003 R2, Enterprise x64 Edition (*1)	SP2

SP: Service Pack

*1:

It is available in only IPv4 single stack environment.

It is not available in IPv6 single stack and IPv4/IPv6 dual stack environment, including the case of operating with IPv4.

[Linux]

Operating system	Remarks (service pack)
Red Hat Enterprise Linux 5 (for x86)	
Red Hat Enterprise Linux 5 (for Intel64)	
Red Hat Enterprise Linux 6 (for x86)	
Red Hat Enterprise Linux 6 (for Intel64)	

[Solaris] (*1)

Operating system	Remarks (service pack)
Oracle Solaris 10	
Oracle Solaris 11	

*1:Solaris version supports only Business servers.

Development Computers

Operating system	Remarks (service pack)
Windows(R) 8 Pro(x86) (*3)	
Windows(R) 8 Enterprise(x86) (*3)	
Windows(R) 8 Pro(x64) (*1) (*3)	
Windows(R) 8 Enterprise(x64) (*1) (*3)	
Windows(R) 7 Professional (x86)	
Windows(R) 7 Ultimate (x86)	
Windows(R) 7 Enterprise (x86)	
Windows(R) 7 Professional (x64) (*1)	
Windows(R) 7 Ultimate (x64) (*1)	
Windows(R) 7 Enterprise (x64) (*1)	
Windows Vista(R) Business (x86)	SP1
Windows Vista(R) Ultimate (x86)	SP1
Windows Vista(R) Business (x64) (*1)	SP1
Windows Vista(R) Ultimate (x64) (*1)	SP1
Microsoft(R) Windows(R) XP Professional (*2)	SP3
Microsoft(R) Windows Server(R) 2012 Standard(x64) (*1) (*3)	
Microsoft(R) Windows Server(R) 2012 Datacenter(x64) (*1) (*3)	
Microsoft(R) Windows(R) Small Business Server 2011 Essentials (*1)	
Microsoft(R) Windows Server(R) 2008 R2 Standard (x64) (*1)	SP none/1
Microsoft(R) Windows Server(R) 2008 R2 Enterprise (x64) (*1)	SP none/1
Microsoft(R) Windows Server(R) 2008 R2 Datacenter (x64) (*1)	SP none/1
Microsoft(R) Windows Server(R) 2008 Standard (x86)	SP none/2
Microsoft(R) Windows Server(R) 2008 Enterprise (x86)	SP none/2
Microsoft(R) Windows Server(R) 2008 Standard (x64) (*1)	SP none/2
Microsoft(R) Windows Server(R) 2008 Enterprise (x64) (*1)	SP none/2
Microsoft(R) Windows Server(R) 2008 Datacenter (x64) (*1)	SP none/2
Microsoft(R) Windows Server(R) 2008 Datacenter without Hyper-V (x64) (*1)	
Microsoft(R) Windows Server(R) 2003 R2, Standard Edition (*2)	SP2
Microsoft(R) Windows Server(R) 2003 R2, Enterprise Edition (*2)	SP2
Microsoft(R) Windows Server(R) 2003 R2, Standard x64 Edition (*1) (*2)	SP2
Microsoft(R) Windows Server(R) 2003 R2, Enterprise x64 Edition (*1) (*2)	SP2

SP: Service Pack

*1:

This runs as a 32-bit application on WOW64 (Windows 32-bit On Windows 64-bit) subsystems.

*2:

It is available in only IPv4 single stack environment.

It is not available in IPv6 single stack and IPv4/IPv6 dual stack environment, including the case of operating with IPv4.

*3:

It is available only to Microsoft(R) Internet Explorer for desktop.

Web Console

Operating system	Remarks (service pack)
Windows(R) 8 Pro(x86) (*3)	
Windows(R) 8 Enterprise(x86) (*3)	
Windows(R) 8 Pro(x64) (*1) (*3)	
Windows(R) 8 Enterprise(x64) (*1) (*3)	
Windows(R) 7 Home Premium (x86)	
Windows(R) 7 Professional (x86)	
Windows(R) 7 Ultimate (x86)	
Windows(R) 7 Enterprise(x86)	
Windows(R) 7 Home Premium (x64) (*1)	
Windows(R) 7 Professional (x64) (*1)	
Windows(R) 7 Ultimate (x64) (*1)	
Windows(R) 7 Enterprise(x64) (*1)	
Windows Vista(R) Home Basic (x86)	
Windows Vista(R) Home Premium (x86)	
Windows Vista(R) Business (x86)	
Windows Vista(R) Ultimate (x86)	
Windows Vista(R) Enterprise (x86)	
Microsoft(R) Windows(R) XP Professional (*2)	SP 2/3
Microsoft(R) Windows(R) XP Home Edition (*2)	SP 2/3
Microsoft(R) Windows(R) XP Professional x64 Edition (*1) (*2)	
Microsoft(R) Windows Server(R) 2012 Standard(x64) (*1) (*3)	
Microsoft(R) Windows Server(R) 2012 Datacenter(x64) (*1) (*3)	
Microsoft(R) Windows Server(R) Small Business Server 2011 Essentials (*1)	
Microsoft(R) Windows Server(R) 2008 R2 Standard (x64) (*1)	SP none/1
Microsoft(R) Windows Server(R) 2008 R2 Enterprise (x64) (*1)	SP none/1
Microsoft(R) Windows Server(R) 2008 R2 Datacenter (x64) (*1)	SP none/1
Microsoft(R) Windows Server(R) 2008 Standard (x86)	SP none/2
Microsoft(R) Windows Server(R) 2008 Enterprise (x86)	SP none/2
Microsoft(R) Windows Server(R) 2008 Standard (x64) (*1)	SP none/2
Microsoft(R) Windows Server(R) 2008 Enterprise (x64) (*1)	SP none/2
Microsoft(R) Windows Server(R) 2008 Datacenter (x64) (*1)	SP none/2
Microsoft(R) Windows Server(R) 2008 Datacenter without Hyper-V (x64) (*1)	
Microsoft(R) Windows Server(R) 2003 R2, Standard Edition (*2)	SP2
Microsoft(R) Windows Server(R) 2003 R2, Enterprise Edition (*2)	SP2

Operating system	Remarks (service pack)
Microsoft(R) Windows Server(R) 2003 R2, Standard x64 Edition (*1) (*2)	SP2
Microsoft(R) Windows Server(R) 2003 R2, Enterprise x64 Edition (*1) (*2)	SP2

SP: Service Pack

*1:

This can only use 32-bit Microsoft(R) Internet Explorer.

*2:

It is available in only IPv4 single stack environment.

It is not available in IPv6 single stack and IPv4/IPv6 dual stack environment, including the case of operating with IPv4.

*3:

It is available only to Microsoft(R) Internet Explorer for desktop.

3.2.2 Required Software

Management Servers

[Linux]

The following software, which comes with the operating system, is required.

- redhat-lsb package
- The elfutils package (*1)

Red Hat Enterprise Linux 5.2 or earlier

elfutils-libelf-0.125-3.el5.i386.rpm (*1)

Red Hat Enterprise Linux 5.3 or later

elfutils-libelf-0.137-3.el5.i386.rpm (*1)

Red Hat Enterprise Linux 6.0 or later

elfutils-libelf-0.148-1.el6.i686.rpm (*1)

*1: The 32-bit version is required even for 64-bit versions of Linux.

Red Hat Enterprise Linux or later, in addition to the above, the following software, which comes with the operating system, is required.

Red Hat Enterprise Linux 6.0 (for x86) or later

- alsa-lib pack package (32-bit versions)
- cloog-ppl package (32-bit versions)
- compat-readline5 package (32-bit versions)
- compat-libtermcap package (32-bit versions)
- cpp package (32-bit versions)
- file package (32-bit versions)
- gcc package (32-bit versions)
- gcc-c++ package (32-bit versions)
- gdb package (32-bit versions)

- glibc-devel package (32-bit versions)
- glibc-headers package (32-bit versions)
- kernel-headers package (32-bit versions)
- libICE package (32-bit versions)
- libSM package (32-bit versions)
- libX11 package (32-bit versions)
- libX11-common package
- libXau package (32-bit versions)
- libXext package (32-bit versions)
- libXi package (32-bit versions)
- libXp package (32-bit versions)
- libXt package (32-bit versions)
- libXtst package (32-bit versions)
- libgomp package (32-bit versions)
- libstdc++-devel package (32-bit versions)
- libtool-ltdl package (32-bit versions)
- libxcb package (32-bit versions)
- make package (32-bit versions)
- mpfr package (32-bit versions)
- nss-softokn-freebl package (32-bit versions)
- perl package (32-bit versions)
- perl-Module-Pluggable package (32-bit versions)
- perl-Pod-Escapes package (32-bit versions)
- perl-Pod-Simple package (32-bit versions)
- perl-libs package (32-bit versions)
- perl-version package (32-bit versions)
- ppl package (32-bit versions)
- strace package (32-bit versions)
- tcsh package (32-bit versions)
- unixODBC package (32-bit versions)

Red Hat Enterprise Linux 6.0 (for Intel64) or later

- alsa-lib package (32-bit versions)
- audit-libs package (32-bit versions)
- cloog-ppl package (64-bit versions)
- compat-readline5 package (32-bit versions)
- compat-libtermcap package (32-bit versions)
- cpp package (64-bit versions)

- cracklib package (32-bit versions)
- db4 package (32-bit versions)
- expat package (32-bit versions)
- file package (64-bit versions)
- gcc package (64-bit versions)
- gcc-c++ package (64-bit versions)
- glibc package (32-bit versions)
- glibc-devel package (32-bit versions)
- glibc-headers package (64-bit versions)
- kernel-headers package (64-bit versions)
- libICE package (32-bit versions)
- libSM package (32-bit versions)
- libX11 package (32-bit versions)
- libX11-common package
- libXau package (32-bit versions)
- libXext package (32-bit versions)
- libXi package (32-bit versions)
- libXp package (32-bit versions)
- libXt package (32-bit versions)
- libXtst package (32-bit versions)
- libattr package (32-bit versions)
- libcap package (32-bit versions)
- libgcc package (32-bit versions)
- libgomp package (64-bit versions)
- libseline package (32-bit versions)
- libstdc++ package (32-bit versions)
- libstdc++-devel package (64-bit versions)
- libtool-ldt package (32-bit versions)
- libuuid package (32-bit versions)
- libxcb package (32-bit versions)
- make package (64-bit versions)
- mpfr package (64-bit versions)
- ncurses-libs package (32-bit versions)
- nss-softokn-freebl package (32-bit versions)
- pam package (32-bit versions)
- perl package (64-bit versions)
- perl-Module-Pluggable package (64-bit versions)
- perl-Pod-Escapes package (64-bit versions)

- perl-Pod-Simple package (64-bit versions)
- perl-libs package (64-bit versions)
- perl-version package (64-bit versions)
- ppl package (64-bit versions)
- readline package (32-bit versions)
- tcsh package (64-bit versions)
- unixODBC package (32-bit versions)
- zlib package (32-bit versions)

To use operation components developed using Perl scripts

- strawberry perl 5.12.0

The following modules are also required to use the Perl libraries provided by Systemwalker Runbook Automation.

- XML::Simple 2.18
- XML::Parser 2.40

LDAP (Lightweight Directory Access Protocol)

Select one of the following LDAP directories.

The Interstage Directory Service can only be used when Interstage Single Sign-On is installed.

- OpenLDAP
- Active Directory
- Interstage Directory Service

For cluster operations

[Windows]

Microsoft(R) Cluster Service (MSCS) or Microsoft(R) Failover Clustering that is included in the following products:

- Microsoft(R) Windows Server(R) 2003, Enterprise Edition
- Microsoft(R) Windows Server(R) 2008 Enterprise
- Microsoft(R) Windows Server(R) 2012 Standard
- Microsoft(R) Windows Server(R) 2012 Datacenter

[Linux]

Cluster operation is not supported.

For VM environments

VMware vSphere(R) 4

The table below lists the supported guest operating systems:

Supported operating systems	Remarks (service pack)
Microsoft(R) Windows Server(R) 2012 Standard(x64)	
Microsoft(R) Windows Server(R) 2012 Datacenter(x64)	
Microsoft(R) Windows Server(R) 2008 R2 Standard(x64)	SP none/1

Supported operating systems	Remarks (service pack)
Microsoft(R) Windows Server(R) 2008 R2 Enterprise(x64)	SP none/1
Microsoft(R) Windows Server(R) 2008 R2 Datacenter(x64)	SP none/1
Microsoft(R) Windows Server(R) 2008 Standard(x86)	SP none/2
Microsoft(R) Windows Server(R) 2008 Enterprise(x86)	SP none/2
Microsoft(R) Windows Server(R) 2008 Standard(x64)	SP none/2
Microsoft(R) Windows Server(R) 2008 Enterprise(x64)	SP none/2
Microsoft(R) Windows Server(R) 2008 Datacenter(x64)	SP none/2
Microsoft(R) Windows Server(R) 2003 R2, Standard Edition	SP none/2
Microsoft(R) Windows Server(R) 2003 R2, Enterprise Edition	SP none/2
Microsoft(R) Windows Server(R) 2003 R2, Standard x64 Edition	SP none/2
Microsoft(R) Windows Server(R) 2003 R2, Enterprise x64 Edition	SP none/2
Red Hat Enterprise Linux 5 (for x86)	
Red Hat Enterprise Linux 5 (for Intel64)	

SP: ServicePack

Windows Server 2008 Hyper-V

The table below lists the supported guest operating systems:

Supported operating systems	Remarks (service pack)
Microsoft(R) Windows Server(R) 2012 Standard(x64)	
Microsoft(R) Windows Server(R) 2012 Datacenter(x64)	
Microsoft(R) Windows Server(R) 2008 R2 Standard(x64)	SP none/1
Microsoft(R) Windows Server(R) 2008 R2 Enterprise(x64)	SP none/1
Microsoft(R) Windows Server(R) 2008 R2 Datacenter(x64)	SP none/1
Microsoft(R) Windows Server(R) 2008 Standard(x86)	SP none/2
Microsoft(R) Windows Server(R) 2008 Enterprise(x86)	SP none/2
Microsoft(R) Windows Server(R) 2008 Standard(x64)	SP none/2
Microsoft(R) Windows Server(R) 2008 Enterprise(x64)	SP none/2
Microsoft(R) Windows Server(R) 2008 Datacenter(x64)	SP none/2
Microsoft(R) Windows Server(R) 2003 R2, Standard Edition	SP 2
Microsoft(R) Windows Server(R) 2003 R2, Enterprise Edition	SP 2
Microsoft(R) Windows Server(R) 2003 R2, Standard x64 Edition	SP 2
Microsoft(R) Windows Server(R) 2003 R2, Enterprise x64 Edition	SP 2
Red Hat Enterprise Linux 5 (for x86)	
Red Hat Enterprise Linux 5 (for Intel64)	

SP: ServicePack

Windows Server 2012 Hyper-V

The table below lists the supported guest operating systems:

Supported operating systems	Remarks (service pack)
Microsoft(R) Windows Server(R) 2012 Standard	

Linked Servers/Relay Servers/Business Servers

Linux

Install the software shown below. This software is attached to the operating system. Refer to the operating system manual before installing this software.

- redhat-lsb package

For installations in Red Hat Enterprise Linux 6 (for Intel64) environments, the 32-bit version of the following software, which is provided with the operating system, will be required:

- expat package
- glibc package
- libattr package
- libcap package
- libgcc package
- libstdc++ package
- nss-softokn-freebl package
- zlib package

Solaris:

The following software is required if collecting IT resource information.

- Enhanced Support Facility

Using the operation component to direct the operation to each server

- The software types shown below are required to perform SSH communications between the Management Server and the Linked Server, Relay Server, and Business Server.

[Windows]

- SSH V2.0 or later

Install OpenSSH (cygwin OpenSSH V1.7 or later) in environments in which SSH has not been installed yet.

[Linux] [Solaris]

- SSH V2.0 or later

In Red Hat Enterprise Linux 5.0 or later and Solaris 10 or later, SSH is already installed as a standard operating system feature. Install OpenSSH in environments in which SSH has not been installed yet.

- The software types shown below are required to perform Windows PowerShell communications between the Management Server and the Linked Server, Relay Server, and Business Server.

[Windows]

- Windows PowerShell 2.0 or later

Install Windows PowerShell 2.0 or later in environments in which Windows PowerShell has not been installed yet.

- The software types shown below are required to perform Telnet communications between the Management Server and the Linked Server, Relay Server, and Business Server.

[Windows]

- Telnet Server service

Install the Telnet Server service in environments in which it has not been installed yet.

[Linux]

- telnet-server

Install telnet-server in environments in which it has not been installed yet.

[Solaris]

- telnet service

The telnet service is already installed as a standard operating system feature.

- The software types shown below are required to perform RSH/REXEC communications between the Management Server and the Linked Server, Relay Server, and Business Server.

[Windows]

- Subsystem for UNIX-based Application(SUA)

Install Subsystem for UNIX-based Application (SUA) in environments in which it has not been installed yet.

[Linux]

- rsh-server

Install rsh-server in environments in which it has not been installed yet.

[Solaris]

- rexec service

The rexec service is already installed as a standard operating system feature.

- The software types shown below are required to perform FTP communications between the Management Server and the Linked Server, Relay Server, and Business Server. Install the software types shown below.

[Windows]

- Internet Information Service (IIS) and FTP service

For IPv6 environments, install Internet Information Service 7.0 or later and FTP service 7.5 or later.

[Linux][Solaris]

- Vsftpd

- The software types shown below are required to perform SNMP communications between the Management Server and the Linked Server, Relay Server, and Business Server. Install the software types shown below.

[Windows]

- SNMP agent

[Linux]

- Net-snmp (or ucd-snmp)

[Solaris]

Solaris 10

- SUNWsmmgr

- SUNWsmagt

- SUNWsmcmd

Solaris 11

- system/management/snmp/net-snmp/addons
- system/management/snmp/net-snmp
- system/management/snmp/net-snmp/documentation (This package is required by the SNMP agent document, and must therefore be installed)

For cluster operations

[Windows]

Microsoft(R) Cluster Service (MSCS) or Microsoft(R) Failover Clustering contained in the following products:

- Microsoft(R) Windows Server(R) 2003, Enterprise Edition
- Microsoft(R) Windows Server(R) 2008 Enterprise
- Microsoft(R) Windows Server(R) 2012 Standard
- Microsoft(R) Windows Server(R) 2012 Datacenter

[Linux]

- Fujitsu PRIMECLUSTER Enterprise Edition 4.1A20 or later
- Fujitsu PRIMECLUSTER HA Server 4.1A20 or later
- Fujitsu PRIMECLUSTER Clustering Base 4.1A20 or later

For VM environments

VMware vSphere(R) 4

The table below lists the supported guest operating systems:

Supported operating systems	Remarks (service pack)
Microsoft(R) Windows Server(R) 2012 Standard	
Microsoft(R) Windows Server(R) 2008 R2 Standard	
Microsoft(R) Windows Server(R) 2008 R2 Enterprise	
Microsoft(R) Windows Server(R) 2008 Standard (x86)	SP none/2
Microsoft(R) Windows Server(R) 2008 Enterprise (x86)	SP none/2
Microsoft(R) Windows Server(R) 2008 Standard (x64)	SP none/2
Microsoft(R) Windows Server(R) 2008 Enterprise (x64)	SP none/2
Microsoft(R) Windows Server(R) 2003 R2, Standard Edition	SP none/2
Microsoft(R) Windows Server(R) 2003 R2, Enterprise Edition	SP none/2
Microsoft(R) Windows Server(R) 2003 R2, Standard x64 Edition	SP 2
Microsoft(R) Windows Server(R) 2003 R2, Enterprise x64 Edition	SP2
Microsoft(R) Windows Server(R) 2003, Standard Edition	SP none/1/2
Microsoft(R) Windows Server(R) 2003, Enterprise Edition	SP none/1/2
Red Hat Enterprise Linux 5 (for x86)	
Red Hat Enterprise Linux 5 (for Intel64)	

Windows Server 2008 Hyper-V

The table below lists the supported guest operating systems:

Supported operating systems	Remarks (service pack)
Microsoft(R) Windows Server(R) 2012 Standard	
Microsoft(R) Windows Server(R) 2008 R2 Standard	
Microsoft(R) Windows Server(R) 2008 R2 Enterprise	
Microsoft(R) Windows Server(R) 2008 Standard (x86)	SP none/2
Microsoft(R) Windows Server(R) 2008 Enterprise (x86)	SP none/2
Microsoft(R) Windows Server(R) 2008 Standard (x64)	SP none/2
Microsoft(R) Windows Server(R) 2008 Enterprise (x64)	SP none/2
Microsoft(R) Windows Server(R) 2003 R2, Standard Edition	SP 2
Microsoft(R) Windows Server(R) 2003 R2, Enterprise Edition	SP 2
Microsoft(R) Windows Server(R) 2003 R2, Standard x64 Edition	SP 2
Microsoft(R) Windows Server(R) 2003 R2, Enterprise x64 Edition	SP 2
Microsoft(R) Windows Server(R) 2003, Standard Edition	SP 2
Microsoft(R) Windows Server(R) 2003, Enterprise Edition	SP 2
Red Hat Enterprise Linux 5 (for x86)	
Red Hat Enterprise Linux 5 (for Intel64)	

Windows Server 2012 Hyper-V

The table below lists the supported guest operating systems:

Supported operating systems	Remarks (service pack)
Microsoft(R) Windows Server(R) 2012 Standard	

Development Computers

Required software	Version
Microsoft(R) Internet Explorer	7 8 9 10(*1)

(*1)

- Only Microsoft(R) Internet Explorer 10 present in Windows Server 2012 or Windows(R) 8 is supported.

Web consoles

Required software	Version
Microsoft(R) Internet Explorer	7 8 9 10(*1)

Required software	Version
Adobe Flash Player	10
	11

(*1)

- Only Microsoft(R) Internet Explorer 10 present in Windows Server 2012 or Windows(R) 8 is supported.
- It is available only to Microsoft(R) Internet Explorer for desktop.

3.2.3 Software that cannot Coexist

Management Servers

The following software cannot be installed.

[Windows]

Product	V/L
<ul style="list-style-type: none"> - INTERSTAGE - INTERSTAGE Standard Edition - INTERSTAGE Enterprise Edition 	Cannot coexist, regardless of the version
<ul style="list-style-type: none"> - Interstage Application Server - INTERSTAGE Application Server Standard Edition - INTERSTAGE Application Server Enterprise Edition - INTERSTAGE Application Server Web-J Edition - Interstage Application Server Standard Edition - Interstage Application Server Standard-J Edition - Interstage Application Server Enterprise Edition - Interstage Application Server Plus - Interstage Application Server Standard Plus Developer - Interstage Application Server Web-J Edition 	Cannot coexist, regardless of the version
<ul style="list-style-type: none"> - Interstage Application Framework Suite - Interstage Application Framework Suite Standard Edition - Interstage Application Framework Suite Enterprise Edition - Interstage Application Framework Suite Web Edition 	Cannot coexist, regardless of the version
<ul style="list-style-type: none"> - Interstage Business Application Server - Interstage Business Application Server Standard Edition - Interstage Business Application Manager 	Cannot coexist, regardless of the version
Interstage Job Workload Server	Cannot coexist, regardless of the version
Interstage Apcoordinator	Cannot coexist, regardless of the version
INTERSTAGE WEBCOORDINATOR	Cannot coexist, regardless of the version

Product	V/L
Interstage BPM Flow	Cannot coexist, regardless of the version
Interstage Business Process Manager	Cannot coexist, regardless of the version
Interstage Shunsaku Data Manager	Cannot coexist, regardless of the version
Interstage Traffic Director	Cannot coexist, regardless of the version
Interstage Apworks	Cannot coexist, regardless of the version
Interstage Studio	Cannot coexist, regardless of the version
Interstage Service Integrator	Cannot coexist, regardless of the version
Interstage Service Integrator Standard Edition	Cannot coexist, regardless of the version
Interstage Service Integrator Enterprise Edition	Cannot coexist, regardless of the version
Interstage Security Director (Interstage Proxy)	Cannot coexist, regardless of the version
Interstage Web Server	Cannot coexist, regardless of the version
Interstage Web Server Express	Cannot coexist, regardless of the version
ObjectDirector	Cannot coexist, regardless of the version
<ul style="list-style-type: none"> - Systemwalker Centric Manager - SystemWalker/CentricMGR - SystemWalker/CentricMGR-M - SystemWalker/CentricMGR EE - SystemWalker/CentricMGR SE - Systemwalker Centric Manager Enterprise Edition - Systemwalker Centric Manager Standard Edition 	<p>Only Systemwalker Centric Manager Enterprise Edition and Systemwalker Centric Manager Standard Edition V10.0L21 or later (for x86) can coexist (*1)</p> <p>In all other cases, the listed products cannot coexist</p>
Systemwalker PKI Manager	Cannot coexist, regardless of the version
Systemwalker Runbook Automation(Linked Servers/Relay Servers)	Cannot coexist, regardless of the version
Systemwalker Runbook Automation(Business Servers)	Cannot coexist, regardless of the version
Systemwalker Software Configuration Manager(Management Servers)	Cannot coexist, regardless of the version
Systemwalker Software Configuration Manager(Managed Servers)	Cannot coexist, regardless of the version

Product	V/L
Systemwalker Service Quality Coordinator Enterprise Edition (Dashboard Servers)	Cannot coexist if versions are V13.4.0 or later
Securecrypto libraries	Cannot coexist, regardless of the version
TeamWARE Office Server	Cannot coexist, regardless of the version
TRADE MASTER	Cannot coexist, regardless of the version
Cloud Infrastructure Management Software	Cannot coexist, regardless of the version

*1:

For the installation order of coexisting versions later than Systemwalker CentricMGR V10.0L21, see "*Installing Systemwalker Centric Manager*" in the "*Systemwalker Runbook Automation Installation Guide*".

[Linux]

Product	V/L
<ul style="list-style-type: none"> - Interstage Application Server <ul style="list-style-type: none"> - INTERSTAGE Application Server Standard Edition - INTERSTAGE Application Server Enterprise Edition - INTERSTAGE Application Server Web Edition - INTERSTAGE Application Server Web-J Edition - Interstage Application Server Standard Edition - Interstage Application Server Standard-J Edition - Interstage Application Server Enterprise Edition - Interstage Application Server Plus - Interstage Application Server Plus Developer - Interstage Application Server Web-J Edition 	Cannot coexist, regardless of the version
<ul style="list-style-type: none"> - Interstage Application Framework Suite <ul style="list-style-type: none"> - Interstage Application Framework Suite Standard Edition - Interstage Application Framework Suite Enterprise Edition - Interstage Application Framework Suite Web Edition 	Cannot coexist, regardless of the version
<ul style="list-style-type: none"> - Interstage Business Application Server <ul style="list-style-type: none"> - Interstage Business Application Server Standard Edition - Interstage Business Application Server Enterprise Edition 	Cannot coexist, regardless of the version
Interstage Job Workload Server	Cannot coexist, regardless of the version
Interstage BPM Flow	Cannot coexist, regardless of the version
Interstage Business Process Manager	Cannot coexist, regardless of the version

Product	V/L
Interstage Shunsaku Data Manager	Cannot coexist, regardless of the version
Interstage Traffic Director	Cannot coexist, regardless of the version
Interstage Service Integrator	Cannot coexist, regardless of the version
Interstage Service Integrator Standard Edition	Cannot coexist, regardless of the version
Interstage Service Integrator Enterprise Edition	Cannot coexist, regardless of the version
Interstage Web Server	Cannot coexist, regardless of the version
<ul style="list-style-type: none"> - Systemwalker Centric Manager - Systemwalker Centric Manager Global Enterprise Edition - Systemwalker Centric Manager Enterprise Edition - Systemwalker Centric Manager Standard Edition 	<p>Only Systemwalker Centric Manager Enterprise Edition and Systemwalker Centric Manager Standard Edition V10.0L21 or later (for x86) can coexist (*1)</p> <p>In all other cases, the listed products cannot coexist</p>
Systemwalker Runbook Automation(Linked Servers/Relay Servers)	Cannot coexist, regardless of the version
Systemwalker Runbook Automation(Business Servers)	Cannot coexist, regardless of the version
Systemwalker Software Configuration Manager(Management Servers)	Cannot coexist, regardless of the version
Systemwalker Software Configuration Manager(Managed Servers)	Cannot coexist, regardless of the version
Systemwalker Service Quality Coordinator Enterprise Edition (Dashboard Servers)	Cannot coexist if versions are V13.4.0 or later
Cloud Infrastructure Management Software	Cannot coexist, regardless of the version

*1:

For the installation order of coexisting versions later than Systemwalker CentricMGR V10.0L21, see "*Installing Systemwalker Centric Manager*" in the "*Systemwalker Runbook Automation Installation Guide*".

Linked Servers/Relay Servers

The Systemwalker Runbook Automation Linked Server/Relay Server cannot coexist with the following software.

Product	V/L
Systemwalker Runbook Automation (Management Server/Business Server)	Cannot coexist, regardless of the version
Systemwalker Software Configuration Manager (Management Server)	Cannot coexist, regardless of the version

Product	V/L
Systemwalker Software Configuration Manager (Managed Server)	Cannot coexist, regardless of the version

Business Servers

The Systemwalker Runbook Automation Business Server cannot coexist with the following software:

Product	V/L
Systemwalker Runbook Automation (Management Server/Linked Server/Relay Server)	Cannot coexist, regardless of the version
Systemwalker Software Configuration Manager (Management Server)	Cannot coexist, regardless of the version

Development Computers

Systemwalker Runbook Automation Studio cannot coexist with the following software.

Product	V/L
<ul style="list-style-type: none"> - Interstage Application Development Cycle Manager <li style="padding-left: 20px;">- Interstage Application Development Cycle Manager Enterprise Edition <li style="padding-left: 20px;">- Interstage Application Development Cycle Manager Standard Edition 	Cannot coexist, regardless of the version
Interstage Business Process Manager Studio	Cannot coexist, regardless of the version

3.2.4 Linked Software

Linked Servers/Relay Servers

The following software links to the Agent for Systemwalker Runbook Automation.

- Systemwalker Centric Manager V13.1.0 or later

Business Servers

To collect IT resource information, the following software links to Systemwalker Runbook Automation.

- ServerView Operations Manager

3.2.5 Installing Operation Management Products on the Management Server

The operation management products listed below can be installed on the Management Server, but some of the functions used by these products conflict with some of the functions used by the Management Server. For this reason, care is required with the installation procedure if these products are installed on the same server.

- Systemwalker Centric Manager
- ServerView Resource Orchestrator Cloud Edition

Refer to the *Systemwalker Runbook Automation Installation Guide* before installing any of the above products on the Management Server.

Appendix A Limited Values

This appendix describes the limit values for Systemwalker Runbook Automation.

A.1 Limited Values for Scheduling

Limit values for Schedule Definitions

A maximum of 1000 Automated Operation Process Groups can be set with Schedule Definitions.

A.2 Limited Values for Audit Logs

Limit values for process instance audit logs

Up to 10 generations of audit logs can be stored with a maximum size of 10 MB.

Limit values for CMDB audit logs

Up to 10 generations of audit logs can be stored with a maximum size of 5 MB.

Appendix B Memory Estimation

B.1 Memory Required to Execute Automated Operation Processes

The formula below can be used to estimate the memory required when Automated Operation Processes are executed.

Estimation formula

$$y = 780 + i \times j$$

- y: Memory used (MB)
- i: Number of Automated Operation Processes executing simultaneously
- j: Memory usage required to execute one Automated Operation Process (Unit: MB)

When using an operation component that was provided as standard in Systemwalker Runbook Automation, use 50 for this value.

When using an operation component that was developed independently, use 80 for this value.

Estimation example

The memory usage that will be required to execute three Automated Operation Processes using an operation component that was provided as standard in Systemwalker Runbook Automation is as shown below:

* The number is 100 that Automated Operation Processes are able to execute simultaneously has been verified.

$$780 + 3 \times 50$$

$$= 780 + 150$$

$$= 930 \text{ (MB)}$$