Systemwalker: Supporting Stable and Reliable IT Operation

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This paper describes an outline of the basic concept and important characteristics of Systemwalker under the following headings:
- **History and initiatives of Systemwalker as IT operation management software**
- **Policy-based Systems Management (PSM) architecture**
- **IT service management**
- **Systemwalker product lineup**

This paper also briefly explains the next-generation architecture based on Service Oriented Architecture (SOA) that we are now planning to implement.

1. Introduction

Fujitsu originally developed Systemwalker in 1995 as its IT operation management software. This long-term successful product has registered an accumulated 5 million licenses as of 2007.

We are now developing Systemwalker based on Policy-based Systems Management (PSM) — the concept for managing the service level agreement (SLA) of information systems. Moreover, we have strengthened the functions by implementing the IT Infrastructure Library (ITIL)[1)] or so-called IT operation management best practices. We have also realized an IT service management system that can exchange services and intercommunicate information by taking advantage of Service Oriented Architecture (SOA) technology.

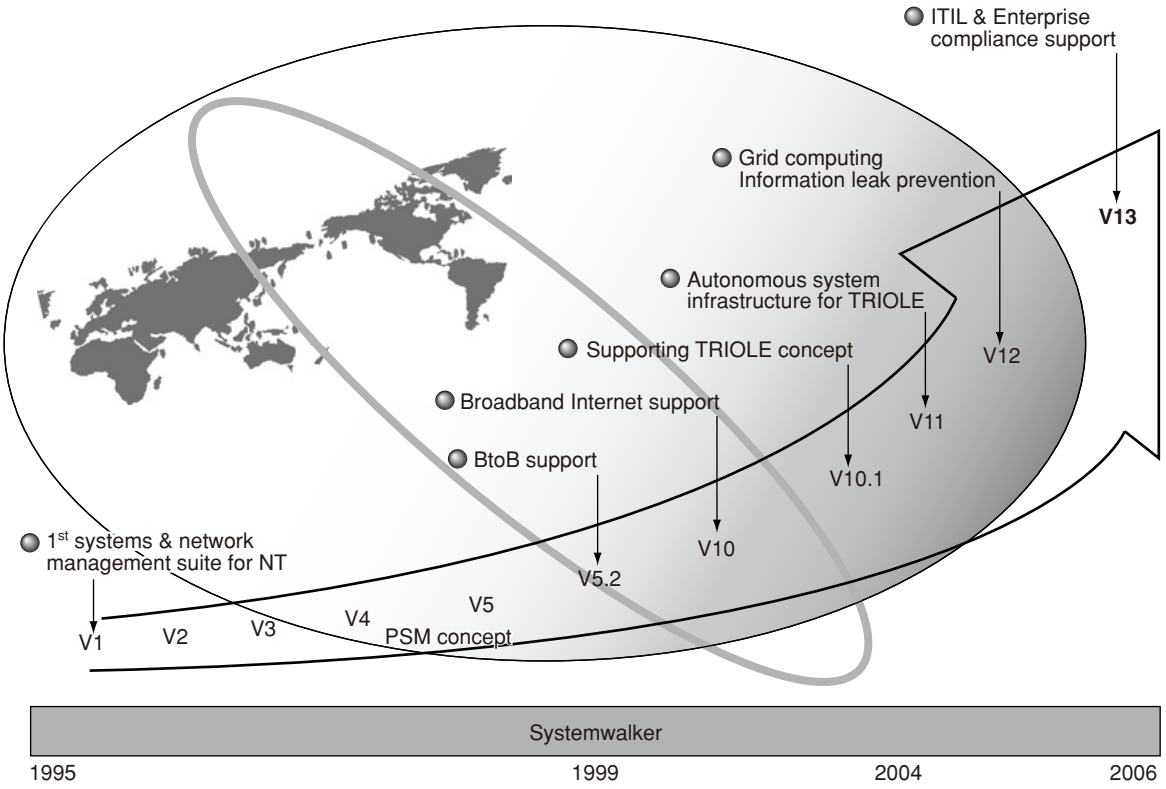
2. History and initiatives of Systemwalker as IT operation management software

This section describes the history of Systemwalker from 1995 to 2005. **Figure 1** shows an outline of this history.

2.1 Japan's first integrated IT operation management

Systemwalker was launched as Japan's first integrated IT operation management product in 1995. This was during the transition from mainframe processing to client-server processing using UNIX or Windows servers and PCs. Downsizing was expected to bring initial cost reductions. However, there were also concerns about possibly higher management costs due to changes in management from a mainframe to many distributed servers. Customers expected integrated IT operation management software that would provide management solutions for distributed systems similar to the centralized ones for mainframe systems. In response to this expectation, Systemwalker provided centralized management functions for systems and networks, resource allocation functions for software, business data, and other applications, and also enabled automatic server operation.

The widespread popularization of distributed systems entailed a proportional increase in the complexity and cost of IT operation manage-



PSM: Policy-based Systems Management

Figure 1
Systemwalker history.

ment. As a result, the need arose for a PSM architecture that would integrate individual functions based on specific operational policies and manage a complex environment such as one consisting of thousands of servers and various types of platforms. Since Systemwalker V4, Systemwalker development has conformed to PSM architecture.

2.2 IT operation management in an Internet environment

In response to requirements from the Internet environment, Systemwalker V5, shipped in 1999, offered business application management functions as well as secure management functions.

In the Internet environment, numerous servers conduct real-time data communication in response to Internet users. To realize real-time response and Internet security, servers were specially configured as dedicated ones for specific processing, such as for the Web, mail, application processing, database access, and other processing. Thus, many enterprise systems became configured in a 3-tier system that typically consists of Web servers, application servers, and a database server. In such an environment, a new need arose for the management of multiple servers specializing in dedicated roles even within a company. The advent of electronic commerce (BtoB and BtoC) using the Internet also increased security requirements for IT operation management that can securely control an Internet access zone or demilitarized zone (DMZ) at an enterprise data center.

2.3 Grid technology and information security

As the degree of concentration at data centers increased and systems grew bigger, the numbers of servers also increased rapidly. To meet the requirement for utilizing this expanding computing power more effectively, Systemwalker provided a solution in 2004 that implements grid computing technologies.

The growing usage of IT by end users also prompted a greater need to prevent leaks of personal and other information. In response, Systemwalker provided an information leak countermeasure solution as part of client PC management in 2004.

2.4 Systemwalker Version 13

In Systemwalker V13, the latest version of Systemwalker (released in November 2006), the theme of product enhancements is achieving IT operation that supports IT governance. The reasons given for this theme are the growing requirements for corporate compliance and the governance of IT systems. Up until now, the main purpose of IT operation management products has been the stable and reliable operation of IT systems. Conversely, functions that can verify proper IT system operation in accordance with legal requirements and corporate policies, instead of simply ensuring reliable operation, are now required.

In view of these requirements, Fujitsu decided that efforts to enhance Systemwalker should focus on corporate compliance and governance for IT systems, in addition to ensuring stable and reliable operation. This new development theme is called IT service management. Thus, IT service management that conforms to ITIL — IT service management best practices — is positioned as the development theme for Systemwalker V13, and the functions are enhanced so as to satisfy the requirements of ITIL.

The functions to guarantee that management processes and IT system operation as planned are performed correctly are also enhanced as part of this theme.

3. Policy-based Systems Management (PSM) architecture

This section describes the PSM architecture of Systemwalker.

For stable and reliable management of an IT system, it is important to consistently manage and understand information during the entire lifecycle, from installation to disposal, rather than simply regarding IT operation management as functions for the operating phase.

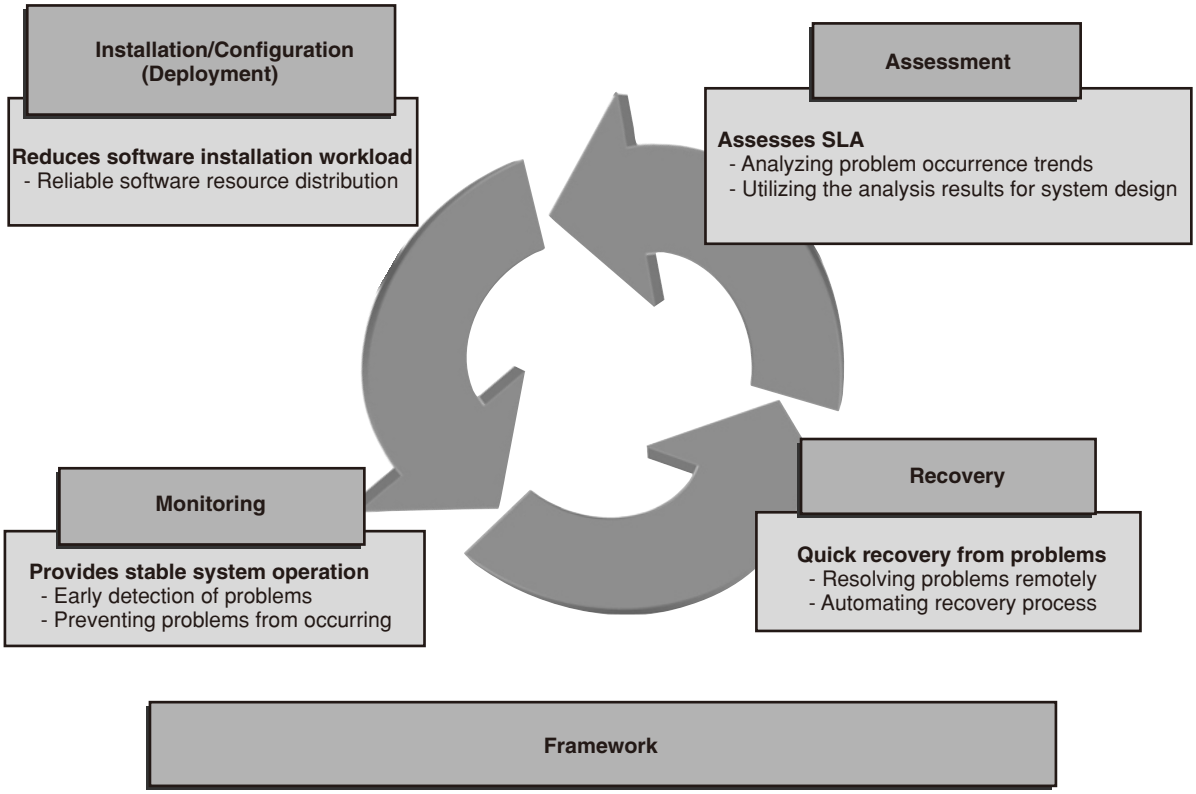
IT systems are constructed from computers and peripheral devices (e.g., network devices, printers) at different locations. These elements are mutually connected to provide services to users.

IT systems must also cope with changes in business, task, and service processing requirements (such as the quantity of data processed and number of transactions).

Given the number of elements comprising an IT system and the degree of complexity, however, dependent relationships among elements may be complicated and thus make it difficult to predict the influence of faults or changes on an individual element. Lifecycle management consisting of deployment (installation and configuration), monitoring, recovery, and assessment (evaluation) is essential for resolving these problems and achieving the reliable management of distributed systems (**Figure 2**).

Lifecycle management is an indispensable procedure in building IT systems that support corporate management, and its role is not simply to achieve reliable IT system operation. It also plays a major role in guaranteeing the service level of an IT system in order for a corporation to achieve its management strategies.

In Systemwalker, corporate management strategies for IT systems are formulated as



SLA: Service level agreement

Figure 2
Lifecycle management of distributed system.

definitions known as "policies." This formulation is similar to that of the SLA, and the requirements for an IT system should comply with requirements for achieving optimization for the corporation as a whole. For example, if the completion of a specific process is found not to be possible within the expected time, other unrelated low-priority processes are to be stopped until the more important process can be completed. To achieve such processing, overall optimization must be kept consistent, with the status and performance of all resources that comprise the IT system monitored and controlled. The architecture that makes this possible is the policy-based architecture or PSM architecture for the lifecycle management of distributed systems. In other words, PSM is the means of achieving SLA in an IT system. **Figure 3** shows the relationship between corporate strategies, SLA, and PSM.

4. ITIL-based, process-oriented IT service management

This section describes ITIL-based, process-oriented IT service management.

4.1 What is ITIL?

This section begins with a brief explanation of ITIL — a framework in which the best practices for IT service management are collected. These best practices were created and documented in the late 1980s by the Central Computer and Telecommunications Agency (CCTA), now the Office of Government Commerce (OGC), under the UK government. These best practices represent an accumulation of practical knowledge and expertise concerning IT operations.

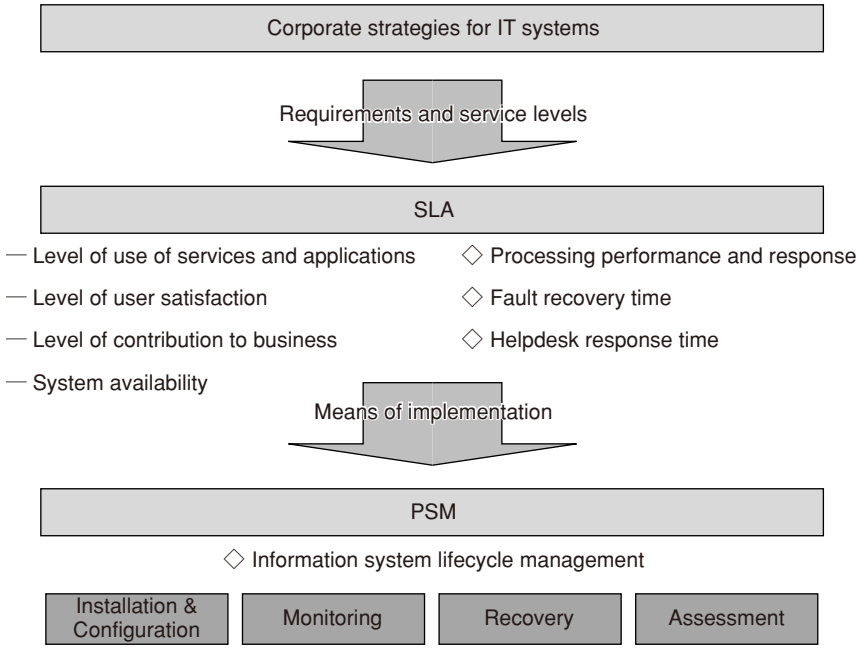


Figure 3
Relationship between corporate strategies, SLA, and PSM.

The core of ITIL is service management that covers service support[2] and service delivery.[3] ICT infrastructure management[4] is the key function used to integrate each management function such as monitoring and control service management.

Figure 4 shows the relationship between service support, service delivery, and ICT infrastructure management.

1) Service support

Service support provides a service desk as the end user interface. Service support refers to the routine management tasks of an IT service, and consists of certain IT operation processes for incident management, problem management, change management, release management, and configuration management.

2) Service delivery

Service delivery defines the processes related to planning and implementing the plans for the medium to long-term outlook for IT services. Service delivery consists of service level management, availability management, capacity management, IT service continuity management, and financial management for IT services.

3) ICT infrastructure management

Service management processes the required information collected from IT systems, performs system operations, and makes changes, and therefore must be linked to IT system monitoring and control. Under ITIL, the IT system monitoring and control functions are called ICT infrastructure management.

4.2 ITIL and Systemwalker management layers

In Systemwalker, the ITIL processes are mapped into the following management layers (**Figure 5**).

The top ITIL layer contains the functions that implement ITIL management processes. The Helpdesk system, Workflow, and similar functions that assist in accomplishing service support management processes are located in this layer, along with Dashboard and report functions, and data analysis tools for imple-

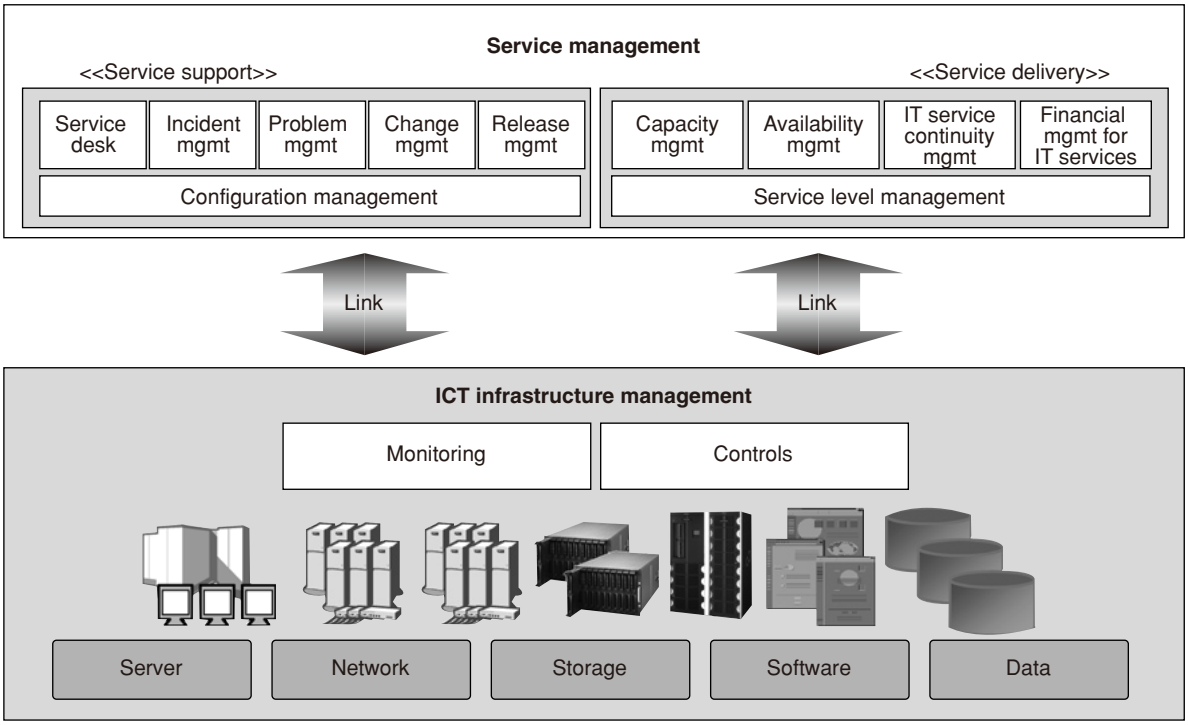


Figure 4
Relationship between service support, service delivery and ICT infrastructure management.

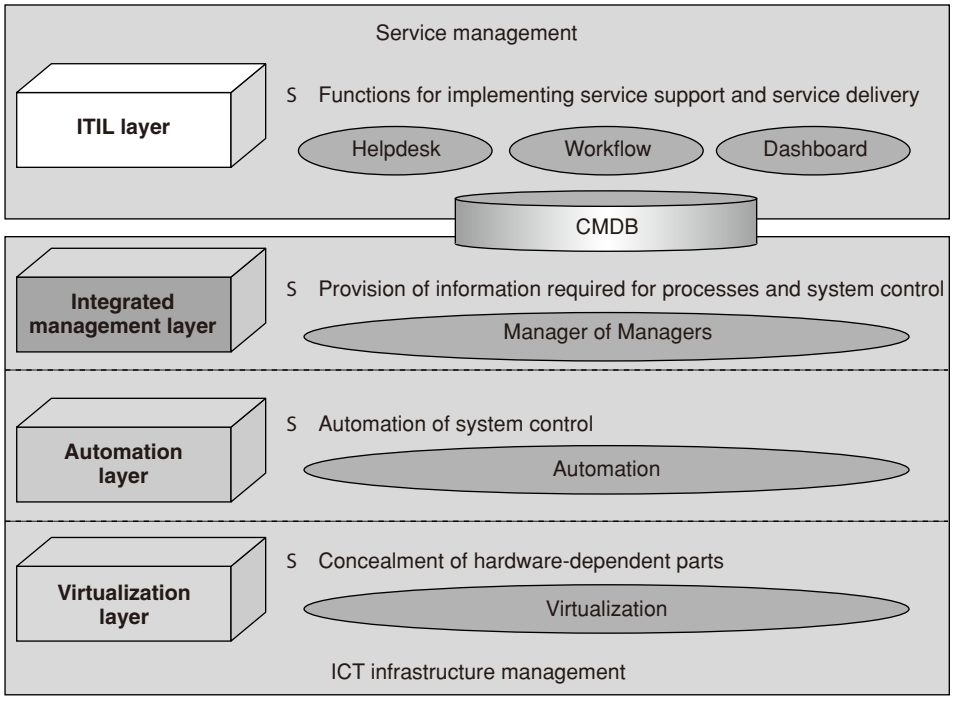


Figure 5
Systemwalker management layers.

menting service delivery. Since this part is directly related to operation processes and includes the user interface, it must be sufficiently flexible to meet usability requirements.

Next is the integrated management layer. This layer standardizes the hardware and software configuration information, operating information, error logs, operation history, and other information collected from the IT system, and enables the top ITIL layer to use the information collected. This layer is the so-called the Manager of Managers layer that integrates the various management functions. Since multiple vendors are typically involved in constructing an IT system within an enterprise, the different information formats and interfaces of each vendor pose an impediment to realizing enterprise-wide ITIL management. The Systemwalker Manager of Managers uses linkage adapters to connect third-party IT operation management tools, and thus enables enterprise-wide service management even in an environment constructed by multiple vendors.

The information collected from the system by the integrated management layer is managed in the configuration management database (CMDB) located between the ITIL layer and integrated management layer. Moreover, by using the CMDB it is possible to manage operation plans, operation policies, system design information and related documentation, and other information as required by the top ITIL layer.

The automation layer automates operations to handle the IT system itself. Since operators inevitably make mistakes, automated operation should eliminate such human error. This layer has functions for automating operations to handle or change the system, including starting and stopping the system, making backups, performing system diagnostics, and changing software.

The bottom layer or virtualization layer virtualizes the hardware-dependent parts of the system. If an IT system is continuously expanded to enhance its functions and improve its hardware performance, then the hardware and its dependent parts should be virtualized to guarantee unchanged interfaces to the upper layer in case of hardware additions and updates. The technology to achieve this is contained in the bottom layer.

5. ITIL-based Systemwalker product lineup

Figure 6 shows the Systemwalker V13 product lineup within the context of the architecture described above.

This section introduces the Systemwalker products, starting with the ITIL layer.

The products implementing ITIL service support are Systemwalker IT Service Management and Systemwalker IT Process Master.

Systemwalker IT Service Management provides the functions related to the service desk for assisting in incident management and problem management. Moreover, Systemwalker IT Process Master also provides functions such as the Workflow product used for implementing change management and release management.

Systemwalker Service Quality Coordinator is the product implementing ITIL service delivery. This product manages the capacities of resources used by the system, the availability of business processes, and related aspects.

The following describes the product for the integrated management layer.

The product for the integrated management layer is Systemwalker Centric Manager. This product performs such functions as collecting system information from each management server in the IT system, providing this information to the ITIL layer products, and requesting the automation layer to execute operational tasks as ordered by the ITIL layer products.

The following describes the product for the automation layer.

The product for the automation layer

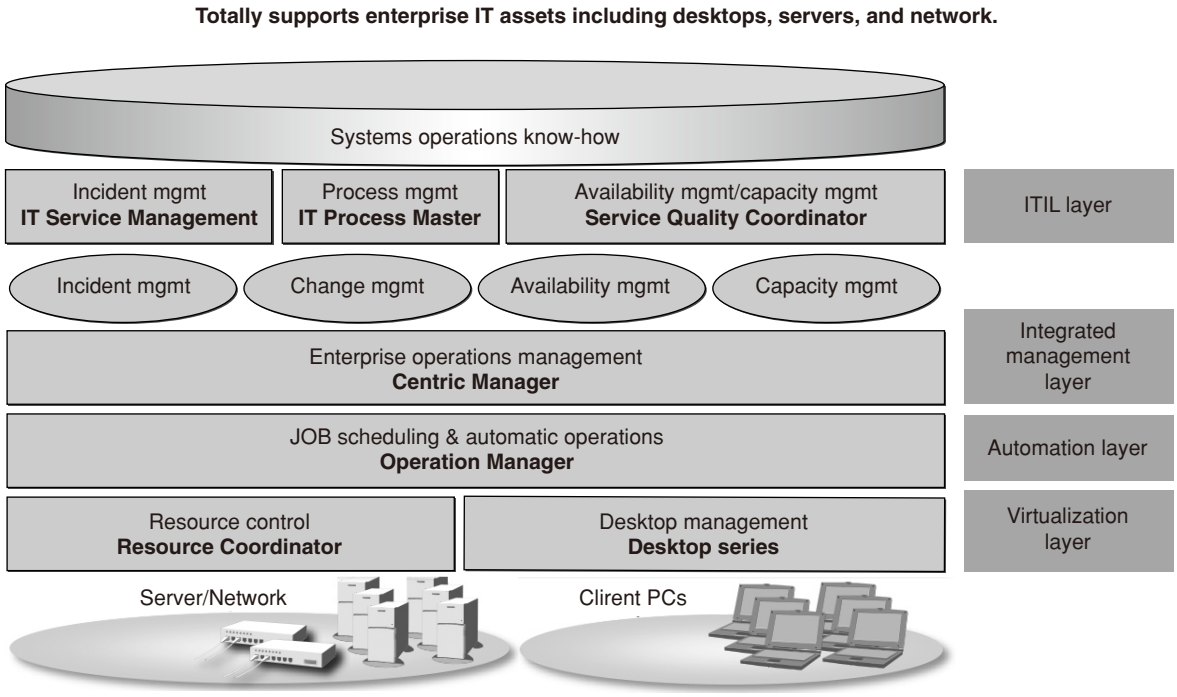


Figure 6
Systemwalker V13 product lineup for implementing ITIL.

is Systemwalker Operation Manager. This product is used to automate operations related to the system. It uses the operating system or infrastructure software interfaces to perform scheduled or event-driven execution of starting and stopping, backup, diagnosis, change, and other operations.

Finally, the following describes the product for the virtualization layer.

The virtualization layer virtualizes processing that varies in accordance with the servers, networks, storages, and other hardware devices that comprise the IT system infrastructure. This layer provides an IT infrastructure environment that can be commonly handled by the upper layer functions. Systemwalker Resource Coordinator is the product that performs this role.

The Systemwalker Desktop series manages client PCs and protects the information against security risks.

6. SOA-based architecture (next-generation IT service management)

This final section describes the SOA-based architecture[5] to be used for the next generation of Systemwalker.

The service management layer should have the potential to be extended to corporate asset management, service level management for customers, and financial management. IT service management systems with even greater extendibility are required in order to expand IT systems suited for corporate management.

Figure 7 shows the SOA-based architecture for the next generation of Systemwalker that satisfies these requirements.

SOA-based architecture has two important characteristics compared with the Systemwalker V13 architecture described in Section 5. First, the CMDB enables normalized access to various

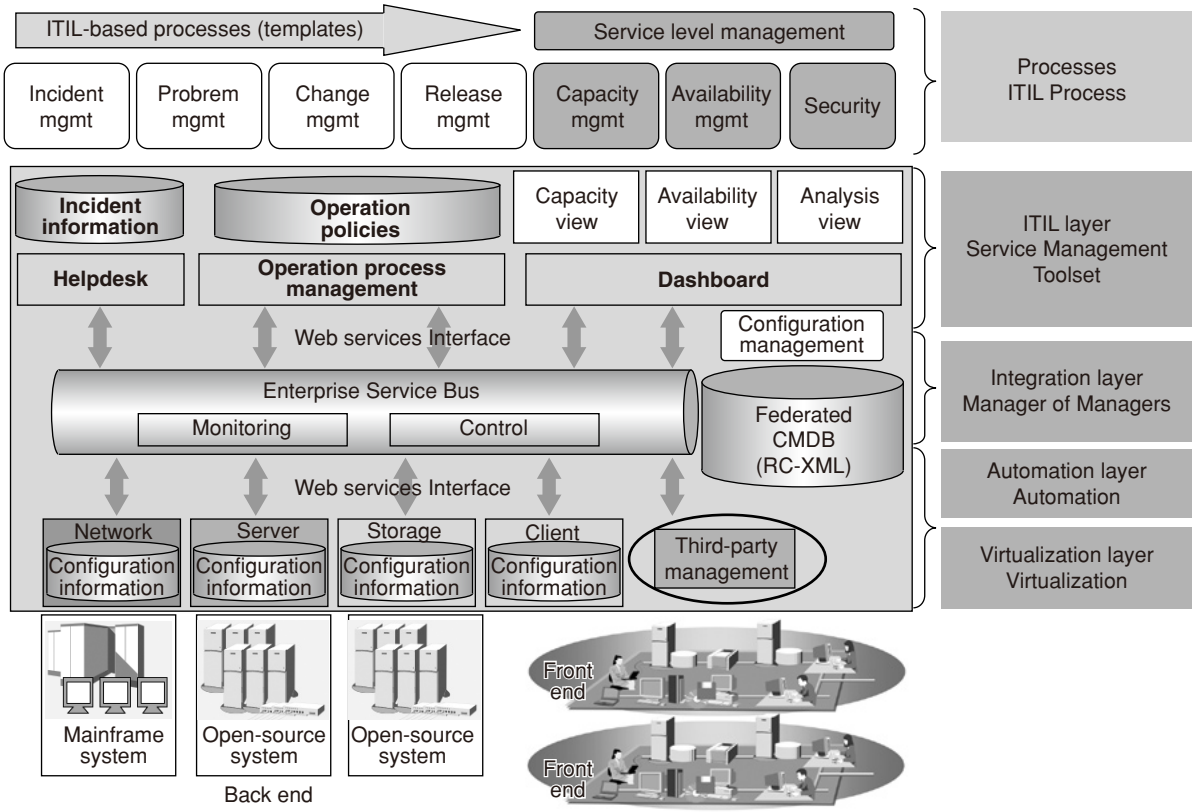


Figure 7
Systemwalker next-generation architecture.

types of management information about IT systems. The CMDB must standardize the information in a common format for use among the products of various layers. In the architecture of V13 CMDB, the Manager of Managers layer performs this standardization.

Management information, such as system designs, contracts with vendors, documentation and manuals for IT systems, and operations must be integrated in the CMDB, in addition to the management information collected from IT systems. Moreover, extendibility independent from any particular function is required to make CMDB available to the products of various layers. SOA-based architecture uses the XML schema called Resource Control XML (RC-XML) as its common management model to regulate all managed information, and manages access to this information at its original location (configuration information database for network, server, storage, clients, and third parties shown in Figure 7). This enables the centralized management of and uniform access to a variety of information and documents. This type of CMDB is known as a Federated CMDB. The purpose of using the RC-XML management model used here is standardize the management information.

The second characteristic is to provide IT service management functions as Web services. For example, inventory information is used in incident management and change management processes, as well as for budget management and financial management purposes. Thus, inventory information must be able to be accessed from any management function at any time. With the IT service management functions created as Web services, the functions of the integration layer and automation layer can be used at any time, as required, from the ITIL layer products.

7. Conclusion

In implementing IT service management, Systemwalker provides the following useful solutions:

- By visualizing the service support processes of ITIL such as incident management, problem management, change management, release management, and configuration management, it reduces the number of problems caused by human error.
- By visualizing the service delivery processes of ITIL such as service level management, it improves the quality of IT service management.
- It reduces the costs for integrating IT management of multi-vendor systems and hybrid platforms.

As the next step, Fujitsu intends to create a new management environment where two or more IT service management systems can intercommunicate. Fujitsu will provide such new functions in V14 based on the SOA-based architecture.

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