



Optimizing Your Data Center

Using Microsoft® System Center

Published: May 2008

For the latest information, please see <http://www.microsoft.com/systemcenter>

Content

Introduction	2
The Changing Data Center Landscape	3
Resource Constraints and Efficiencies.....	4
Increasing Demands on the Data Center	4
Aligning Solutions with Business Processes	4
Microsoft Data Center Management Solutions.....	6
Configuration Management Solution	7
End-to-End Monitoring Solution	7
Server Compliance Solution	8
Data Protection and Recovery Solution	8
Benefits of the Solution-Driven Approach	9
The Microsoft System Center Server Management Suite Enterprise.....	9
Conclusion	9
Microsoft System Center Products	10

Introduction

IT organizations are re-evaluating their strategies for managing data centers. Increasing demands from the business, rapid advances in technology, limited IT resources, and new regulatory and compliance standards are driving data center managers to change how they operate. Higher energy costs and limited space in the data center require new ways to better manage resources more efficiently. At the same time, more mission-critical systems and line-of-business applications are being moved into the data center, with organizations requiring them to be continually available and responsive around-the-clock, all while delivering superior levels of service to the end customer. Additionally, regulatory requirements are driving the need for increased security, continuous data protection, and control and collection of information.

To help alleviate the growing pressures in the data center, IT organizations must address four main challenges:

- Servers need to be consolidated and optimally configured to address increasing power and space concerns. At the same time, a disproportionate amount of time and resources are spent on provisioning and maintaining servers in the data center. With a growing number of servers being moved into the data center, this problem is being compounded.
- Systems must be highly available and responsive to meet the needs of the business. More line-of-business applications and mission-critical systems are being managed in the data center, making service-level management a top priority. Systems and applications span multiple heterogeneous environments and are interdependent, making a single outage anywhere in the environment more critical.
- Compliance mandates and processes require auditing and reporting of an increasing amount of information regarding the data center environment. Additionally, these compliance requirements are putting more responsibility on the shoulders of data center managers to enforce configuration controls, along with access and data retention policies.
- Critical data must be safeguarded and unplanned outages must be minimized or eliminated to help reduce data loss and risk in the data center. If one location fails, systems must be automatically distributed to working locations to ensure business operations are continuous and uninterrupted. If an outage does occur, the system and mission-critical data must be recovered and quickly restored to the original operating state.

This paper explores these trends and challenges before examining how Microsoft System Center data center management solutions help IT organizations reduce costs while helping meet the needs of the business, regulators, and end customers. System Center data center management solutions provide a unified, extensible management solution for the physical and virtual data center environment to lower costs, improve efficiencies, and ensure the servers, applications, and services in the data center remain available.

The Changing Data Center Landscape

The increased demands on enterprise data centers stem from new business realities, including increased energy costs, the need to deploy and manage applications that require higher availability and increased service levels for uptime and responsiveness, and regulatory compliance requirements for data retention and security. In response to changing business demands, IT organizations are looking at ways to optimize their data center operations. Data center managers are launching projects to consolidate physical data center servers and implement green computing practices, both of which reduce costs by lowering data center power consumption. To meet service-level agreements, control costs, and satisfy critical business requirements, IT organizations are re-evaluating their data center strategies.

Virtualization

Server virtualization has enabled businesses to reduce costs and improve business continuity within the data center. Virtualization blends economies of scale with the efficiencies gained from shared systems. For example, IT organizations can use virtualization to reduce server interruption and enhance data center scalability. Separating workloads from hardware dependencies allows rapid workload provisioning and deployment, which reduces time and labor. Virtual build/test environments streamline test and development efforts and simplify application migration.

Although the benefits of virtualization can be substantial, the ease of adding virtual servers has resulted in numerous unaccounted-for virtual servers. This virtual machine “sprawl” has brought unique challenges related to accountability and management. As new virtual machines are created and others are moved from server to server, data center managers need to track accountability. Determining who is responsible for responding to technical and service issues becomes more complex as virtual machines multiply.

Server and Data Center Consolidation

Consolidation brings existing servers into one location and combines applications and storage from multiple servers into a smaller number of more capable devices. An intrinsic benefit of consolidation is the cost savings that result from reduced physical space and reduced duplication of applications and physical devices. Virtualization plays an important role in server consolidation, with powerful 64-bit servers hosting dozens of guest operating systems that deliver features and functionality to enterprise users. A recent report shows that 81% of customers will consolidate servers within the next 2 years, with 63% consolidating within 1 year.* Managing ongoing virtualization and consolidation projects is an increasingly complex task for data center managers.

Regulatory Compliance

Regulatory requirements are also a big concern for data center managers. Broad regulatory issues (such as Sarbanes-Oxley, the European Union Data Protection Directive, etc.) and industry-specific concerns (such as HIPAA and SEC Rule 17-4) can place a significant financial and resource burden on IT management infrastructures. Compliance with internal policy and auditing requirements often puts extra demands on a data center because companies must retain more data and ensure the integrity of the data by protecting it from

* (Server Consolidation Trends Connect Survey, 2007).

alteration. In addition, companies must secure the data through encryption and storage behind firewalls.

Resource Constraints and Efficiencies

While data centers help businesses effectively address their complex IT environments, they also require those responsible for the data center to effectively manage their available space, provide for increased power to run servers, and address the need for cooling that results from dense, heat-generating racks of equipment.

Data centers require more processing power to meet the growing data and computing needs of the enterprise. Therefore, dealing with the data center environmental issues (space, power, and cooling) has become a priority for businesses today. According to the U.S. Environmental Protection Agency, data centers alone consumed about 61 billion kilowatt hours of electricity in 2006 (about 1.5% of all electricity used in the United States that year) and will consume 5% of the total energy used in the United States by 2009†. Research has shown that data centers spend 50% of their budgets on power and cooling, and that amount is expected to grow to 70% by 2010.

Regardless of the financial costs, the data center manager must address space, power, and cooling issues to keep the system up, available, and responsive to the needs of the business.

Increasing Demands on the Data Center

The changes in IT environments bring greater demands on data center managers. More applications that need increased storage and processing power are being deployed in data centers. The typical enterprise data center comprises several thousand in-house and packaged ISV applications. Successfully managing interconnected applications and services has become vitally important. Multiple existing heterogeneous platforms often increase the complexity of managing the data center. Service-level monitoring—including real-time performance, health, and application behavior monitoring—helps ensure that critical systems stay up and running and allows the data center to deliver the services users demand.

Most IT application resources are being consolidated into data centers, where traditional IT functions such as backup, restore, and disaster recovery take on a much higher profile. These tasks must be planned and implemented as part of a comprehensive data center management solution.

Aligning Solutions with Business Processes

As enterprises change their business processes, data center managers need new strategies to manage applications and systems across the IT infrastructure. Microsoft System Center data center management solutions provide a cohesive approach for end-to-end business process and IT lifecycle management.

End-to-End Management for Business Processes

Today's heterogeneous IT environments need solutions that provide end-to-end service management of the IT infrastructure. Ensuring interoperability among disparate systems and effectively managing interconnected data center systems are key objectives for data center

† (Report to Congress on Server and Data Center Energy Efficiency, Public Law 109-431, U.S. Environmental Protection Agency, August 2, 2002)

managers. Many IT organizations operate a mix of Microsoft applications and operating systems, Linux and UNIX systems, and non-Microsoft virtualization technologies such as VMware.

Monitoring interconnected and cross-platform environments is an important requirement of service-level monitoring and business-service management initiatives. An IT problem rarely has only one potential cause. Data center managers must often identify every possible source of trouble. When the problem is the result of the interaction between different systems, such as configuration problems with servers and applications, solving those problems can be time-consuming and expensive.

Data center managers need solutions that can tell them, at a glance, the state of their data center environment. The solution must not only monitor system health, but also monitor the current state of applications and ongoing projects within the data center.

Microsoft System Center data center management solutions enable interoperability by adopting standards—such as the [WS-Management](#) specification and the [OpenPegasus](#) standard—providing, for example, the ability to manage Linux and UNIX systems alongside Windows systems.

Managing the IT Lifecycle

In addition to managing business processes, IT organizations must manage the IT lifecycle as new applications are deployed, new servers are installed, and older hardware and software applications are removed. The data center management lifecycle is a continuous process of planning, building, deploying, and managing. As one IT project closes, the next is already well into its lifecycle. The Microsoft System Center data management solutions approach is unique because it lets IT managers address the entire IT lifecycle.

For example, IT managers can use the System Center solutions to:

- **Plan** application deployments using features that let them evaluate existing capabilities and conduct “what-if” capacity analyses.
- **Build** and package appropriate software components to be deployed.
- **Deploy** the selected configurations to the appropriate targets.
- **Manage** not only the deployed applications but also the end-to-end process, regardless of whether the deployment is to physical or virtual servers, or a combination of both.

System Center data management solutions align with each stage of the IT lifecycle and with the business processes implemented in the data center. In addition, the solutions help monitor the multi-platform, interconnected applications and hardware that constitute the data center structure. Greater interoperability, openness, and choice are benefits that System Center data center management solutions offer to help manage the changing data center environment.

Microsoft Data Center Management Solutions

System Center's integrated solutions enable data center managers to optimize resources, improve visibility of IT assets and issues, meet service levels, and increase efficiencies—all while decreasing costs. The Microsoft System Center Data Center Management integrated solutions provide:

- Configuration management: Automated provisioning and updating with server consolidation through virtualization.
- End-to-end monitoring: Application and service-level monitoring with proactive platform monitoring.
- Server compliance: Configuration controls and reporting plus centralized audit of system security.
- Data protection and recovery: Backup and restore in addition to business continuity through server virtualization.

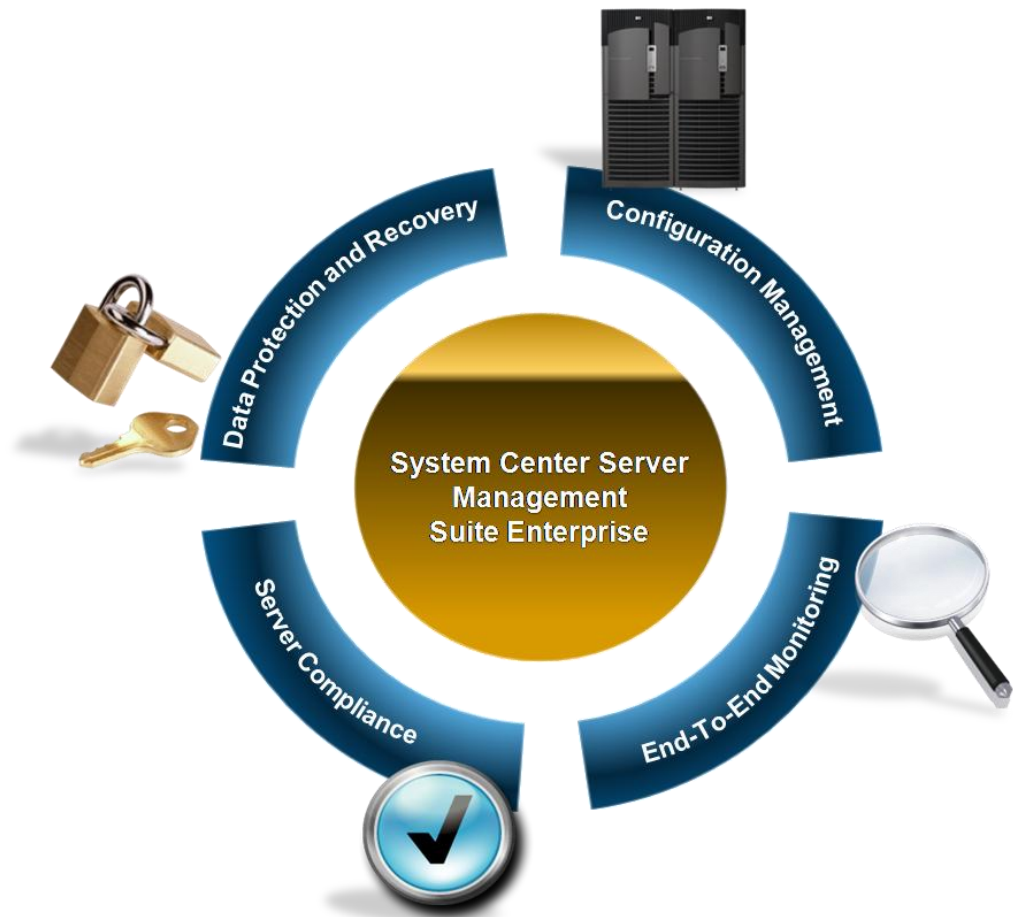


Figure 1 - System Center Data Center Management Solutions and the Server Management Suite Enterprise

Microsoft data center management solutions often include Solution Accelerators to drive quicker time to value. Solution Accelerators are combinations of documents, guides, and software tools assembled to give IT professionals a best-practices methodology of well-tested

techniques and tools to accomplish a specific goal. Some of these Solution Accelerators include:

- Security Compliance Management Toolkit - Automates security checks, verifies security baselines, and identifies baseline-setting changes or drift from prescribed values.
- Microsoft Deployment and Microsoft Assessment and Planning Solution - Enables rapid deployment by providing guidance and tools for project planning and deployment.
- Service Level Dashboard for System Center Operations Manager 2007 - Monitors and reports service levels through an IT service/service-level agreement (SLA) dashboard.
- Offline Virtual Machine Servicing Tool - Provides a way to automate the process of updating virtual machines with the latest OS patches.

Additionally, the System Center data center management solutions can be augmented to include Microsoft service offerings. These offerings can help IT managers take advantage of best-practice skills and knowledge for optimizing their data center infrastructures. The service offerings assist in deploying end-to-end management, implementing robust security tools, enabling comprehensive disaster recovery capabilities, deploying enterprise-wide identity management, and consolidating servers through virtualization.

Configuration Management Solution

To help data center managers deal with the increasing number of servers and applications deployed in the data center, and to support consolidation to fewer physical machines, the System Center data center configuration management solution provides a centralized method of managing the automated provisioning of software and servers, both physical and virtual. The solution provides:

- ***Automated provisioning and updating*** of servers by centralized management of physical and virtual server software deployments in the data center.
- ***Server consolidation through virtualization*** by converting, provisioning, and managing virtual machines to consolidate physical servers.

The solution helps cut costs by reducing power consumption, optimizing IT resources, and improving efficiency. The solution also keeps applications and operating systems updated and patched. Finally, the solution provides management of virtualization for server consolidation.

The provisioning capability becomes increasingly important given that the number of virtual servers is expected to grow at a rate far exceeding that of physical servers. Current estimates put the number of virtual servers currently in use in corporate environments at about 500,000, with expected growth to almost 8,000,000 virtual servers during the next two years.

End-to-End Monitoring Solution

The System Center data center end-to-end monitoring solution provides the capability to see across the entire enterprise application environment, regardless of complexity, and identify any potential problems that affect business process and workflow. The solution provides:

- ***Proactive platform monitoring*** of availability, performance, and configuration to identify potential problems.
- ***Application and service-level monitoring*** for proactive operational management.

This solution leverages an open and extensible platform to help ensure that IT services, applications, and servers run smoothly and are meeting service levels to ensure optimal

uptime and responsiveness. End-to-end monitoring delivers a seamless, cross-platform monitoring solution with support for many platforms found in the data center (Windows, Linux, and UNIX) and support for open standards related to systems management and monitoring. The end-to-end monitoring solution also can interoperate with third-party management systems through open standards and connectors.

Server Compliance Solution

To reduce the burden put upon data center managers from internal and external compliance requirements, the System Center data center server compliance solution provides configuration controls, consolidated reporting, and centralized collection and auditing of security events. Data center managers can now more easily satisfy the requirements of auditors, evaluate the effects of compliance on business policies, and see an overall improvement in server security. The solution provides:

- **Configuration controls and reporting** to create, maintain, and report configuration controls for the data center environment.
- **Centralized audit of system security** for gathering and reporting security-related events.

The server compliance solution maintains a secure environment and helps ensure compliance with corporate system policies by gathering and reporting security-related events. It also creates, maintains, and reports on configuration controls while checking compliance with policies developed in relation to external regulatory requirements such as the Federal Information Security Management Act (FISMA), Health Insurance Portability and Accountability Act (HIPAA), the Gramm-Leach-Bliley Act (GLBA), and the European Union Data Protection Directive (EUDPD).

Data Protection and Recovery Solution

The System Center data protection and recovery solution delivers backup and recovery capabilities for physical and virtual servers and applications. This enables data center managers to ensure they both protect vital organizational data and to ensure business processes can continue in the face of server failures. The solution provides:

- **Business continuity through server virtualization** to enable quick restoration of virtual machines in case of failure.
- **Backup and restore capability** to recover the data center's physical and virtual environment after an outage, data loss, or data corruption.

This solution is built around two capabilities to keep systems and applications available and to back up and restore lost data. The first capability uses virtualization technology to support rapid recovery of the virtual machine's operating system state. Through virtualization, workloads are load balanced over geographically distributed locations. If one location fails, the workload is automatically distributed over the remaining locations to ensure business continuity.

The second capability restores mission-critical enterprise data in the event of a power outage, data loss, or file corruption problem. This capability allows backup of Windows servers and applications to enable file recovery in minutes rather than hours. It enables lossless recovery of many applications, without the need for constant replication and synchronization, through continuous data protection. If an outage does cause a system or operations failure, the backup and recovery functionality enables rapid restoration of the data center environment.

This solution delivers improved responsiveness, simplified storage management, and higher availability for data centers.

Benefits of the Solution-Driven Approach

The Microsoft data center approach delivers the best combination of solutions to help IT managers meet data center objectives and address challenges. System Center data center management solutions provide the benefits of integrated management, optimized resources, and increased availability and responsiveness. The System Center solution-driven approach helps data center managers by:

- Reducing costs, improving efficiencies, and maintaining high availability through an integrated management system for the physical and virtual data center infrastructure. This approach provides a familiar interface across the solution, resulting in higher visibility of IT assets and issues as well as improved service levels, which can lead to reduced costs.
- Keeping mission-critical applications and systems in the data center up and running through deep knowledge from Microsoft.
- Enabling standards-based management and monitoring so that data center professionals can manage disparate software or hardware within the data center that adheres to the same industry standards.
- Providing the ability to manage cross-platform systems through extensibility and interoperability between Microsoft and third-party applications, services, and devices. The System Center solutions interoperate with Windows, Linux, and UNIX systems as well as with Microsoft and VMware virtualization technologies. Moreover, the solutions give business management systems and help desks greater interoperability and shared information.

Microsoft System Center Server Management Suite Enterprise

Businesses are optimizing their existing data center infrastructure by transitioning to a dynamic IT infrastructure. The Microsoft System Center Server Management Suite Enterprise provides the System Center products that together help IT organizations manage their physical and virtual environments. This license is a cost-effective way for enterprise IT organizations to acquire the core components of the System Center data center management solutions.

Conclusion

Enterprise IT organizations are looking for new strategies for managing their data centers to meet changing business demands. Data center managers must adapt to technology changes, meet increased service levels for uptime and responsiveness of systems and applications, ensure regulatory compliance, and optimize limited resources—all while reducing costs and improving efficiencies. Initiatives such as server consolidation and green IT practices help data center managers meet their objectives. But these initiatives also contribute to the complexity of the IT environment. In enterprise organizations with heterogeneous platforms, data center managers also need to address interconnected, cross-platform applications and systems. Data center managers need solutions that help them support business processes and manage the IT lifecycle across the infrastructure.

The System Center solutions help data center managers optimize resources, monitor IT assets and potential problems, and meet service levels. The Microsoft System Center Server Management Suite Enterprise is a cost-effective way for enterprise IT organizations to acquire

the core components of the System Center data center management solutions. These solutions help data center managers reduce costs, optimize resources, keep critical business processes up and running, and prepare the data center for future demands.

Microsoft System Center Products

For more information on System Center, see <http://www.microsoft.com/systemcenter>

For more information on Microsoft Solution Accelerators, see <http://technet.microsoft.com/en-us/solutionaccelerators>

For more information on Microsoft Consulting Services, see http://www.microsoft.com/services/microsoftservices/srv_coreio.aspx

For information on how to buy the Microsoft System Center Server Management Suite Enterprise, see <https://www.microsoft.com/systemcenter/svrmgmtsuites/howtobuy/default.aspx#ELB>

The information contained in this document represents the current view of Microsoft Corporation on the issues discussed as of the date of publication. Because Microsoft must respond to changing market conditions, it should not be interpreted to be a commitment on the part of Microsoft, and Microsoft cannot guarantee the accuracy of any information presented after the date of publication.

This White Paper is for informational purposes only. MICROSOFT MAKES NO WARRANTIES, EXPRESS, IMPLIED OR STATUTORY, AS TO THE INFORMATION IN THIS DOCUMENT.

Complying with all applicable copyright laws is the responsibility of the user. Without limiting the rights under copyright, no part of this document may be reproduced, stored in or introduced into a retrieval system, or transmitted in any form or by any means (electronic, mechanical, photocopying, recording, or otherwise), or for any purpose, without the express written permission of Microsoft Corporation.

Microsoft may have patents, patent applications, trademarks, copyrights, or other intellectual property rights covering subject matter in this document. Except as expressly provided in any written license agreement from Microsoft, the furnishing of this document does not give you any license to these patents, trademarks, copyrights, or other intellectual property.

© 2008 Microsoft Corporation. All rights reserved.

Microsoft, the Microsoft logo, People Ready, SharePoint, Windows, and Windows Vista are either registered trademarks or trademarks of Microsoft Corporation in the United States and/or other countries.

The names of actual companies and products mentioned herein may be the trademarks of their respective owners.