



Configuration Management in the Data Center

Using Microsoft® System Center

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Executive Summary

Data centers manage complex server environments, including physical and virtual machines, across a wide variety of platforms, and often in geographically dispersed locations. Data center managers are responsible for ensuring that servers in these increasingly complex environments are properly configured and monitored throughout the IT life cycle. Therefore, they seek solutions to help them automate the consolidation of servers through virtualization, the provisioning of new servers, and processes to keep systems current with the latest software and security updates. At the same time they need to work diligently on monitoring the health of their infrastructure, industry compliance regulations, and reducing the total cost of managing that data center.

The Microsoft System Center data center configuration management solution gives data center managers the tools to plan capacity for data center expansion, automate server provisioning and updating, monitor data center server configuration against server policy baselines, and quickly migrate server workloads from physical-to-virtual or virtual-to-virtual environments.

Introduction

Although data centers have automated some of the key processes for the management of their overall environment, data center managers are struggling to keep pace with the increasing number of deployments, servers, and applications. The contrasting forces of server hardware consolidation (often supported by server virtualization) and server centralization in the data center are placing increasing pressure on data center managers. The focus of the pressure is on the need to scale their efforts to the multitude of servers they must configure, deploy, and manage. Adding to this challenge is the need to accomplish this entire task with tighter budgets, personnel changes and the complexity in the IT environment.

The introduction of server virtualization, using technologies such as Microsoft Windows Server 2008 Hyper-V, breaks the tight dependency between hardware and the OS. With virtualization, multiple OSs (and thus multiple workloads or applications) can run on the same hardware. But while virtualization delivers improved hardware utilization, it greatly increases the number and scope of activities such as deployment, redeployment, and management of servers and workloads. It also introduces the risk of virtual machine sprawl: servers no longer have a one-to-one mapping to hardware, which means they can be configured, deployed, or powered down outside of normal control processes.

This white paper discusses some of the challenges associated with configuration management in the evolving data center and shows how the Microsoft System Center data center configuration management solution supports the effective planning, deployment, configuration, and management of physical and virtual servers in their increasingly complex environments.

Configuration Management in the Changing Data Center

Estimates are that one-half of unplanned system downtime, which can add significant strain to IT budgets, can be attributed to configuration problems. As an organization consolidates their server environments, and increase the number of applications and services their data centers are delivering, data center managers are forced to find ways to scale their processes without introducing prohibitive operational costs. While it is feasible to patch or update 50 or 60 servers manually, this approach becomes cost prohibitive (and introduces greater risk of human error) when data center managers must configure hundreds or even thousands of servers to optimize performance, while complying with organizational policies.

Data center managers are also under increased pressure to respond with more flexibility to increasingly variable business requirements that extend beyond availability or performance service level agreements (SLAs). They must be able to respond rapidly even as they optimize their use of resources in the long term by decreasing server deployment *and* de-provisioning time to meet demand and cost requirements.

Virtualization is one key technology that enables this more flexible approach. At the same time this supports the green IT, power management, and cost-control efforts that are driving server consolidation. But each server, whether physical or virtual, must be deployed and managed. Additionally, virtualization introduces a new management challenge for data center managers because they can no longer track or physically point to a piece of server hardware and categorically state which workloads or applications are deployed on it.

The number of management challenges this new reality in the data center presents are offset by significant prospective gains. These benefits include:

- More efficient server configuration, deployment, and management

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- Reduced hardware, space, and power costs through consolidation
 - Optimized use of server virtualization by maintaining control

The Microsoft System Center Data Center Configuration Management Solution

System Center provides a range of data center management solutions that help customers to proactively manage their environment. System Center delivers an integrated and extensible suite of solutions for configuration management, server compliance, end-to-end monitoring, and data protection and recovery that help lower costs while improving the overall operational efficiency of the data center.

The System Center data center configuration management solution automates server deployment, update, and patching, whether physical or virtual, in the data center. Automation reduces the cost of scaling to the reality of the modern data center; at the same time, it ensures that servers are configured to meet corporate policies. Additionally, the solution allows data center managers to intelligently consolidate servers using virtualization, while they manage both physical and virtual servers with a single solution.

The following sections detail the capabilities and benefits of the data center configuration management solution:

Automated Server Provisioning and Updating

- Centralized configuration management across the complete data center
- Automated software provisioning and updating
- Physical and virtual server management

Server Consolidation through Virtualization Management

- Intelligent server consolidation through virtualization
- Physical and virtual server management to make the most of hardware resources
- Optimized use of virtualization and avoidance of virtual machine sprawl via tools and best practices

Automated Server Provisioning and Updating

With applications and services introducing a larger number of servers, often spread across multiple pieces of hardware, data center managers must automate the server deployment, update, and patch processes to avoid prohibitive costs. Additionally, they must manage the configuration of these servers to prevent configuration “drift” (a process by which servers gradually become configured in ways that do not meet corporate policies or standards), as different administrators make changes over time based on perceived needs.

With the System Center data center configuration management solution, data center managers can build and deploy server images. These images can be based on authorized server baselines and templates and include all the required components from the server OS to specific applications and settings. Then, using a task-sequencing capability that automates all the steps of installation and deployment, data center managers can deploy these images automatically to groups of servers, and even “multi-cast” them to many servers at the same time, to further reduce their deployment time and efforts. With this solution, the deployment of virtual servers is also automated to ensure that the increased number of servers does not introduce additional costs.

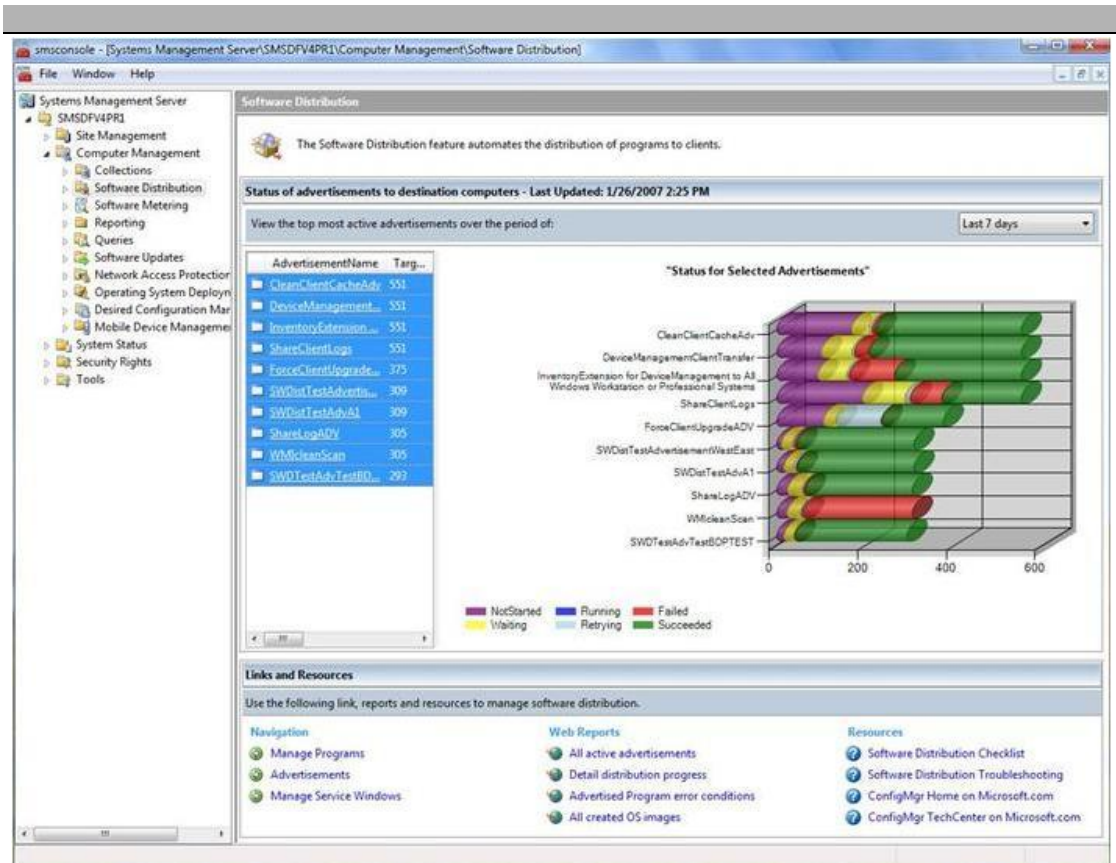


Figure 1. Reporting of Successful Deployment

To ensure compliance with corporate policies and avoid configuration drift, the solution provides Desired Configuration Management capabilities. The Desired Configuration Management feature compares the actual configuration of physical or virtual servers against defined baselines, and then takes remedial action if the servers have drifted from the desired configuration. Data center managers can access specific baselines and configuration guidance via Configuration Packs from Microsoft and its partners. These can be customized or be created from scratch by data center managers to compliment changing organizational needs. These capabilities automate the monitoring and enforcement of configuration policies for physical and virtual servers; they also allow the automation of key processes such as change management. For example, data center managers can automatically execute the deployment of server configuration updates for a specified collection of servers. Figure 1 shows a report of the success of one such deployment.

The solution also provides best practices and guidance to help data center managers design and deploy their servers. For example, it delivers capacity-planning capability that gives data center managers tools and guidance to simplify data center deployment planning. They can use “what-if” analyses to predict the impact of change which helps them:

- Plan the correct amount of infrastructure needed for a new application to meet service-level goals
- Proactively diagram how to meet current and future service-level goals
- Automatically analyze and report performance trends and bottlenecks to address current and future performance issues

The solution also assists data center managers in sizing and planning deployments of Microsoft server products such as Microsoft Exchange Server, Microsoft Windows SharePoint

Services, Microsoft Office SharePoint Server, and Microsoft System Center Operations Manager.

As Figure 2 shows, after they have created a system capacity model, data center managers can run a simulation that provides a summary and details about the projected performance of the application and its supporting components.

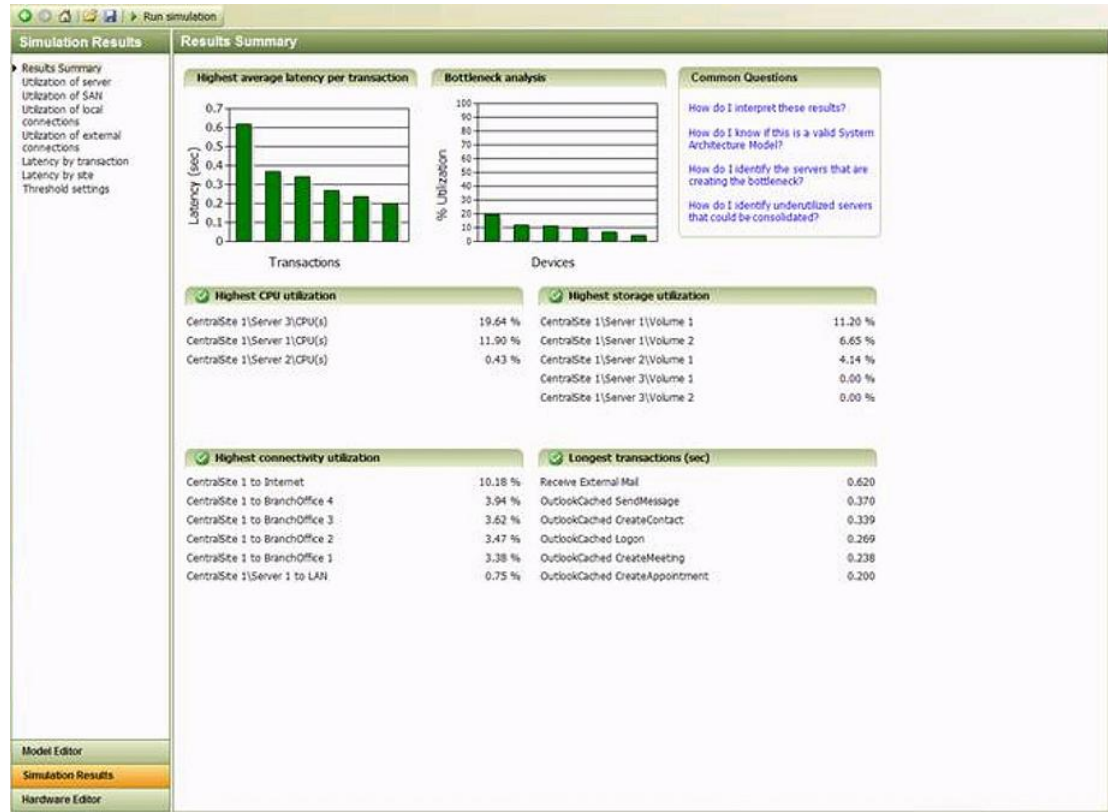


Figure 2: The configuration management solution provides a visual summary of capacity planning

Managing Server Consolidation through Virtualization Management

With the emergence of more robust power management, green IT, and cost-management policies in the data center, server consolidation is becoming a key trend. The adoption of server virtualization technologies is accelerating this trend, but these technologies also introduce new management challenges. More virtual servers are being deployed onto single pieces of hardware, yet each server requires the same management as individual physically deployed servers require. Additionally, minimizing the risk of virtual machine sprawl requires that managers be able to track virtual servers, monitor their performance, and ensure compliance with corporate policies wherever those servers are deployed. Meanwhile, data center managers can take advantage of virtualization to respond more rapidly to changes in demand for resources without having the resources permanently dedicated and available.

With the data center configuration management solution, data center managers can use virtualization to intelligently consolidate hardware. They accomplish this by using historical performance data to automatically identify servers in the data center that are currently underused and so are possible candidates for virtualization. Once they have identified appropriate servers, the solution can quickly perform the conversion from physical to virtual,

and then place the virtual server on the most appropriate host based on its resource requirements. Data center managers also can apply this process to the conversion of virtual servers to the Microsoft Virtual Server or Hyper-V format.

Automating Virtualization Deployment, Configuration, and Updating

To automate virtualization deployment and configuration, data center managers can create a library of virtual machine templates by defining virtual machine images and adding them to a library that is accessible to all virtual servers in the environment. Doing this allows managers to distribute templates to multiple locations, and thus automate the deployment process when a new virtual machine is needed on any host server in the environment.

The data center configuration management solution also enables data center managers to effectively and securely patch and upgrade online and offline virtual machines using automated tools. They can apply desired configuration baselines to easily monitor a virtual environment and receive near real-time information about servers that are improperly configured and need patches or updates.

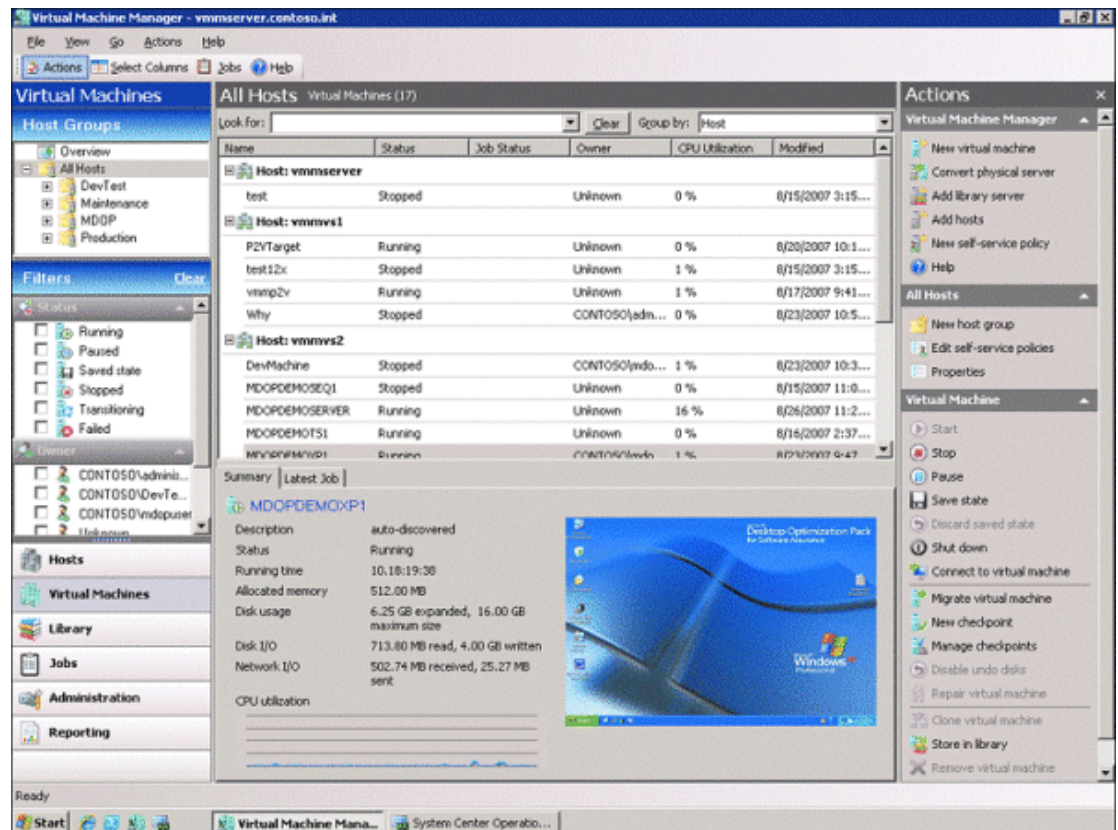


Figure 3. Easily manage virtual servers across the data center through a consolidated view.

By building and maintaining a library of virtual servers to meet explicit requirements, data center managers can rapidly provision those servers with the appropriate workloads, for quick response to changes in demand for specific services or applications.

The solution provides the capabilities to both consolidate the data center server environment via virtualization and manage that environment over time (including managing non-Microsoft virtualization technologies such as VMware™ ESX). With this solution, data center managers can manage the complete server life cycle, whether the server is physical or virtual. They can monitor, patch, update, secure, and back up not only the virtual server itself, but also the

workload or application running within the server. Thus data center managers can employ the complete System Center capabilities for both physical and virtual servers through a single “pane of glass.”

The Microsoft System Center Server Management Suite Enterprise

Businesses are optimizing their existing data center infrastructure by transitioning to a dynamic IT infrastructure. With a comprehensive set of solutions for managing the physical and logical IT environment, the Microsoft System Center Server Management Suite Enterprise license is an ideal solution for IT organizations that want to optimize their changing data centers.

The suite provides an integrated combination of the System Center data center management solution core components. The suite provides an easy, cost-effective way to acquire the System Center data center management solutions for complete server management of departmental or enterprise server environments

Conclusion

The System Center data center configuration management solution gives data center managers powerful tools for planning, deploying, configuring, and managing their entire physical and virtual environments. The solution reduces complexity by automating server provisioning and updating tasks throughout the organization.

The solution also helps data center managers automatically deploy virtual servers and migrate workloads from physical servers to virtual machines. System Center monitors the entire environment to verify that all physical and virtual systems are properly configured and up to date.

The System Center data center configuration management solution simplifies data center management by automating configuration management, optimizing IT resources (which support green IT through decreased power usage, etc.), streamlining server consolidation through virtualization, and improving data center availability and efficiency.

Additional Tools and Resources

Microsoft System Center

<http://www.microsoft.com/systemcenter>

System Center Management Pack Catalog

<http://www.microsoft.com/technet/prodtechnol/scp/catalog.aspx>

System Center Configuration Manager 2007

<http://www.microsoft.com/systemcenter/configmgr>

System Center Operations Manager 2007

<http://www.microsoft.com/systemcenter/opsmgr>

System Center Server Management Suites – How to Buy

<http://www.microsoft.com/systemcenter/en/us/management-suites.aspx>

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