

INTRODUCTION

To meet the constant demand to deploy, maintain and grow a broad array of services and applications, IT organizations must continually evaluate the need to add new infrastructure. As organizations add more capacity, capital and operational expenditures grow in proportion.

Server Virtualization is a game-changing technology for reducing these expenses; however, to realize the full promise of an optimized datacenter, IT Pros need to think beyond the Compute infrastructure and consider options for Storage and Networking components while factoring in the need for integrated management throughout the stack.

IT OPTIMIZATION SOLUTION OVERVIEW

Microsoft® Windows Server® 2008 R2 and Microsoft® System Center form the core of an optimized datacenter. By leveraging both, Microsoft IT Optimization solutions combine the components of the compute infrastructure with capabilities of leading storage and networking partners, helping reduce capital expenses, operational expenses, server sprawl as well as power and cooling costs.

Solution Components

Supplemental to server consolidation, the impact of storage and networking must also be considered in order to fully realize the possibilities for efficiencies in the datacenter. Microsoft® Windows Server® 2008 R2 provides the ideal platform for integrating storage and networking technologies by delivering leading interface support for storage and networking. Additionally, Microsoft® Windows Server® 2008 R2 Hyper-V™ helps customers consolidate their Compute infrastructure through server virtualization.

Microsoft® System Center provides comprehensive management for both physical and virtual assets, critical when integrating the Compute, Storage and Network stack. Organizations require management software that fully integrates virtualization capabilities and extends into storage and networking. With System Center, they have one interface to manage both physical and virtual assets.

Microsoft's comprehensive IT Optimization solutions leverage Windows Server 2008 R2 and System Center along with the capabilities of the industries leading partner ecosystem so organizations can achieve the maximum return on their IT investment optimizing 1) Compute 2) Storage and 3) Network infrastructure.

1. COMPUTE INFRASTRUCTURE

In server consolidation, physical servers are converted to Virtual Machine (VM) files, which can be centrally stored and managed and

dynamically deployed based on load and available resources. This reduces the number of required physical machines, while dramatically improving server utilization and business agility.

Microsoft® Windows Server® 2008 R2 Hyper-V™ is a scalable flexible, cost-effective tool that provides the server virtualization capability in Microsoft's IT Optimization solution. Based on a familiar Windows interface, Hyper-V allows IT staff to manage VMs at lower training cost and is included as a role in Windows Server 2008. It does not require any additional software licensing, providing a cost effective option for service consolidation to optimize the Compute infrastructure.

- Hyper-V supports servers with more than 32 GB of RAM and more than four processors. This allows one to create high performance host servers that help dramatically improve hardware utilization in the datacenter.
- Hyper-V VM live migration allows one to move running VMs between Hyper-V hosts. This feature provides fast failure recovery, increases availability and minimizes VM downtime. New services can be provisioned in a matter of minutes, rather than days, when using Hyper-V.
- Multiple VMs running on a Hyper-V host require less space, less cooling and fewer kilowatt hours of power compared to separate physical servers. Windows Server 2008 R2 has state of the art power management features to help further maximize power savings.

2. STORAGE INFRASTRUCTURE

Microsoft's IT Optimization solutions leverage a number of leading storage technologies to help customers reduce investment and complexity in the datacenter. In addition, many virtualization benefits such as VM migration are enabled through shared storage.

- Windows Server 2008 R2 and Hyper-V have outstanding support for popular storage approaches like Direct-Attached Storage (DAS) and Storage Area Network (SAN) with flexible, industry leading performance for iSCSI, 10GB iSCSI and Fibre Channel.
- Windows Server 2008 R2 provides the foundation for integrating with a range of storage partners who are continuing to innovate with a range of functionality to optimize the datacenter. The Microsoft partner ecosystem provides a number of functions including storage virtualization, deduplication and thin provisioning.

By delivering powerful storage functionality in conjunction with server consolidation, Microsoft and the storage partner ecosystem provide value-added capabilities to help further increase datacenter efficiency and cost savings.

3. NETWORK INFRASTRUCTURE

As applications are virtualized in increasing numbers and businesses use server virtualization to enable high availability and disaster recovery, the network infrastructure must evolve to be more robust and intelligent to accommodate VM migrations.

Windows Server 2008 R2 offers an excellent foundation to implement virtualized networks by providing a robust platform for optimizing the datacenter network infrastructure via TCP/IP Offload and Jumbo Frame support.

- TCP Offload allows a VM to allocate the network processing load onto the NIC of the host computer. This works the same as in a physical TCP Offload scenario - Hyper-V now extends this functionality into the virtual world. This benefits both CPU and overall network throughput performance and it's fully supported by Live Migration.
- Windows Server 2008 R2 extends Jumbo Frame capabilities to VMs. So, just like in physical network scenarios, Jumbo Frames add the same basic performance enhancements to virtual networking. That includes up to six times larger payloads per packet, which improves not only overall throughput but also reduces CPU utilization for large file transfers.

Additionally, Microsoft's IT Optimization solutions address the cost and complexity of deploying and managing the virtualized datacenter by delivering interfaces to support a broad range of network equipment.

4. INTEGRATED MANAGEMENT

Though virtualization can increase IT efficiency, it carries the risk of increased complexity, especially when dealing with the integration of Compute, Storage and Network capabilities. In addition, even the most extensive use of virtualization will include physical components that necessitate monitoring and management.

Effective management software is critical to the optimized datacenter. It must:

- Have visibility into the entire IT infrastructure from the physical layer through the virtualization and OS layers to the application layer.
- Be able to show causal relationships between infrastructure components.
- Not treat VMs as black boxes.

Microsoft® System Center is the only management product that provides this level of comprehensive management and monitoring capabilities for the virtualized datacenter. System Center provides one interface to manage physical and virtual assets, including hypervisors from Microsoft and VMware. It allows management of virtual and physical environments with the same levels of specificity and uses common deployment, provisioning, monitoring

and backup methodologies across both.

With System Center's VMM Performance and Resource Optimization (PRO) feature, System Center's visibility into the health and performance of all layers of the infrastructure can be leveraged. IT staff can automate their datacenter across the Compute, Storage, and Network stack, delivering better responses to changing conditions in the datacenter. This automation ensures that the infrastructure will dynamically respond to changing system and network variable to make sure they run efficiently. For example, if a link to SAN storage is overloaded, System Center can redistribute VMs among Hyper-V hosts in the cluster to better manage the load.

As an extension of the existing Windows Server 2008 R2 model, the management of virtualized hosts (and the data those hosts contain and manipulate) is already supported by the complete suite of existing Windows Server 2008 R2 management tools provided by Microsoft. Specific tools, such as the Microsoft System Center Virtual Machine Manager (VMM), provide for simplified migration to, and management of, virtualized environments.

MICROSOFT IT OPTIMIZATION SOLUTIONS DELIVER

As IT organizations juggle the calls for added capacity against the corresponding rise in capital and operational expenditures, they look to bolster efficiency within the datacenter to provide a happy medium. By leveraging Microsoft® Windows Server® 2008 R2's capabilities for server consolidation and storage and networking integration and Microsoft® System Center's comprehensive management capabilities for both virtual and physical assets, IT organizations are able to fully integrate Compute, Storage and Network infrastructures and achieve the best Total Cost of Ownership for virtualized environments.