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TOP FIVE REASONS — AT A GLANCE

1. Improved performance with storage that responds quickly to increased workloads
2. Simplified management that easily allocates storage capacity to each virtual machine
3. Industry leading price performance with enterprise-class storage features
4. Improved efficiencies and lower operating costs
5. Flexible storage that scales as virtualization demand grows

Top Five Business Reasons to Use Hitachi Modular Storage in Virtualized Server Environments

Organizations are enthusiastically adopting server virtualization because of its tremendous business benefits. As a result, deployment of server virtualization has never been higher, and it keeps growing.

But many organizations make the critical mistake of overlooking the crucial role storage plays in these environments. Research shows that the storage choices organizations make today to support their virtualized environments can directly impact — good or bad — their businesses tomorrow. As one proof point, a March 2009 research report in *Network World* shows the direct effect storage choice has on virtual server performance, data protection and storage utilization.[1]

[1]"Virtual servers drive storage consumption," Shurr, Amy, *Network World*, March 3, 2009.
http://www.networkworld.com/newsletters/itlead/2009/030209itlead1.html

While selecting the right storage is important during all phases of server virtualization deployment, it is increasingly vital as the scope of deployments widens to include more business critical applications and hundreds and thousands of virtual machines. As these environments evolve, capacity, management and especially performance issues can quickly spiral out of control. Once "manageable" issues can inhibit business, preventing organizations from meeting service level agreements and cutting costs.

Following are the **Top Five Business Reasons** organizations tell us they are deploying the Hitachi Adaptable Modular Storage 2000 family in their virtualized environments.

Top Five Reasons to Use AMS2000 in Virtualized Server Environments

Reason 1: Improved Performance

If an organization's storage isn't up to the task, it can dramatically erode any benefits derived from virtualization. Storage needs to respond quickly to increased workloads and overcome I/O bottlenecks automatically. But administrators don't have the time or resources to constantly tweak the performance characteristics of their storage systems. As overall workloads increase, storage systems need to scale easily, without time consuming or costly upgrades.

Hitachi Dynamic Load Balancing Controller and symmetric, active-active controllers at the heart of the Adaptable Modular Storage 2000 family distribute workloads across all paths connected to the controller. This ensures automatic distribution of I/O with little or no intervention, regardless of how traffic ebbs and flows across the attached server environment. This is in stark contrast to the way all other midrange storage solutions balance workload.

For systems with asymmetric, active-active or active-passive controllers, this type of balancing in a server virtualization environment is a detailed, manually intensive process, adding hours to storage configuration and maintenance.

Also, the Hitachi symmetric, active-active controller architecture eliminates I/O path thrashing and performance degradation, which in severe cases can lead to application failures and time-outs. This thrashing can occur in active-passive controller environments when two hosts access the same LU (logical unit) through the same controller, making the LU unavailable to either server. Because controllers are often shared over multiple hosts in virtualized environments, this condition can slow system performance considerably, which can degrade performance benefits realized through server virtualization. Hitachi symmetric active-active controller technology distributes paths across all controllers, eliminating thrashing risks and application degradation.

Asymmetric, active-active, storage systems can experience degradation when I/O is passed between controllers. While load balancing and a reduction in path thrashing can be reduced in other storage environments, it requires many additional management tasks and time intensive configurations to complete and does not easily adapt to dynamic workloads.

Hitachi symmetric active-active controllers and Dynamic Load Balancing Controller solve both of these potential performance problems.

Reason 2: Simplified Management

Managing disk capacity in virtualization environments can be time consuming, complex and costly. Many companies overprovision the storage for virtual machines as a result, relying on machine templates to allocate space, hoping that one size will fit all. Also, setting up storage that must host multiple virtual servers can require significant configuration to achieve optimal performance. I/O bottlenecks can kill virtual server applications.

EASE "GROWING PAINS" WITH VAAI

As VMware use becomes more pervasive across the data center, integration between storage and virtual server environments becomes increasingly important. With it, virtual server performance, virtual machine density and management are improved significantly. Conversely, without it, the very scalability and efficiency that VMware promises is limited. In fact, the lack of integration between storage and servers is actually causing virtualization adoption to plateau, as organizations wrestle with the challenges of managing separate server and storage workloads.

While enterprise IT environments are likely to experience "growing pains" of fast-growing VMware environments most acutely, midsize and large organizations are far from immune from the effects. And, importantly, all can all benefit from server and storage integration.

The VAAI Factor

In partnership with VMware, Hitachi Data Systems has developed vStorage APIs for Array Integration (VAAI). These APIs enable storage processing to be offloaded from the VMware ESX host to the storage environment, which has important performance, scalability and management benefits for IT environments.

Specifically, this integration enables three important new features:

- **Hardware-assisted locking.** This feature allows block-locking tasking to be done by the storage system versus in the VMware ESX kernel, which results in fewer SCSI reserve conflicts, easier storage configuration and larger data stores. *What This Means:* Improved server performance and scalability, and storage utilization. (Further efficiencies can be realized when combined with Hitachi technology. See bullets below.)
- **Full copy.** This feature allows the storage system to make full copies of data without involving ESX servers. *What This Means:* More efficient and less resource-intensive cloning and vMotion operations.
- **Block zeroing.** This feature allows storage systems to "zero out" a large number of blocks, which speeds up the provisioning process. *What This Means:* Faster provisioning and better "virtual density," which is a big "plus" for VMware cloning or VDI deployments.

The Hitachi Factor

By integrating with VMware, Hitachi also gives organizations access to its powerful dynamic provisioning and load balancing active-active symmetric controller technology, which can further optimize vSphere environments by improving performance, scalability and utilization.

- **Hitachi Dynamic Provisioning.** This feature allows organizations to create a storage pool from which capacity can be drawn, as needed, to support the VMware environment. *What This Means:* Better storage performance, scalability and utilization.
- **Hitachi Dynamic Load Balancing Controller.** This active-active symmetric controller technology distributes vSphere workloads across all paths, which eliminates I/O path thrashing. *What This Means:* Improved performance.

Hitachi Dynamic Provisioning software allows the RAID groups to be placed in a pool and LUs to be allocated from the pool. Data is striped across all disks in the pool, eliminating the uneven workload at the disk level and relieving the system administrator from the complexity of host-based striping. Hitachi Dynamic Provisioning software also lets administrators quickly allocate the right amount of storage to virtual machines as needed.

The Hitachi Adaptable Modular Storage 2000 family provides dynamic, automatic load balancing and path resolution, requiring a fraction of the setup and configuration of other storage systems. Because Hitachi storage systems are built to best optimize server virtualization, administrators spend less time configuring and reconfiguring storage when network demand and applications change, which can maximize cost savings in the virtualized environment.

Reason 3: Enterprise Features at an Affordable Cost

Reducing capital and operating costs is an essential benefit of virtualization. But many companies underutilize their storage capacity and spend little time researching how fast their storage really is in their virtualized environments. The Hitachi Adaptable Modular Storage 2000 family has the best value in I/O characteristics. Measured in I/O per second, Hitachi midrange systems consistently beat competing storage systems in benchmarks rating price and performance.

Hitachi midrange systems are designed to expand easily with no degradation in performance. The Adaptable Modular Storage 2000 family clearly excels in data protection and data replication tasks, as most data copy operations (for example, replication) are handled by the storage system, preserving valuable virtual machine resources. Other enterprise-class features include a 99.999 percent uptime rating with no single point of failure, scalability to 60TB, advanced RAID-6 capabilities and hot-swappable components and disks.

With all of these enterprise-class features in one affordable package, the Adaptable Modular Storage 2000 family is the price-performance leader in virtualized environments and, again, allows organizations to maximize performance benefits and cost savings.

Reason 4: Improved Efficiency and Lower Operating Costs

Ironically, greater efficiencies using server virtualization often means a proportional decrease in storage utilization. Part of the problem is proper management of storage provisioning in virtual environments. Administrators should look for storage solutions that provide thin provisioning and dynamic storage allocation to improve capacity efficiency and ease management burdens.

Hitachi Dynamic Provisioning software provides storage capacity to virtualized environments on the fly, through its simple administrative interface. Administrators allocate only the storage needed for a given virtual machine, rather than relying on machine templates that may overallocate or underallocate storage space. This saves disk space and purchases, and reduces energy and rack space requirements.

Hitachi Dynamic Load Balancing Controller and symmetric, active-active controllers distribute workloads across all paths connected to the controller. They stripe workloads across the environment and effectively minimize costly administrative management time.

Reason 5: Greater Flexibility

Virtualization deployment is growing. More and more applications are moving from traditional, physical servers to virtual resources. Storage is no different. Companies need storage systems that scale as virtualization demand grows, without sacrificing the savings that virtualization provides. Storage systems as an integral component of virtualization infrastructures should easily scale, preserve virtual resources and adapt to changing conditions.

The Hitachi Adaptable Modular Storage 2000 family of storage systems is an affordable choice for the data center and remote sites. Expansion is easy with a choice of SAS or SATA drives and up to 48 disks per expansion shelf, enabling companies to grow their capacity as needed.

When used behind Hitachi Universal Storage Platform® V and VM, the capacity of Hitachi midrange systems and third party storage can be pooled. This further leverages virtualization benefits:

- Preserves your investment in existing internal and external storage
- Extends the cost benefits of virtualization to both servers and storage

The Bottom Line

The Hitachi Adaptable Modular Storage 2000 family complements virtualized server environments by providing a flexible, powerful, highly available and cost-effective storage environment to support evolving virtualized environments.

Administrators can define specific storage needs in their virtualization environments. With years of experience working with VMware and Microsoft Hyper-V, Hitachi Data Systems service specialists can assist administrators in selecting the storage solution that best fits their business requirements today and, importantly, tomorrow. Hitachi storage systems can also add an additional layer of protection and business resilience to VMware and Hyper-V environments.

For more information, visit www.hds.com.

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