

Enabling the Virtual Data Center: Hitachi Virtual Storage Platform for VMware



Predictable, Adaptable Storage via Integration and Automated Tiering

Hitachi Virtual Storage Platform, with industry differentiated 3D scaling, provides the performance, efficiency and scalability needed to enable the next wave of VMware growth. Support for VMware vStorage APIs for Array Integration (VAAI) and Hitachi Dynamic Tiering make the platform ideal for the most demanding VMware environments.

The Progression of IT

The rapid pace of VMware adoption is creating new challenges for even the most innovative IT departments. Maintaining or improving performance, manageability, application and data integrity, and cost reduction levels is proving increasingly difficult, and in some cases, impossible, without the right storage infrastructure supporting the virtual server environment.

A highly functioning VMware environment necessitates a flexible, adaptive storage infrastructure. The storage infrastructure must integrate with the virtual server environment. It must be able to dynamically pool and tier resources (performance and capacity) to applications as needed. And it must scale within the same footprint to meet current and future application demands.

With industry differentiated 3D scaling (see sidebar), dynamic tiered storage pools and tight integration with VMware, Hitachi Virtual Storage Platform provides a predictable, adaptable enterprise infrastructure. It supports organizations throughout their VMware progression and provides a highly adaptable platform for enabling private and public clouds.

HITACHI VIRTUAL STORAGE PLATFORM AND 3D SCALING

The unique 3D storage architecture of Hitachi Virtual Storage Platform scales in three dimensions: up, out and deep.

- **Scale up** to enable improved performance through the use of multicore and special purpose processors to handle critical internal functions.
- **Scale out** to add capacity, connectivity, processing power and throughput with the addition of special components to the control chassis, including a second, tightly coupled control chassis.
- **Scale deep** to extend the life of storage assets and increase the return on assets by facilitating the migration of data from external storage devices to Hitachi Virtual Storage Platform.

Why This Matters

3D scaling provides the flexibility and scalability needed to support growing VMware environments. It allows organizations to meet or improve quality of service (QoS) levels and keep associated costs down. Scaling up, out and deep minimizes the storage footprint while providing the performance and capacity VMware environments require.

VMware integration enables significant improvement in performance, virtual machine density, storage utilization, and backup and recovery rates. Dynamic tiered storage pools allow disk resources (performance, capacity, backup, business continuity, disaster recovery) to be combined and leveraged for improved utilization. Automated tiering ensures the most appropriate type of disk resources (e.g., high performing Fibre Channel versus lower performing SATA) are assigned to applications according to in-place service level or QoS agreements.

This type of flexible, adaptable storage infrastructure has important business and IT benefits today. It will ensure that organizations continue to experience the same or better levels of performance, manageability and scalability to which they have grown accustomed from their virtualized environments.

Maximizing Efficiencies through VAAI

vStorage APIs for Array Integration (VAAI) is all about the integration between vSphere 4.1 and supporting storage systems. This integration significantly improves virtual machine performance, density and availability to support, facilitate and accelerate VMware deployment.

VAAI is a set of mechanisms that offload processing for certain data-related services (e.g., copy functions) to VAAI-supported storage systems. Both Hitachi Virtual

Storage Platform and the Hitachi Adaptable Modular Storage systems support VAAI.

Specifically, VAAI addresses three common performance and efficiency issues with VMware ESX environments through three new features: hardware-assisted locking, full copy and block zeroing.

Hardware-Assisted Locking or SCSI Reservation Lock

This feature provides VMware users with alternative means to protect the metadata of the VMware Virtual Machine File Systems (VMFS) cluster file systems. Thereby, it improves the overall scalability of the VMware environment.

Prior to vSphere 4.1, the entire LUN was locked (using SCSI reserve) when virtual machines accessed the storage. With vSphere 4.1, the SCSI reserve is offloaded onto the storage system (in this case, Hitachi Virtual Storage Platform), which has several important benefits:

- Allows more virtual machines per LUN, or data store
- Sets the standard to fully utilize 2TB volumes, which allows for increased scalability. (While previous versions of vSphere in theory supported 2TB LUNs, however best practices dictated much smaller volumes, which resulted in less virtual machine density per host. This created management complexity as well inconsistent storage utilization. VMFS also

limited the number of servers deployable on each physical host. With vSphere 4.1, IT organization can now deploy 2TB volumes to achieve even greater virtual server densities.)

- Allows for faster virtual machine deployment
- Simplifies storage configuration
- Eliminates “boot storms”
- Enables faster locking

Bottom line: This translates into improved server performance and greater virtual machine density (i.e., more virtual machines can be supported per LUN).

Full Copy

This feature enables the storage systems to make full copies of data within the storage system without requiring the ESX Server to read and write the data. This speeds up virtual machine cloning and Storage vMotion (in the storage system) and allows for:

- Faster copies of virtual machines

Bottom line: Full Copy has important implications for cloning and vMotion, making both features efficient and less resource-intensive (people and hardware). This is particularly important as VMware deployments scale.

Block Zeroing

This feature enables storage systems to zero out a large number of blocks to:

- Speed up provisioning of new virtual machines

Bottom line: Block Zeroing significantly improves the provisioning time of new virtual machines, which is especially important in large VMware or virtual desktop infrastructure (VDI) deployments (see “Use Case” sidebar).

Additionally, VAAI provides organizations with access to functionality specific to hardware platforms and lays the foundation for cloud computing. In the case of Hitachi Virtual Storage Platform, these features include 3D scaling (see “3D Scaling” sidebar), and Hitachi Dynamic Provisioning and Hitachi Dynamic Tiering software. This feature set is ideally suited for VMware environments, providing the flexibility and scalability that is needed for organizations to continue to grow their VMware environments and virtualize additional Tier 1 and Tier 2 applications.

DID YOU KNOW?

By externalizing heterogeneous storage behind Hitachi Virtual Storage Platform, organizations can extend its management and efficiency benefits across their IT environments as well as expand data protection and disaster recovery capabilities.

Hitachi is a premier-level partner in VMware's Technology Alliance Partner program and one of only a handful of storage vendors to support VAAI. Hitachi supports VAAI on its Hitachi Virtual Storage Platform and Hitachi Adaptable Modular Storage family systems.

VMware vStorage API for Data Protection (VADP) makes protecting VMware environments a whole lot easier. VADP replaces virtual consolidated backup (VCB); one of its highlights is support for incremental (versus only full) backups and restores. Hitachi Data Systems data protection solutions for VMware support VADP. Offerings include Hitachi Data Protection Suite (CommVault Simpana 8) and Symantec NetBackup 7.

Going the Distance with Dynamic Tiering

There's no discounting the benefits of VAAI to VMware environments. However, to enable "true" data center transformation, the storage system itself needs to be equipped with specific functionality. It must ensure a predictable, adaptable infrastructure to support all phases of VMware deployment.

Hitachi Virtual Storage Platform provides this through industry differentiated 3D scaling (see "3D Scaling" sidebar) and Hitachi Dynamic Tiering software. This combination complements the capabilities of VAAI to provide a true enterprise storage solution for VMware.

Hitachi Dynamic Tiering, Up Close

Hitachi Dynamic Tiering software is a revolutionary new technology that allows for automated tiering of storage pools for VMware. This capability is similar to Hitachi Dynamic Provisioning; however, with Hitachi Dynamic Tiering, organizations can create multiple tiers within the same Hitachi storage pool based on service level objectives (SLOs).

With Hitachi Dynamic Tiering, organizations can provision one volume composed of a blend of multiple disk types and RAID groups, and place the data on the highest performance volume needed. If a volume on an external storage system does not meet the SLO, Hitachi Virtual Storage Platform automatically moves the volume to a higher performing storage tier. As a result, organizations can achieve Tier 1 performance SLOs at a significantly lower cost.

In the case of VMware, Hitachi Dynamic Tiering automatically allocates VMware Virtual Disk Files (VDMKs) to the most appropriate storage tier (e.g., high performing, lower capacity Fibre Channel or SAS to higher capacity, lower performing SATA). This ensures that the right data is truly on the right disk at the right time, which can help organizations further:

- **Reduce CAPEX costs.** By reserving Tier 1 storage for I/O-intensive virtual machine applications or activities, organizations can

significantly reduce VMware-associated capital storage expenditures. By deploying Hitachi Dynamic Tiering, organizations can recoup significant Tier 1 real estate and delay future storage investments. Storage capacity is better utilized.

- **Improve application performance.** VMware environments are not immune to the cyclical behaviors of applications or users. Being able to respond to sudden surges in virtual machine I/O activity is important. Hitachi Dynamic Tiering automatically migrates disk resources based on current, and not just past, demands. This ensures VMs get the performance they need when they need it. Organizations can bring new application users without degrading performance and improve performance of applications during periods of peak activity.
- **Reduce OPEX costs.** Hitachi Dynamic Tiering can help organizations trim VMware-related operational costs significantly by automating migration or movement of virtual machines during peak activity time (as described above) and automatically balancing VM workloads.

USE CASE: ENABLING LARGE SCALE VDI DEPLOYMENTS

The nature of the virtual desktop infrastructure (VDI) can stress traditional storage infrastructures. When deploying VDI, businesses face two difficult choices:

- Place the majority of data on costly Tier 1 storage to compensate for the "boot storm" that commonly occurs when employees boot up first thing in the morning.
- Place VDI data on lower tier disk and risk performance issues as a result.

The Problem

The boot storm causes a significant "burst" in I/O, which can create significant performance bottlenecks without the right storage environment behind it. Think about it: Each log-in can result in a sequential read of 10Gb/sec to 20Gb/sec. Multiply this by the number of employees and the VDI environment scales quickly into the terabyte range. Traditional storage systems tackle this issue by improving disk latency through cache or solid state disks (SSDs), but they don't address storage system throughput.

The Solution

Hitachi Virtual Storage Platform addresses both disk latency and storage system throughput, and in doing so gives IT administrators the best of both worlds.

Additionally, 3D scaling allows organizations to scale efficiently to support very large scale VDI environments, all within a single footprint. And, lastly, Hitachi Dynamic Tiering software automatically moves desktop virtual machines into different storage tiers according to the desktop I/O profile.

Hitachi Data Systems Rethinks Storage

VMware adoption is at a tipping point. For organizations to continue to experience the benefits to which they have become accustomed (e.g., performance, consolidation, scale and ease of management), they will need to re-think the role and importance of storage in these environments.

VAAI can help organizations simplify VMware deployments and create an infrastructure onto which Tier 1 [online transaction processing (OLTP) database-like workloads] as well as other I/O-intensive and highly available applications can efficiently run. Like database environments, this type of environment necessitates a highly adaptable, scalable and efficient storage system.

Together, Hitachi Data Systems, with its Hitachi Virtual Storage Platform, and VMware, with VAAI, are addressing these demands. In doing so, they are helping to transform the data center. They are paving the way for the next wave of VMware adoption and providing the foundation for both public and private clouds.

To recap: Hitachi Virtual Storage Platform provides unmatched benefits for highly virtualized VMware environments through 3D scaling, tight VMware integration and Hitachi Dynamic Tiering. This translates into:

- **Accelerated performance.** Tasks are offloaded to the storage system, boosting virtual I/O performance for both traditional and VDI deployments.
- **Improved consolidation.** The VMFS I/O profile is optimized, allowing businesses to achieve even greater virtual server densities without sacrificing reliability.
- **Simplified management.** Administrative complexity is reduced, enabling IT to improve data protection, disaster recovery and VMware resource consolidation.

For More Information

To learn more about Hitachi Virtual Storage Platform, Hitachi solutions for VMware environments or about the specific technologies described in this paper, visit www.hds.com or contact your local sales representative. Explore an engagement that will result in the optimal solution for your virtualized storage needs.

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