



Hitachi extends its lead in controller-based storage virtualization

Carl Greiner

May 2007



Hitachi extends its lead in controller-based storage virtualization

Hitachi Data Systems (HDS) continues to set the bar for enterprise-class, controller-based heterogeneous storage virtualization supporting common storage services. The announcement of the Universal Storage Platform V (USP V) renders any controller performance or scalability issues moot, and virtualization-enabled dynamic provisioning allows storage utilizations to exceed 85%, delivering unique economies to storage infrastructures. Carl Greiner says this announcement most definitely takes storage virtualization to a new level and that the USP V's massive parallelism lays a sound foundation for additional functional enhancements, and even greater scalability and performance over the coming years.

The Universal Storage Platform V

At the core of the new USP V is a massively parallel crossbar switch architecture engine, the Hitachi Universal Star Network V, combined with a new 4Gb/s fibre channel switch backplane supporting 4Gb/s end-to-end (channels, adapters, disks, and back-end storage directors) and raising the reported total internal bandwidth from 81GB/s to 106GB/s (cached data bandwidth remains the same). However, metadata bandwidth increased from 15.9GB/s to 38GB/s). The maximum IOPs through the cache has increased to 3.5 million IOPS, up 40% from the previous generation offering. The current maximum internal capacity of the USP V remains constant with its predecessor at 332TB (1,152 hard disk drives); however, the maximum external virtualized storage capacity has now been expanded from 32PB to 247PB, and takes away all constraints of even the largest consolidation exercises. In addition, data cache memory currently remains constant at 256GB, while control (metadata) memory doubles to 32GB, with concurrent internal memory operations increasing to 320, a 25% improvement. FC ports jump from 192 to 224, and ESCON/FICON ports jump from 96 to 112 ports. Maximum volumes supported in the open environment have been increased from 16K to 64K. Hitachi also indicated plans to attain Common Criteria (ISO 15408) certification for its secure logical partitioning software, Virtual Partition Manager, which ensures data is protected from access outside of a partition and that data is secured from access by other partition administrators.



The USP V also has the ability to create large logical storage pools, each with dozens or even hundreds of disk drives operating on an I/O simultaneously. Normally striping (where data is spread over multiple disk drives) utilizes up to 16 drives (thin striping); however, with wide striping, hundreds of drives can be used, leveraging all of the disk actuators which work in parallel to make read/write functions more efficient. In addition, performance improvements of 40% are common, and wide striping basically eliminates tuning for performance and hot spot elimination. Moreover, there is no longer a need for host-based volume managers to create volumes over a large number of disk drives. Large logical storage pools with wide striping provide massively scalable performance and simplify management.

These and additional USP V enhancements that address advanced processor algorithms, internal workload distribution, Hitachi Universal Volume Manager scalability and functionality (plus multi-processing sequencing within the Universal Star Network V architecture), all contribute to the platform delivering the following single-port performance improvements:

- 500% for externally attached storage devices
- 520% for disk writes
- 210% for disk reads
- 130% for Hitachi Universal Replicator Journal Groups
- 200% for Hitachi TrueCopy Synchronous.

Hitachi Dynamic Provisioning

Storage virtualization creates logical abstractions of physical storage assets and allows for aggregated pools of disk to which logical volumes can be allocated. This basic implementation does simplify storage allocation by eliminating the need to manage space on physical storage resources. However, storage administrators typically dedicate a subscribed fixed amount of storage to each particular application (often viewed as over-provisioning of both virtual and real), no matter what the real requirements actually are, and this practice creates the dreaded metric of allocated but unused storage. It is not uncommon to find this number exceeding 40% of the physical storage resources.

Hitachi Dynamic Provisioning (or thin provisioning) refers to a method of improving storage utilization by eliminating allocated but unused storage. Thin provisioning takes virtualization abstraction one step further. It presumes that until an application writes a particular block or group of blocks in a virtual volume, there is no need to allocate physical space. Another way to depict dynamic provisioning is through the allocation of physical storage only on a write, which makes the virtualized storage pools more dynamic and efficient. Management capabilities track physical



capacity and issue alerts at user-chosen utilization levels, allowing for additional physical storage in a timely, cost-effective and non-disruptive manner. The Hitachi Dynamic Provisioning capability supports array groups of RAID 10, 5 and 6, providing ultimate flexibility for different business application requirements.

With the announcement of the USP V, Hitachi becomes the first company to introduce large-scale heterogeneous virtualization, combined with thin provisioning on a true enterprise-class scale.

The combination of dynamic provisioning with the Hitachi Virtual Partitioning Manager (supports 32 logical partitions or unique virtual private storage machines with a virtual serial number for utilization, asset tracking and chargeback) can, for example, enforce thin provisioning for internal USP V drives with a unique private storage machine for guaranteed high performance in the most demanding business environments; for example, OLTP as well as high-security applications.

There are many benefits of Hitachi Dynamic Provisioning, including:

- greatly simplified storage allocation across multiple applications
- creation of more and larger volumes
- optimal storage capacity and asset utilization with resulting improved environmental
- dramatically simplified capacity planning and procurement
- non-disruptive capacity upgrades
- centralized storage utilization monitoring and management.

Delivering on the virtualization promise

Realizing the real benefit of storage virtualization is the enablement of a common, heterogeneous, consolidated, leveraged, dynamic and managed portfolio of services and functions. Hitachi has embraced the 'Services Oriented Storage Solutions' moniker to tie in with its evolving delivery of common virtualized storage services. The goal is to create a portfolio of flexible and common services that can accurately and dynamically meet today's demanding business requirements, basically eliminating combinations of incompatible hardware, software and processes. This is the next phase of storage virtualization, and goes beyond just heterogeneous data migration, replication and storage aggregation. It embraces common required functionality in virtualized heterogeneous environments. The introduction of dynamic provisioning is a further example of this, since it can be applied not only to internal Hitachi storage but, in the near future, also to externally attached storage, no matter who the vendor is. This demonstrates the power of virtualization by delivering utilization rates to the storage infrastructure that have long been desirable



but illusive. The end result of this ongoing evolution of common, virtualized and heterogeneous storage services will be:

- **greater efficiency:** common functions/services greatly reduce redundancy (low utilization), integration complexity and cost
- **incremental, repeatable and holistic deployments:** common functions can be completely evaluated and tested, and operational processes automation (including common change, configuration, asset, problem, measurement and management) adapted prior to deployment, ensuring continued success with minimal risk, and a dramatic reduction in operational and support staff
- **predictable and timely deployments:** common functions enable a rich portfolio of storage services to be deployed and managed, with each able to meet the required and varied business objectives
- **lifecycle management:** common functions allow for dynamic service definitions/solutions that adapt to changing requirements and governance, and compliance requirements with repeatable and auditable processes. Newer and more advanced technologies and functions can be introduced in a more incremental and proven manner with obsolete functions eliminated or minimized more quickly.

Hitachi's USP V and its supporting software introduce the next level in enterprise scalable, heterogeneous, controller-based virtualization, with unique common services that definitely raise the stakes against IBM, EMC and NetApp in the all-important functionality race. With the introduction of the USP V, Hitachi strengthens its industry lead in controller-based storage services, offering enterprise-class virtualization, thin provisioning, logical partitioning and replication services across heterogeneous storage devices, regardless of type, cost or functionality. Clearly Hitachi continues to set the high-end innovation bar.



Client re-use disclaimer

- This is a verbatim reproduction of independent material that has previously been published by Ovum within the last 6 months
- Ovum operates under an Independence Charter. For full details please see www.ovum.com/about/charter.asp
- Ovum may have been paid by the client for the right to re-use the material
- Ovum may have a deal with the client to supply research or consultancy. However, no other relationship exists between the 2 companies (e.g. shareholdings, loans, non-executive directorships etc)
- While we take every care to ensure the accuracy of the information contained in this material, the facts estimates and opinions stated are based on information and sources which, while we believe them to be reliable, are not guaranteed. In particular, it should not be relied upon as the sole source of reference in relation to the subject matter. No liability can be accepted by Ovum, its directors or employees for any loss occasioned to any person or entity acting or failing to act as a result of anything contained in or omitted from the content of this material, or our conclusions as stated
- This material is the copyright of Ovum Europe Ltd.