Storage Systems Brief

The Hitachi USP V - *"V" is for Victory*

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Abstract: The new Hitachi USP V is more than just an upgrade from the popular Hitachi USP Enterprise-class storage virtualization platform. Hitachi has a vision and they are acting on it through a series of major improvements and new software features that provide real value to businesses.

HDS announced the Universal Storage Platform in September, 2004. The compelling news about the USP at the time was that it changed the rules of the Enterprise-class storage system game by delivering a storage system that raised the level of play above the head-to-head competition. The HDS USP was and still is the only leading Enterprise-class storage system that also provides external storage virtualization of heterogeneous storage systems.

In May, 2007, HDS announced the Universal Storage Platform V (USP V). While the USP has always supported external storage virtualization, the USP V–the V stands for virtualization–now has much greater internal and external storage virtualization capabilities and proves that Hitachi continues to innovate in the enterprise space–an area where innovation has been lagging in recent years.

First, it is important to define storage virtualization because, for some reason, there is confusion in the market about the definition. Virtualization provides logical view and control of physical infrastructure to provide greater optimization, better utilization and simplified management of these assets. External storage virtualization does this for heterogeneous storage systems and internal storage virtualization does this for physical elements within a storage system.

ESG believes that infrastructure virtualization needs to exist at multiple layers within the data center. Networks and servers are highly virtualized, but storage has been the laggard. If you think about it, storage networks are only partially networked. We've done a pretty good job at networking servers to storage systems, but we've done a poor job of networking storage systems to storage systems. Other than sharing the same "wire," there is no communication or interaction between individual storage systems within a storage network. Each storage system is an island that is an individual device. One storage system might be at 70% capacity utilization while another one right across the data center might be at 10%. However, instead of transferring data from one storage system to another to load balance capacity, the IT department will typically buy more disk capacity for the system that is almost full. In some cases, they will even acquire new storage systems to deal with rapid growth.

External storage virtualization networks your storage systems. It provides the ability to move and replicate data between these systems by creating a common link between them so they can be greater than the sum of their parts. That is the power of virtualization.

The adopters of external storage virtualization are using it for the following:

- Migrating data as one time moves or upgrades
- Creating intelligent tiers of storage–moving data to different tiers based on data classification
- Copying data onto lower tiers of storage for protection, testing and data mining
- Load balancing between different systems for performance and capacity optimization
- Leveraging heterogeneous storage systems for remote replication and DR to minimize infrastructure costs

The USP V is truly innovative because it provides external storage virtualization as part of a storage system. End-users don't have to get a separate appliance to provide this functionality, but can instead use the USP V as a storage system—something that is budgeted for and provides important value in and of itself—and they can leverage the USP V's storage virtualization capability to create a common communication layer between all of their storage systems. This is innovation without disruption.

The Hitachi USP V brings a number of new things to the table:

- **Thin Provisioning (Hitachi Dynamic Provisioning)**: the ability to provision volumes while only consuming capacity based on the amount of data you have. Thin provisioning essentially eliminates allocated but unused capacity and stranded storage. The USP V marks the introduction of enterprise-class virtualization combined with thin provisioning—an industry first.
- **Large Logical Storage Pools:** the ability to create large pools of storage capacity for easier management and performance.
- **Wide Striping:** the ability to stripe data across a large number of disk drives—dozens, hundreds and even thousands—for greater performance while reducing or eliminating performance tuning.
- **Significantly Improved Performance**: e.g., 3.5 Million IOPS, a 500% increase in external storage port performance
- **Significantly Extended External Device and Capacity Support**: e.g., Up to 247 PB of External Capacity
- **Logical Partitions (standard)**: the ability to carve up storage system resources including host ports, cache memory and capacity to create a "virtual" or logical storage system that is dedicated to an application, department, business unit or customer, providing the ability to chargeback business units
- **Quality-of-Service (standard)**: the ability to provide priority to an application or server based on performance needs when contention occurs.

Internal Storage Virtualization

The USP V supports powerful internal virtualization technology—Large Logical Storage Pools. You can create logical pools of storage from any number of physical disk drives. One of the two main objectives when creating logical pools is to more easily manage storage in general. The other is to improve performance by creating wide stripe groups.

Providing logical pools of capacity makes it easier to manage your storage systems by minimizing the management of individual LUNs. End-users do create large virtual volumes using host-based technologies, but this is not required with the USP V because it provides this functionality internally. Whenever you can centralize functionality, you achieve ease-of-management.

Another major benefit of Large Logical Storage Pools is the ability to stripe data across a large number of disk drives. This improves performance significantly since you can have dozens or hundreds or even thousands of disk drives operating on I/O operations simultaneously. This is extremely important for increasing performance. Additionally, it significantly reduces performance management tasks. Today, using traditional provisioning methods requires a great deal of time to analyze, tune and re-tune performance. Wide striping minimizes and potentially eliminates the need to tune and analyze because it is perpetually optimized for performance.

One of the most significant aspects of the Hitachi USP V is that it supports thin provisioning technology with a new offering the company refers to as Hitachi Dynamic Provisioning software. Thin provisioning is a powerful and valuable form of virtualization because it essentially eliminates allocated but unused capacity and stranded storage. We've found this is to be a big problem, with end-users typically reporting that 30% to over 50% of their storage is stranded.

Issues and Challenges

ESG has seen positive and valuable changes in HDS. They have expanded their storage portfolio to include CAS, NAS and VTL. Their biggest challenge will be effectively selling these solutions and becoming market leaders, as they have done with Enterprise-class SAN solutions. Additionally, we also see improved traction

with midrange storage systems, but they still have more to achieve there to gain leadership status. This is not a product issue, but a business execution challenge.

HDS also has to raise its awareness on all levels. They need to continue to drive home that they are innovating at the high end of the market, that they have a wide range of solutions beyond SAN, including CAS, NAS and VTL and that they offer competitive midrange storage for large and midsize end-users, etc. HDS has exhibited more passion and creativity with regard to marketing campaigns and materials in the last year. They have raised their level of play and hopefully will continue to build the momentum.

ESG's View

It is important to note that the USP V isn't just about the technology or a new beefed up system—although these things are important. They are important because the technology is an enabler for improving the end-user's business. More importantly, the USP V is about providing a platform for end-users to deliver storage services to their business.

The new features within the USP V support Hitachi's commitment to its overall vision, a concept that it refers to as Services Oriented Storage Solutions—using a storage system as a platform that enables IT to deliver storage services back to the business. Every storage system vendor will say that they do this and to some extent it's true. But that's like saying you can run. You may be able to run, but you probably aren't going to win any gold medals in the Olympics. The key isn't whether or not you run, but how well you run. The key here is: how good is your platform at helping end-users deliver storage services to the business? All of the USP V features and improvements—from Thin Provisioning to Improved Performance to Better Environmentals—can and should be mapped to providing true Services Oriented Storage Solutions.

ESG believes that infrastructure virtualization has to live within multiple layers of the data center. Virtualization breaks the boundaries of physical infrastructure and makes them boundless. The Hitachi USP V raises the level of play by supporting external and internal virtualization on a significantly expanded scale.

One of the most compelling aspects of the new Hitachi USP V is that it provides three dimensions of storage virtualization. The first dimension is its internal virtualization capability that includes thin provisioning, large logical storage pools, wide striping, virtual partitions and quality-of-service. The second virtualization dimension of the USP V is its external storage virtualization software that manages heterogeneous storage systems and its capabilities as a high-end platform that provides best-in-class performance, scalability and reliability. The third virtualization dimension is that it allows you to take all of the considerable intelligence and functionality within the USP V and extend it to any class of storage in the data center. Hitachi provides all three dimensions within its flagship storage system—driving innovation where it is needed and executing on a vision that provides real value to end-users.