

May 14, 2007

## **Leveraging a Purpose-Built Architecture**

### ***Can a flexibly optimized storage environment bring value to the enterprise?***

*Over the past 10 years there have been so many new storage technology entrants to the storage market that at times it can be hard to keep track of all the variants. We have seen the introduction of network-attached storage file servers, various forms and levels of RAID protection, object oriented – or commonly referred to as reference or archive storage systems – storage that is nearly online and can be rightly called nearline; storage products that are sometimes online and in use and then turned off when not in use – which, I suppose, would then be called offline; and virtual tape libraries that look like tape to a sever operating system, but are in actuality storage subsystems with servers attached which emulate tape subsystems from a backup server perspective. Okay, all of the aforementioned storage solutions, while numerous, have provided value for users for the specific pain points which they alleviated, or actually provided new and creative solutions to nagging business problems. But what if someone could bring a multitude of variants – or a flexible storage platform – together into a common architecture and provide an integrated storage environment as an optimized framework to IT, application users, and ultimately the user business as a whole? This report takes a look at new approaches to deliver storage flexibility for IT.*

Tom Trainer, Senior Analyst, Evaluator Group, Inc.

# Table of Contents

Storage platform needs are changing.....3

A flexible architecture offers choices.....4

The business value of a services oriented architecture.....6

The engine to provide storage services.....7

Summary.....7

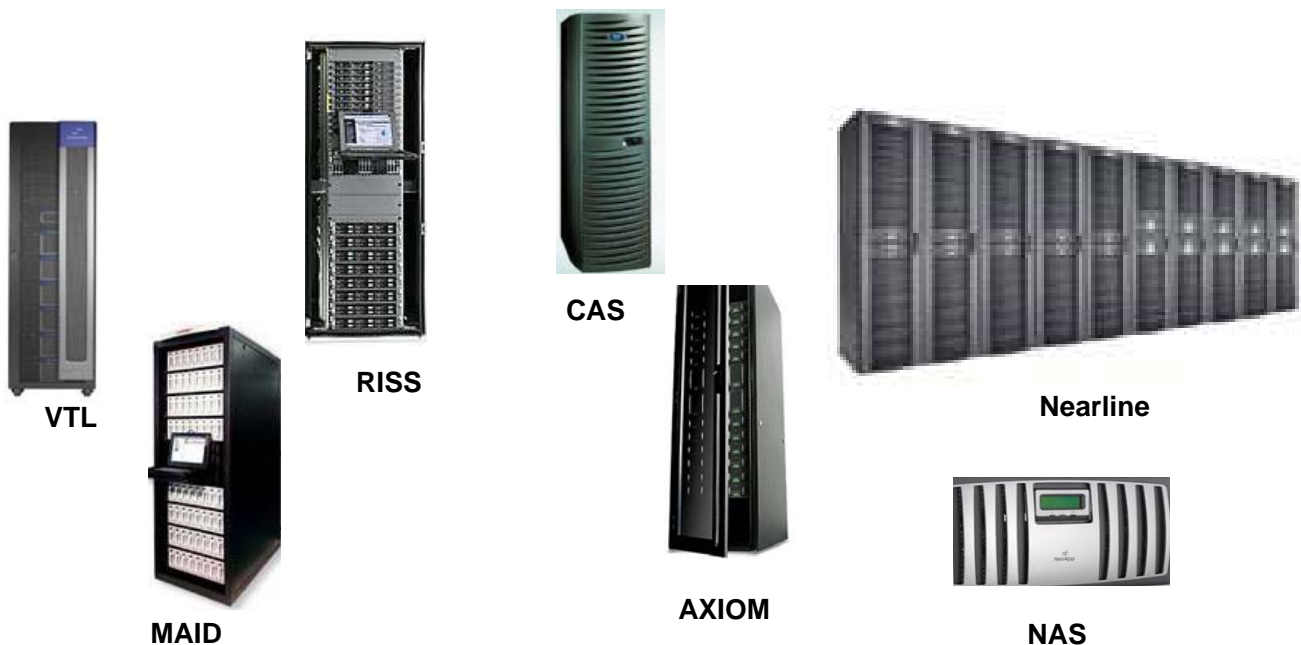
## Storage platform needs are changing

At the turn of the century the face of computer storage as we knew it began a rapid shape-shifting; on the network backbone, file servers made sense and they were easily deployed in the oil and gas industry, development engineering environment, and budding Internet information serving and corporate departmental data outsourcing--and users deployed them by the thousands. From the enterprise data center perspective, mainframes had made the transition to ESCON and were looking heavily at the next transition to FICON, and the primary storage vendors were touting the very real business advantages of storage area networking (SAN) for the heterogeneous open systems computing environment.

Since that time there have been even more new storage or peripheral storage technology introductions which have enhanced network connectivity, bridged islands of information, coupled SANs from one global location to another, introduced various new and creative methods for replicating data for disaster recovery and business continuity, and even technology that allows for IT to connect enterprise-class storage systems via Ethernet using iSCSI protocol encapsulation.

Areas such as media and entertainment, along with the criminal justice systems, and surveillance - to name a few - have benefited from the introduction of object-oriented storage and applications that leverage this kind of reference/archive storage capability.

To say the least, there have been many new technologies introduced, most of which have come along with a new box, or frame, or server storage combination of some sort. Figure 1, below illustrates multiple boxes for the many kinds of solutions available today:

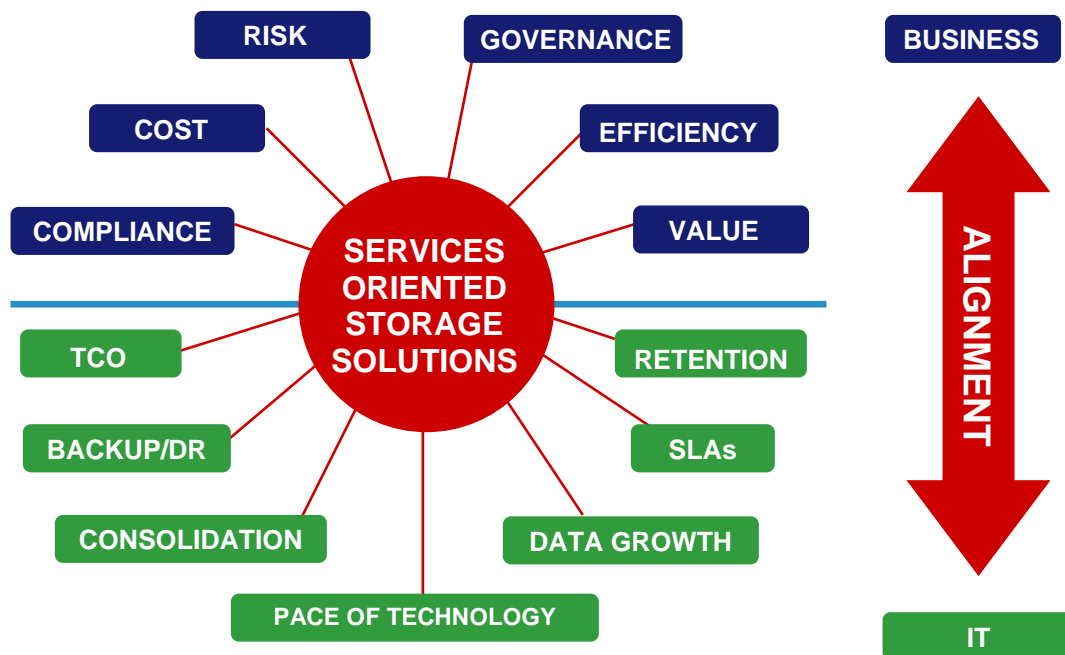


**Figure 1: Individual Storage Products – Multiple Ways to Store and Manage Data**

## A flexible and optimized architecture offers choices

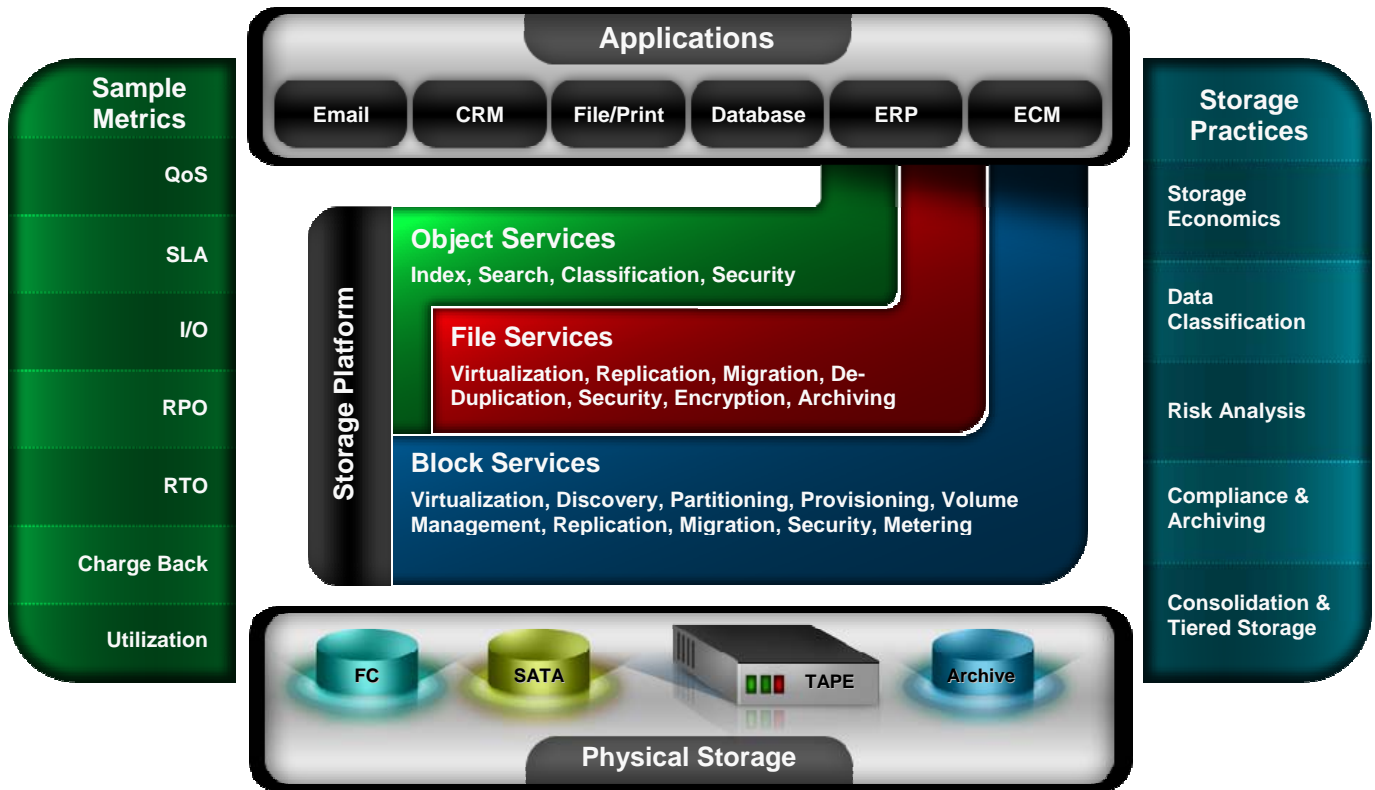
With so many disparate products providing uniquely valuable solutions, we find that the desired ‘one way’ to do things (store and retrieve information) and simply manage the storage environment has actually become quite complex. So, now there are many ways to do things and many ways to manage business critical information. One may ask: “*But doesn’t this provide choice?*” The simple answer is that with so many ways and methodologies and storage management products to become intimately familiar with, it is no longer choice that the user has; one could argue that it is approaching near chaos.

One vendor, Hitachi, is taking on the challenge of the multitudes of solutions and bringing a unified, flexible, and optimized storage approach to the market. Hitachi terms their framework “Services Oriented Storage Solutions,” or SOSS. Figure 2, below, illustrates the basic business topological view of SOSS:



**Figure 2: Hitachi Services Oriented Storage Solutions Elements**

Leveraging this two-way business to IT topological view will certainly require hardware, platform, management software, and application-aware interactive component architecture in order to bring the benefit of topology to real product and to the data center. Figure 3, below illustrates the architecture of Hitachi Services Oriented Storage Solutions:



**Figure 3: A flexible and optimized services oriented storage architecture**

As viewed in the diagram, this architecture illustrates storage control that provides three functional areas: Object Services, File Services, and Block Services. Management software elements interface to the storage metrics software elements for QoS, SLA support, recovery time and point objectives, chargeback capabilities, and utilization reporting so that the user knows the full picture of storage environment utilization status. It is clear that this architecture is positioned to provide more manageability in the e-mail, CRM, File and Print space, and Database, and ERP as it makes its way to the market. This storage architectural environment is one of extensibility; this means that we believe that the three functional areas supported will be further added to over time and as user need/demand dictates. User application environments will be easily able to adapt and port into the architecture and leverage the functional areas supported. It's important to note that the storage layer in this architecture is fully abstracted from any application layer and supports FC, SATA, Tape, and future higher density disk drives for longer-term archiving support.

With the release of this architecture, Hitachi has clearly thrown down the gauntlet in the storage market to make services oriented storage solutions a reality in the data center.

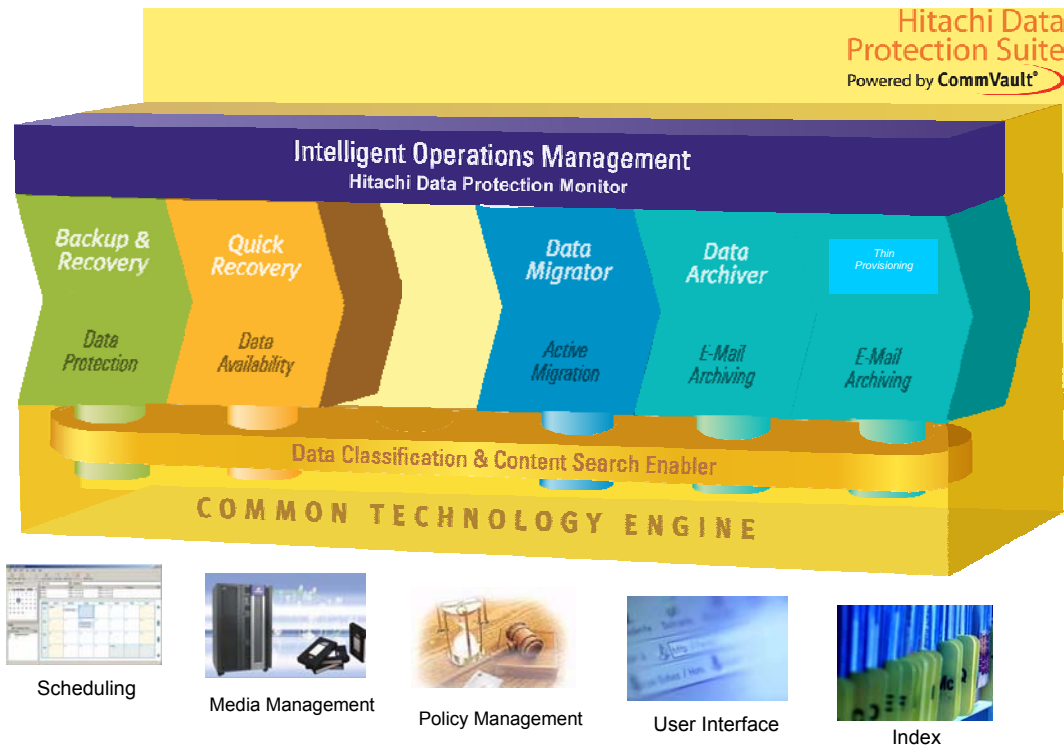
## The business value of a services oriented architecture

Business values of services oriented architecture include the raw economics of storage virtualization coupled with thin provisioning. Classification of storage by tiers and by type of disk drive deployed provides the storage administrator with the ability to choose the correct drive type/cost to meet corporate SLA's. Also included is the support for data mobility within the architecture from tier-to-tier and to a backup media of choice.

Business continuity and data replication are an inherent part of this new architectural view from Hitachi and so we expect all of the familiar replication technologies will be present.

Another clear business benefit is that of consolidation. One may ask another question; *“But aren't you putting all of your eggs in one basket.”* Simply speaking, reliability characteristics, reductions in energy usage and hard dollar savings via virtualization and thin provisioning, and built-in data protection, redundancy, replication, and duplication minimize the “all the eggs in one basket” concern to a negligible amount. Additionally, the architecture supports redundant functional object control and functional object control can be spread across many storage control instances.

Also, through a partnership with CommVault, both companies provide a protection suite of products that has been enhanced with the recently added thin provisioning capability of the USPV. Figure 4, below illustrates the data protection suite of products integrated with the Hitachi SOSS architecture:



**Figure 4: Data Protection Offerings – Hitachi/CommVault – Built on SOSS Technology Engine**

## ***The engine to provide storage services***

Hitachi's Services Oriented Storage Solutions are powered by Hitachi's Universal Storage Platform V, which is designed to provide the performance, scalability, thin provisioning, and embedded virtualization engine needed to deliver storage services across heterogeneous storage assets, whether block, file or object-based. The USP V features innovations designed to fuel Hitachi's Serviced Oriented Storage architecture, including:

- A 247 petabyte address space, providing capacity for extremely large consolidation projects
- An industry first with the co-mixture of thin provisioning and virtualization – this combined capability will allow users to take greater advantage of the 247 petabyte address space.
- The ability to provide asset tracking and chargeback and at multiple levels—from thinly provisioned capacity via Hitachi's Dynamic Provisioning software, to logical partitions via Hitachi Virtual Storage Machine software, to Hitachi Chargeback software, which enables clients to accurately account the associated costs with the quality and quantity of storage utilized by different business units.
- Large logical storage pools and wide striping, enabling hundreds of drives to operate on a single I/O concurrently, helping to minimizing performance tuning since data is striped across a very large number of drives.
- Subsystem support for up to 3.5 million IOPs of maximum performance. This is the kind of horsepower needed to deliver common storage services across the enterprise.

## ***Summary***

We have covered a lot of ground in this document. The changing face of storage, user deployment of multitudes of technologies, the spreading of viable, and valuable – albeit growing in difficulty to manage – storage solutions, and the introduction of a new services oriented architecture that is intended to help users bring more choice, control, manageability and efficiencies to their growing information repositories.

With the introduction of the USP V, Hitachi is leveraging a purpose-built architecture to deliver a storage services platform to its clients that essentially has the ability to provide them with the business and operational benefits of a single replication engine and a single management interface across heterogeneous storage assets.

Is this new architecture from Hitachi going to set a new standard for storage architectures of the future? Execution in delivering the SOS solutions will be the key for Hitachi's success with this brave endeavor. Will the stand-alone multitudes of viable and valuable solutions still be available? Of course they will; however it is my opinion that if execution by Hitachi exceeds a common industry expectation, we may see a new breed of storage architectures emerge – industry wide – over the next few years that delivers real storage services value to the user. A view of the past five years of execution of the Hitachi Storage Solutions Group shows encouraging signs of the ability to execute and compete. For Hitachi execution will be the key; the gauntlet is thrown.

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