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OVERVIEW

Hitachi High-Performance Storage Reins in File-Based Data and Application Growth, Achieves Superior TCO

The Challenge: Data Grows, Budgets Do Not

Organizations of all sizes are overwhelmed with unstructured data growth demands, rising costs, complexities, and difficulties meeting service level agreements. While data capacity, applications and virtual server environments are growing at exponential rates, budgets are not. Data centers must become more efficient, more cost conscious and more effective to successfully meet these challenges.

To handle the massive and growing amount of file-based data and applications in today's environments, organizations need efficient, highly scalable, and high-performance storage systems. They also need a lower total cost of ownership (TCO).

With our Hitachi Unified Storage and gateway Hitachi NAS Platform systems that span from the midrange to enterprise, Hitachi Data Systems provides flexible but powerful platform options.

Hitachi Unified Storage and Gateway Hitachi NAS Platforms

Hitachi Unified Storage (HUS) and the gateway Hitachi NAS Platform (HNAS) family of systems are ideal for file sharing. They are also a top choice for file server consolidation, data protection and application data storage for Oracle, Microsoft and virtual environments. Our products boast the highest performance and usable capacity in the industry in addition to capacity efficiencies that allow organizations to truly do more, but with a lot less. These capabilities translate into significant cost savings for organizations.

The HUS and gateway HNAS products deliver a range of flexibility and choice. They can handle the variety of workloads and use cases of enterprise data centers, medium organizations and remote data centers across a wide range of industries. They enable organizations to:

- **Consolidate more**, with greater usable capacity, scalability and 2 times the performance of comparable products; they provide the horsepower needed to handle large, mixed workload environments.
- **Save time and space**, with rich capabilities such as dynamic provisioning, intelligent tiering, virtualization, snapshots, file cloning, replication and more.
- **Save money**, with primary deduplication capabilities that reduce the amount of storage capacity by up to 90%; they allow organizations to reclaim valuable capacity rather than constantly making new purchases.

Solution Highlights

Reduce Total Cost of Ownership

Our solutions provide several capabilities that help to lower costs, ease management and ensure the highest utilization to deliver optimal TCO.

Intelligent file tiering allows organizations to move data among storage and archive tiers, whether internal to the data center, or externally from remote or branch offices, with automated, policy-driven migration tools. This feature allows organizations to put data on the appropriate tier or storage media, based on the value of the data itself.

- Migrate data between internal flash modules, solid-state drive (SSD), serial-attached SCSI (SAS) and nearline (NL)-SAS storage tiers.
- Migrate data to 3rd-party NAS devices or to Hitachi Content Platform.
- Extend data migration capabilities to external tape, the Hitachi cloud tier and support for the Amazon S3 Web services interface.

Tiered file system, also known as "metadata optimization," separates file system metadata from user data: Each can be stored separately for improved table lookup performance and storage cost-efficiency. The number of metadata operations is significantly greater than regular data operations and contributes to a larger share of the I/O workload mix. This function:

- Enables organizations to use fewer high-performance disks combined with lower cost disks while achieving the same high performance.
- Delivers efficiency by automatically placing the metadata on the fastest tier of storage being used and the user data on a slower, less-expensive tier. The result is improved overall system performance and reduced costs.

Cluster namespace (CNS) functionality simplifies overall system management by providing a single namespace with a directory structure that is independent of where data actually resides in physical storage. The CNS:

- Serves as the common point of integration for all elements of a storage solution.

- Spans single nodes, server clusters, virtual servers, external and 3rd-party storage devices, and even embeds iSCSI for block data access.
- Uses mixed-mode security to enable simultaneous access to native server message block (SMB) and network file system (NFS) based files from shared directories.

Our solutions also provide centralized GUI management, pointer-based snapshots, quick file restore, and hard and soft quotas (volume, group or user). They offer scalable file systems, storage pools and policy-based management to further simplify the management of the overall environment.

Improve Storage Efficiencies

Primary Storage Deduplication

Extend the life of existing storage assets by helping users eliminate redundant data, resulting in up to 90% capacity savings.

- Unique hardware accelerated architecture (using field-programmable gate array or FPGA): Primary data deduplication uses a coprocessing architecture, providing parallel processing resulting in high-performance file services.
- Automatic processing: When the file-serving load passes beyond 50%, the deduplication engine automatically throttles back. No complex scheduling process is required. Deduplication takes place 24/7.
- Unmatched simplicity and reliability: Little to no administration, configuration or tuning is required. Scheduling is not necessary. There is no risk of data loss as the deduplication process is outside of the data path.
- Data-in-place deduplication without impacting workflow: Process reduces the need to pre-allocate capacity to be used as deduplication "workspace."

Storage Virtualization

- Individual file systems belong to enterprise virtual servers (EVS) within each physical system, each with its own set of IP addresses, policies and individual port assignments.
- Virtual servers are used to group server resources to match the needs of application or organizational requirements.

TABLE 1. HITACHI NAS PLATFORM 4000 AND 3000 SERIES SYSTEMS

	3080	3090	4040	4060	4080	4100
Product Class	Lower Midrange	Midrange	Midrange	Midrange	High-end	Enterprise
Cluster Nodes	Up to 2	Up to 4	Up to 2	Up to 2	Up to 4	Up to 8
Maximum (max.) Storage Capacity	4PB	8PB	4PB	8PB	16PB	32PB
Max. File System Pool	256TB	256TB	256TB	256TB	256TB	256TB
NFS Throughput	Up to 700MB/sec	Up to 1,250MB/sec	Up to 700MB/sec	Up to 1,000MB/sec	Up to 1,500MB/sec	Up to 2,000MB/sec
Performance* (NFS ops/sec)	80,279 2 nodes	145,768 2 nodes	130,000 2 nodes	147,957 2 nodes	209,519 2 nodes	1.2M 8 nodes

*Estimated performance based on SPECsfs_2008 NFS.v3 benchmarks.

- In a clustered environment, file systems can be quickly relocated among physical servers for load balancing, and virtual servers automatically migrate in a cluster failover scenario.
- The file system also organizes disparate RAID groups into a logical pool of shared storage that can simultaneously provision multiple file systems. This capability allows administrators to:
  - Provision file systems as needed manually or by setting rules that automatically enforce policies.
  - Add storage capacity when necessary, distributing data dynamically across available storage to optimize performance.
- The universal migrator feature provides a simple and automated way to virtualize data from 1 or more 3rd-party NAS systems to HNAS, with minimal downtime. File data appears as if it's on HNAS local file systems, when in reality it's still physically on the external NAS (for example, NetApp). When needed, data can then be migrated transparently in the background to HNAS without interruption to front-end clients.

Broad Range of Data Protection Options

- High-speed replication of objects that accelerates replication over wide area networks and improves recovery time objective (RTO). Replicate faster and automate system failover and recovery.
- Synchronous disaster recovery support with active-active geoclustering up to 100km.
- High-speed snapshot or point-in-time copies that enable faster and more granular data protection that is space-efficient.
- Application-aware data protection with Hitachi Application Protector, used for Microsoft® Exchange, Microsoft SQL Server® and Microsoft SharePoint® Server environments; simplify backup, restore, and data protection environments via application-consistent snapshot management.
- File and Directory clones enable the creation of writable snapshots (clones) of files and directories to shorten production data copies in testing and development and virtual desktop infrastructure (VDI) environments. These flexible, space-efficient file clones enable organizations to complete testing and roll out production or virtual environments quicker. Oracle data sets in directories and NFS mount points can now be cloned in their entirety to speed up replication.

Optimize Virtual Server Environments

Many organizations have come to the conclusion that managing server virtual machines (VMs) and storage in a more holistic manner provides greater efficiencies. Therefore, IT departments today are deploying NAS and NFS for VM environments for its flexibility, ease of deployment, and simplified management. It provides virtual machine administrators with the ability to simplify management of VM backup, restore, cloning operations and NFS datastore management. In our solutions:

- **Hitachi NAS Virtual Infrastructure Integrator** provides a plug-in for vCenter to help manage HNAS storage resources, snapshots and file clones in a simplified manner. Delivers more capacity and higher VM density, and VM operational lifecycle efficiency. It helps to extend data protection and management to VMware NFS shared storage pools.
- **VMware vStorage APIs for Array Integration (VAAI) adapter** offloads specific storage operations from VMware vSphere to Hitachi Unified Storage or gateway platforms, resulting in improved performance and ESX VM density.

In addition, dynamic virtual volumes, virtual NAS and cluster namespace unify the directory structure while simplifying storage capacity management tasks. Therefore, organizations can achieve high utilization of existing storage for VMware virtual server and VDI environments.

Solutions to Meet a Variety of Workloads, Big and Small

Two series of Hitachi NAS Platforms are available: the 4000 series and the 3000 series (see Table 1). 4000 series systems are designed for organizations that require the highest performance and scalability for their most demanding, revenue-generating and enterprise mission-critical applications. In comparison, the 3000 series systems support organizations with midrange storage requirements that wish to reduce their TCO through consolidation, without sacrificing performance and scalability.

Both the 3000 and 4000 series systems leverage our patented hardware-accelerated architecture, object-based file system, and a full suite of intelligent management tools.

- Enables file system performance and scalability without compromise.
- Provides a comprehensive set of storage virtualization tools within the system.
- Overcomes the complexities associated with large-scale file system management and data availability through multiple layers of storage virtualization.
- Simplifies the administration of file system functions.
- Ensures high utilization of system resources.

High Performance and Scalability

Our platforms were designed to deliver scale, performance, efficiencies and economics. As your file share requirements evolve, Hitachi Unified Storage and the gateway Hitachi NAS Platform family of products will scale to your business and technology needs. They will help you to improve productivity, drive revenue, increase quality and speed time to market. Organizations can:

- Scale up to 8 nodes in a single cluster to meet expanding demands with enhanced access, capacity and performance. As more servers are added to a cluster, IOPS performance increases linearly.
- Incorporate more storage at any time to meet new application or business needs, or to consolidate disparate storage into a single point of management, without downtime.
- Support multiple file systems for a total usable capacity of up to 32PB under a single namespace. All systems are easily managed from a central system management unit (SMU) that enables administration via CLI or an intuitive GUI.

- Choose between 10 gigabit Ethernet (GigE) and 1 GigE (on select models) for high-throughput NAS and iSCSI networking connectivity.
- Certified with leading 3rd-party backup and antivirus software.
- Deliver simplified management to reduce administrative complexity without compromising performance and scalability.

Hitachi Unified Storage and the Gateway Hitachi NAS Platform 4000 Series: Midrange to High-End Enterprise Network Storage

HNAS models 4040, 4060, 4080 and 4100 systems are designed for organizations that require high performance and scalable storage to improve productivity, drive revenue, increase quality and speed time to market. The platforms are designed to handle large workloads and continue to deliver high performance through crunch times. Whether rendering complex special effects for a movie, processing petabytes of geological survey data, or serving the email needs for thousands of users, the HNAS 4000 series is up to the task.

HUS and HNAS: Efficient Consolidation

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This series is best suited for organizations that require a higher number of simultaneous connections to support a greater number of mixed workloads. It easily supports demands for the highest performance and scales to support the most critical applications.

Flexible Configuration Options

Whether an organization would like to add file capabilities to an existing Hitachi block storage system or would like a new

platform that delivers unified block and file, we provide the flexibility and choice. Our unified offerings are best suited for organizations looking to acquire a new platform to consolidate their block and file data. These configurations support Fibre Channel, iSCSI, SMB and NFS. Our gateway platforms are ideal for IT departments looking to take advantage of existing capacity or an existing storage system as the target for their file data. No matter which configuration you choose, the file components and functionality are the same.

Our solutions use world-class Hitachi Virtual Storage Platform (VSP) G1000 series, Hitachi VSP, Hitachi Unified Storage VM (HUS VM), Hitachi Unified Storage 100 (HUS 100) and Hitachi Accelerated Flash for either direct or SAN-attached storage to provide high availability and enterprise-level reliability.

Address the Full Range of Network Storage Applications

With our Hitachi Unified Storage and gateway Hitachi NAS Platform systems that span from the midrange to high end, Hitachi Data Systems provides flexible but powerful platform options. These solutions support a full range of IT requirements, price points, application environments and user loads.

HDS Global Services provides expert technical and thought leadership designing and delivering enterprise-class storage infrastructure and cloud solutions for organizations.

For More Information

For more information regarding Hitachi Unified Storage and gateway Hitachi NAS Platform family, please visit www.HDS.com.

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