Simplified Management With Hitachi Command Suite

By Hitachi Data Systems

July 2014
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Executive Summary

Today’s data center has seen its responsibilities evolve from the storage of data to the management of information. As the requirements for more flexible, efficient information management have grown, Hitachi Data Systems has transformed its storage management products to meet those needs. Hitachi Command Suite (HCS) is a critical component of the Hitachi Data Systems solution for integrated management of a global storage virtualization environment. It provides a comprehensive set of tools for IT and storage administrators to manage their infrastructure, their storage, their applications and their information.

While data centers have become increasingly complex and IT is looking for new ways to lower costs, HCS continues to enable simplified administrative practices. It improves storage management efficiency and productivity. By providing a common set of management tools for administrators, HCS provides an integrated management framework for Hitachi virtualized storage and server environments. It unifies management across all Hitachi storage systems and data types. This capability combined with Hitachi Virtual Storage Platform (VSP) G1000 and Hitachi Storage Virtualization Operating System (SVOS) enables IT organizations to build a Continuous Cloud Infrastructure. This infrastructure helps them manage their growing storage needs and is always available, agile and automated.

Hitachi Command Suite enables organizations to align business applications to the required data resources according to business-related objectives. Such objectives may include application quality of service, shared resource optimization and just-in-time delivery. HCS provides the necessary tools to properly provision and configure the storage environment with visibility all along the path from application through to the logical storage resources for true end-to-end monitoring. HCS effectively replaces manual procedures with unifying administrative operations, leveraging a common management framework.

Simplification helps administrators manage their storage more effectively and reduce operational costs. Advancements to consolidate all core storage configuration operations under HCS, combining best practice workflows with built-in intelligence, streamline common management tasks. This approach reduces the number of required steps to properly manage storage and eliminates the potential for errors.

Advanced Hitachi Dynamic Tiering software may do the most toward simplifying tiered storage management. Within Dynamic Tiering, many of the underlying technologies for tiered storage management have been automated and thus significantly reduce the need for information lifecycle management.

Hitachi Command Suite provides significant advantages in flexibility to speed deployment of and simplify IT management operations that complement the advanced capabilities of Hitachi storage systems. This approach helps to drive IT data center transformation, resulting in a software management framework that can manage the data center of today and tomorrow.
Introduction

Hitachi Command Suite is an integrated software management framework that simplifies management complexities and enables organizations to take full control of their storage infrastructure. HCS consolidates management across all Hitachi storage systems and data types to easily align storage to changing business application needs. At the same time, it centralizes administration for device configuration, data mobility, application service level management, storage performance optimization and replication management.

By providing an integrated set of management tools for administrators, HCS establishes common management practices for Hitachi virtualized storage and server environments. It enables IT organizations to build a continuous cloud infrastructure that is always available, agile and automated. With simplified, unified management of software defined storage virtualization, organizations can establish efficient data infrastructures. They can maximize use of existing storage assets and lower their ongoing operational costs.

Hitachi Command Suite provides an integrated management framework that encompasses the following 5 strategic management areas:

- **Control.** Simplifies management complexities while unifying management across all Hitachi storage systems, data types, servers and virtualized storage environments to facilitate agile deployments.
- **Analyze.** Helps users to gain key insights to improve storage performance and utilization, and avoid problems.
- **Optimize.** Increases return on investment (ROI) and efficiency by properly aligning business applications to the appropriate tiered storage resources.
- **Intelligence.** Enables intelligent business application views across virtualized storage infrastructures to ensure application-specific storage service level objectives are being met.
- **Protect.** Improves business continuity and high availability while reducing risks.

**Hitachi Command Suite v8**

The latest release of Hitachi Command Suite, Version 8 (HCS v8), introduces numerous new enhancements with the following key highlights:

- Enables effective management of Hitachi global storage virtualization by facilitating the configuration, management and monitoring of virtual storage machines.
- Integrates a redesigned element manager architecture, further consolidating all core storage management operations within the Hitachi Command Suite management framework.
- Provides new reporting integration with a common Web-based API, enabling users to easily incorporate performance statistics from HCS into existing management reporting systems.
- Streamlines the establishment of application storage service level agreements (SLAs) with integrated service level profile recommendations that simplifies storage service level objective (SLOs) setting for business applications.
- Offers enhanced unified management for both unstructured and structured data with new HNAS platform monitoring that covers performance analytics for file servers.
Hitachi Command Suite v8: Key Highlights

Global Storage Virtualization Management

Global storage virtualization is an advanced storage virtualization technology that provides new levels of abstraction of physical storage system resources to form new virtual storage machines. These virtual storage machines provide a complete separation between server and storage. They are independent of system, connectivity, location or vendor that attached servers or hosts see and manage as a single device.

Hitachi Command Suite is fully integrated with Hitachi Virtual Storage Platform (VSP) G1000 and its Hitachi Storage Virtualization Operating System (SVOS). Together, they create the next generation of enterprise storage that redefines mission-critical storage virtualization. Powered with Hitachi global storage virtualization, VSP G1000 provides the always-available, agile and automated foundation needed for a continuous cloud infrastructure.

SVOS is the software foundation for Hitachi global storage virtualization. SVOS provides software-defined storage virtualization that elevates unified management across the new virtual storage machines. Virtual storage machines can enable a spanned virtualized volume or a global-active device across VSP G1000 systems that can be located up to 100km apart. This capability provides continuous access to an application that extends beyond the bounds of a single physical storage system. In addition, SVOS supports customer-driven nondisruptive migration between storage tiers and between virtualized physical storage systems for true workload mobility.

HCS v8 integrates global storage virtualization management into its existing management framework to enable administrators to fully leverage and deploy Hitachi global storage virtualization into their environment. The suite incorporates management practices to easily define the physical storage resources (storage system, parity groups, logical storage devices, storage ports and host groups) to create virtual storage machines and provision or allocate this new virtual storage resource to servers and applications within the IT infrastructure. Utilizing the same graphical user interface to manage all Hitachi storage systems, HCS simplifies storage management operations for all Hitachi and 3rd-party virtualized storage resources under a centralized management framework.

Hitachi Command Suite addresses the dynamic nature of global storage virtualization, providing the visibility and monitoring required to optimize virtual storage machines. Hitachi Tuning Manager monitors and correlates all networked storage resources on the application’s data path from hosts through the SAN to the virtual storage machines. It works with key storage performance and latency indicators to properly conduct performance analytics for virtual storage machines. Its integrated storage performance troubleshooting aids and reporting tools incorporate historical trending, so application performance bottlenecks can quickly be identified and analyzed to determine if storage is at fault. Hitachi Command Director provides storage service level management for virtual storage machines that enable the proper monitoring of application-based storage service levels. It improves application availability and helps you quickly identify any applications at risk.

Integrated Management Operations

1 Customer-driven nondisruptive migration is a separately licensed software feature available after initial release. Ask your HDS representative or HDS reseller partner for more details regarding restrictions and availability.
All core storage management operations continue to be centralized and integrated within the Hitachi Command Suite. Element manager functions from Hitachi Device Manager and Hitachi Storage Navigator are merged and consolidated under the HCS management console. Thus, user resource management and task operations can be combined, reducing complexity and improving storage configuration synchronization. By streamlining all basic management tasks within HCS, new levels of operational efficiency can be achieved that further simplify administration, reduce administrator training and lower the operational costs of managing storage.

Storage Reporting Extensibility

A new standardized Hitachi Command Suite application programming interface (API) is available to improve performance data sharing and integration with existing management reporting systems. This Web-based API (also referred to as REST API) is platform and language independent that leverage standard HTTP based commands, such as GET, PUT, POST, and so forth. This interface enables enhanced data queries from HCS products. In particular it enables performance and capacity statistics from Hitachi Tuning Manager and Hitachi Command Director, to be easily extracted and used with other management reporting systems.

Storage Service Level Objective Profiles

Hitachi Command Director v8 introduces new aids to help users to define storage service level objectives for different business applications. In addition to providing predefined service level objective profiles for common business applications, such as Oracle database, Microsoft® Exchange, Microsoft SQL Server®, and so forth, Command Director can baseline historical performance of applications and their respective storage devices. This capability provides recommended SLOs that can be applied to an application. It simplifies the analysis required to properly define storage SLOs, thus streamlining the establishment of storage service level agreements for mission critical business applications.

Enhanced Performance Monitoring for Hitachi NAS Platform

Hitachi Tuning Manager v8 adds new monitoring features for Hitachi NAS Platform (HNAS) file storage to its existing end-to-end storage performance management capabilities. Tuning Manager provides accurate reporting of detailed file system storage performance. It covers key performance statistics of storage system component resources (such as CPU, controller, cache, ports), storage protocol operations (such as NFS, SMB, iSCSI or FTP) and latencies (read and write). As a result, it provides accurate performance reporting and troubleshooting for file servers. Tuning Manager simplifies performance analysis across a unified management infrastructure, covering both block- or file-based data that improves performance and availability for both file servers and business applications.

Key Hitachi Command Suite Management Use Cases

Centralized Management

As data growth continues its current growth trends, most application data sits in various silos within the infrastructure that is not easily inventoried or tracked. Hitachi Command Suite provides centralized management to discover and manage all virtualized storage resources using a common set of management tools. This capability enables administrators to centrally measure storage usage and capacity trends to maximize asset usage. By consolidating storage asset management and operations across all virtualized...
storage resources with centralized management, you can increase operational efficiency and reduce ongoing operational costs.

HCS leverages a common shared architecture that integrates the management products of the suite from the bottom up. Instead of separate products linked together, the software products in HCS use a common code base and a common database of shared configuration information. HCS software products all use the same graphical user interface, common user experience and share a common dashboard (see Figure 1). The transition from product to product is virtually transparent to the administrator, who can simply click on a task function in a common menu instead of having to know which product within the suite is being accessed (such as Hitachi Device Manager or Hitachi Tiered Storage Manager software). All configuration and storage tier information is combined and synchronized in 1 database accessed by multiple products, rather than on separate databases requiring larger data repositories that could be subject to inconsistencies. This design improves the efficiency and reliability of storage management information, as well as it provides a consistent and more flexible user interface.

Logical group constructs and logical storage device (LDEV) labels provide the ability to logically group related storage resources and apply meaningful labels to logical storage devices. The importance of this lies in the ability of logical groups and LDEV labels to be shared among many of the components of Hitachi Command Suite. As a result, these labels expose one of the key integration points of the suite as a whole. Use of logical groups and LDEV labels provides an enhanced organizational aspect to managing LDEVs that makes their reporting and provisioning easier.

Figure 1. Hitachi Command Suite Dashboard
For example, an administrator can define logical groups of storage resources according to how a company runs its business (by department and application). This action simplifies "application" mobility as it relates to application in-system and remote replication and application migration between storage tiers. The same logical group and LDEV label filters can be used as selection criterion by Hitachi Tiered Storage Manager to define migration operations or by Hitachi Replication Manager to build an application set of PVOLs in order to form a copy group. The combination of using logical groups and LDEV labels enables administrative scalability for organizations to centrally manage more storage with existing IT staff resources.

Unified Management and Provisioning
Hitachi Command Suite enables unified management practices for advanced data and storage management across all Hitachi storage environments and data types. By unifying block and file management capabilities, HCS delivers efficient management practices for Hitachi unified storage. It covers key administrative functions of device configuration, provisioning, system monitoring and service level management. Independent of storage configurations, HCS shares the same levels of consolidated operations, usability, task management and scalability. It helps IT organizations to take full advantage of leading Hitachi storage technologies across their data type needs.

Integrated Data Mobility
Hitachi Command Suite provides integrated data mobility with Hitachi Tiered Storage Manager. This mobility simplifies the process of defining and managing storage tiers and policies while enabling volume-based movement of data between storage tiers. As data storage requirements change over time, volume migration tasks across virtualized storage tiers required for data lifecycle management can be performed nondisruptively, without interrupting business application operations.

By defining storage tier and custom data management policies, administrators can achieve maximum performance of application workloads in shared storage pools. With user-defined policies, application data can be moved automatically to the optimal storage tier to properly align with business application needs and increase storage utilization.

With its unique ability to move data volumes nondisruptively across virtualized storage tiers, Tiered Storage Manager provides an efficient data management solution. It allows administrators to get data when and where it is needed most. Tiered Storage Manager enables easy and interactive matching of application-driven cost, performance and availability requirements to storage system and tier characteristics.

Automated Tiered Storage Management
With Hitachi Dynamic Tiering, Hitachi Command Suite enables efficient, automated tiered storage management with page-based data mobility based on an I/O heat index. Data is dynamically moved to the appropriate tier based on its usage. The most frequently accessed data is moved to the top tier and less frequently accessed data is placed in a lower tier (see Figure 2). Dynamic Tiering leverages the technology used in Dynamic Provisioning to create a pool consisting of multiple tiers.

Hitachi Command Suite enables storage administrators to take full advantage of the capabilities and benefits of Dynamic Tiering without manual management of storage tiers, manual data classification or data migration. Data stored in a Dynamic Tiering volume is automatically moved to the most appropriate storage tier: The most critical, most frequently accessed data is stored on the highest performing tier, such as flash or solid state disk.
Infrequently accessed data is moved to a lower tier reducing costs by taking advantage of less expensive disks, such as SATA. All movement is accomplished nondisruptively to the application and without causing any performance degradation. Just as with Dynamic Provisioning, only pages with data written to them take up physical disk space, improving capacity utilization and reducing waste. Data is dynamically allocated across each tier, taking advantage of wide striping and load balancing for optimal performance.

**Figure 2. Hitachi Dynamic Tiering**

Service-Level Management

Hitachi Command Director software centralizes service-level management for the Hitachi Command Suite by consolidating storage configuration, tier, capacity and performance data to enable informed management decisions. By providing a business-oriented view into the storage environment, Command Director simplifies application-to-storage reporting across block, file and unified storage environments. At the same time it enables the implementation of application-based storage service levels.

From a global dashboard of the storage environment (see Figure 3), an administrator can quickly organize storage assets with specific service-level objectives by application and monitor capacity and performance based service levels to ensure they are being met. Application storage service level recommendations simplifies the creation of custom storage SLOs for business applications. By accurately monitoring key capacity and performance statistics provided to critical business applications and file servers, compliance to application service levels can be properly monitored and enforced.
Integrated Performance Analytics

Hitachi Command Suite provides integrated performance analytics with Hitachi Tuning Manager that can quickly identify, isolate and find possible causes of performance bottlenecks. Tuning Manager maps, monitors and analyzes performance of network resources from the application, server through the SAN to the Hitachi storage system. It monitors all storage network resources, including hosts, file systems, databases, SAN switches, physical and logical storage devices, and virtual storage machines. Tuning Manager provides the necessary visibility for performance optimization and management of the entire virtualized storage environment.

Integrated storage performance analytics (see Figure 4) within HCS provides performance first aid to quickly identify and isolate whether an application performance issue is storage related and help diagnose any storage performance bottlenecks. If additional performance details or diagnosis is required, Tuning Manager includes a Web-based reporting interface (see Figure 5). It provides deeper performance monitoring across a comprehensive range of performance and capacity metrics incorporating historical trending and custom reporting capabilities.
As server and storage virtualization grows more prevalent across the data center, storage capacity and performance planning becomes increasingly more challenging. Shared storage resources can easily become overtaxed, requiring lengthy workload analysis to determine the origin of the stress. Tuning Manager provides broad infrastructure monitoring and deep storage system analysis required to establish performance and capacity baselines as well as storage health checks. With informative reports and forecasting tools to eliminate the guesswork, you can easily optimize both capacity and performance planning within Hitachi global storage virtualization environments. You can efficiently increase utilization of existing storage resources and plan for future growth.

Figure 4. Hitachi Command Suite - Integrated Storage Performance Analytics
Figure 5. Hitachi Tuning Manager Performance Reporter
Summary

Hitachi Command Suite helps to establish the unified management required for all Hitachi storage systems and accelerates delivery of Hitachi global storage virtualization. This approach drives the Hitachi Data Systems vision of IT that is virtualized, automated, cloud-ready and sustainable: IT that transforms data centers into information centers. Hitachi Command Suite raises the bar in integration, simplification and centralized management. The capabilities of each product in the suite have been enhanced to support the latest advanced Hitachi storage technologies, particularly in the area of global storage virtualization.

The built-in intelligence in Hitachi Command Suite not only simplifies administrative tasks, but also helps users leverage existing Hitachi best practices in storage management. Combined with the Hitachi Storage Virtualization Operating System and Hitachi Dynamic Tiering, these practices dramatically increase the level of automated management and self-optimization in Hitachi storage solutions. Administrators can focus on fine-tuning, monitoring and managing the exceptions in their storage environment.

With Hitachi Command Suite, you can leverage existing IT investments longer, reduce operational costs without added complexity, and increase storage asset utilization and efficiency. Hitachi Command Suite enables your organization to properly align the management practices needed today for your unique infrastructure environment while appropriately planning for future growth.