

STORAGE IN THE CLOUD SERIES

- **Storage Virtualization: Deliver Storage as a Utility for the Cloud**

What are the requirements for cloud storage? You need agile systems and management solutions to meet changing business requirements over time. You need to segregate or compartmentalize storage for multitenancy. And you need to be able to flexibly deliver specified service levels to individual departments and applications. When you virtualize storage with Hitachi block virtualization, you can use any of your storage for any system or application. Plus you can move data throughout the Hitachi Dynamic Storage infrastructure without disrupting operations. Attend this informative session to learn how Hitachi Command Suite can help you meet the demanding storage requirements of private cloud computing.

MAINFRAME SERIES

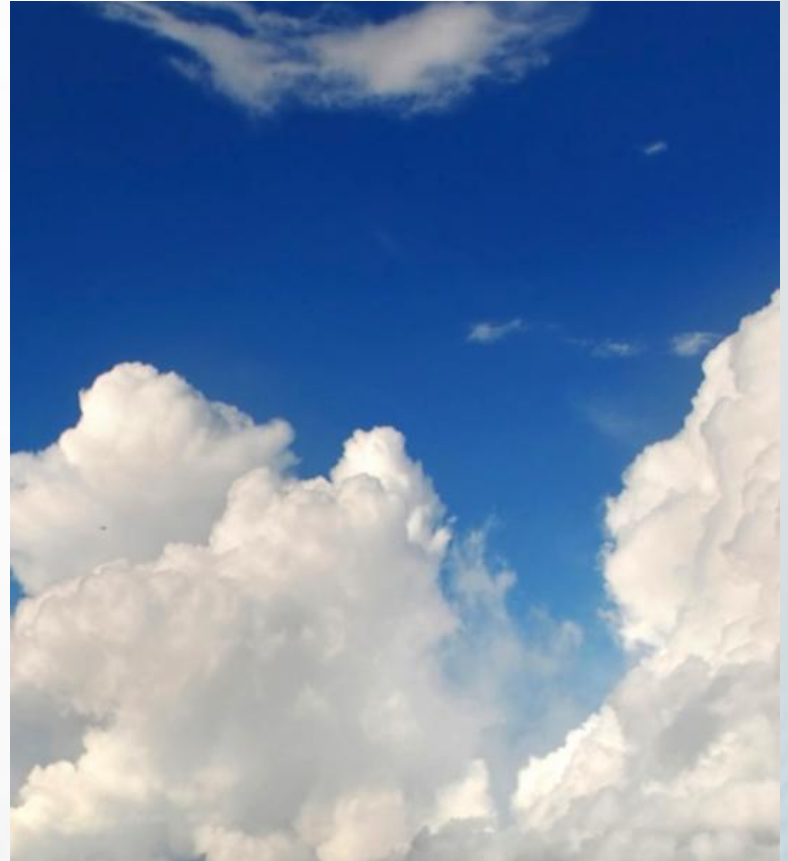
- **Advances in Mainframe Storage**, October 19, 9am PT, 12pm ET
- **Replication in a Mainframe Storage Environment**, October 26, 9am PT, 12pm ET
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AGENDA

- Bring Cloud Economics to Enterprise Storage
- Service-based Approach to Storage Management
 - Service-based delivery
 - Agile provisioning
 - Data mobility
 - Simplified management
 - Performance SLA-based service
 - Capacity metering and chargeback enablement
- Enable the Cloud
- Demonstration

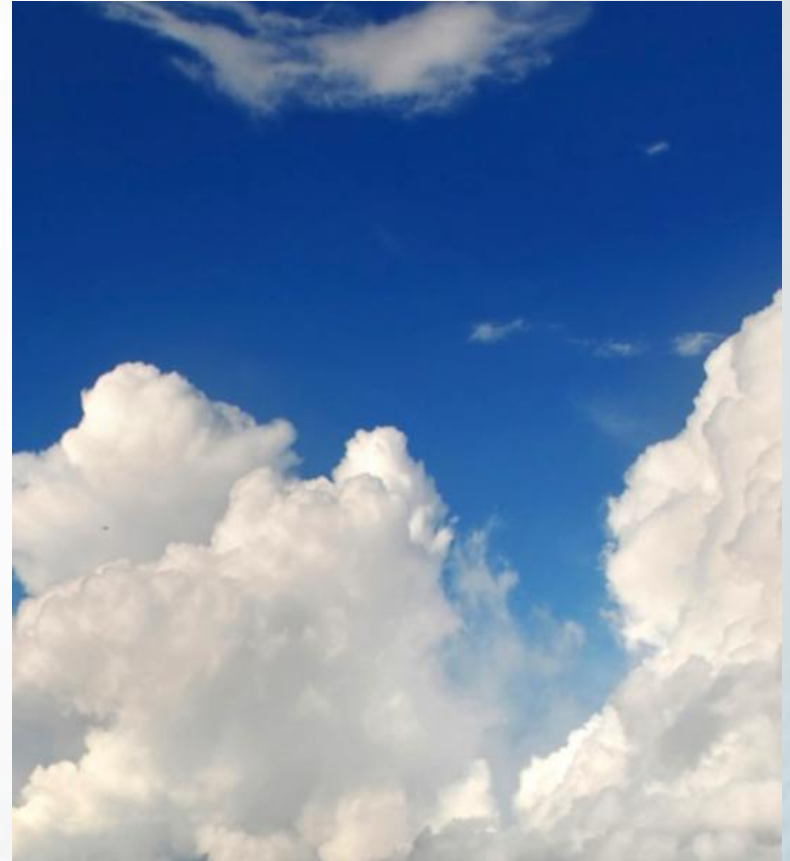
THE PROMISE OF THE CLOUD

- On-demand application delivery as a service
- Pay per use
- Elastic scalability
- Reduced infrastructure costs
- Easier to manage



CLOUD CONCEPT OF VIRTUALIZATION

- Service-based delivery
- Agile provisioning
- Data mobility
- Simplified management
- Performance SLA-based service
- Capacity metering and chargeback enablement



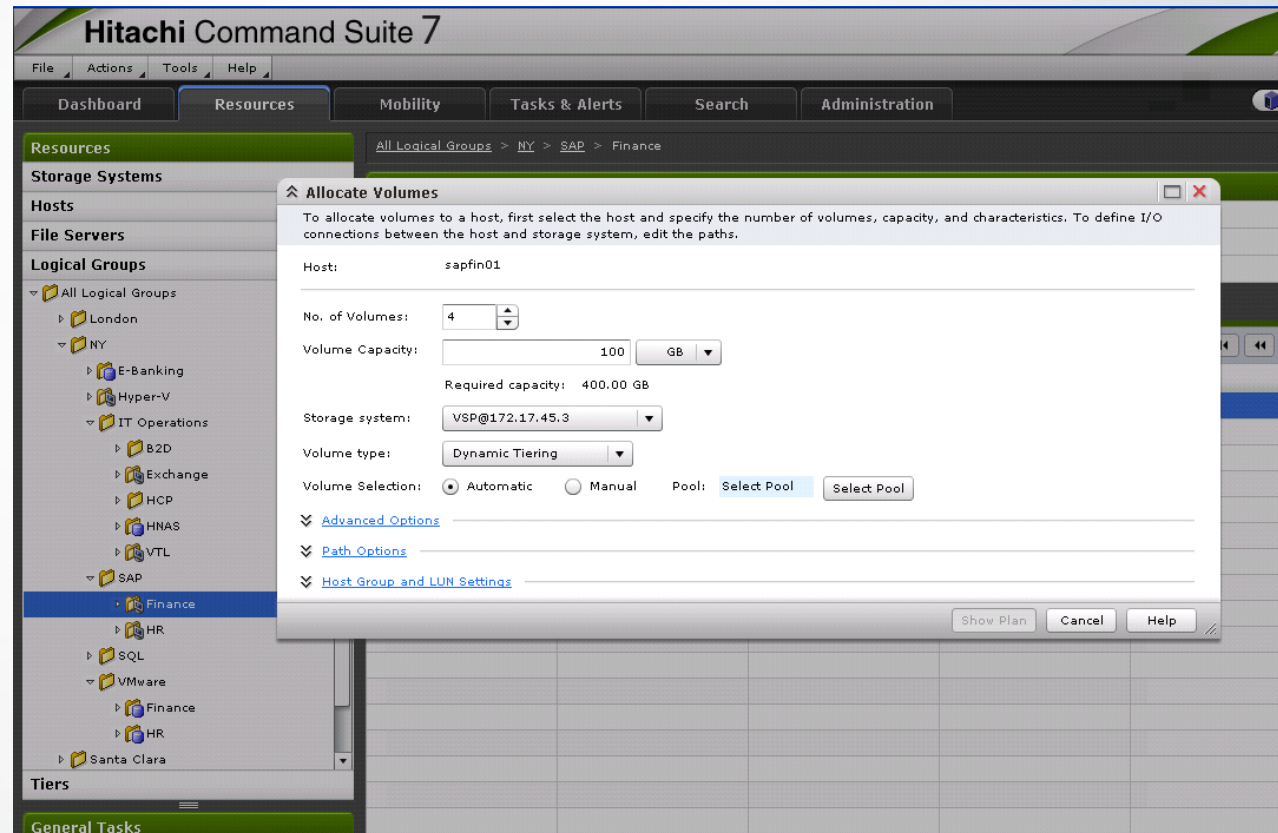
- Virtualized IT environment that dynamically pools and shares resources for storage service delivery
 - Rapid and flexible storage services
 - Storage on demand
 - Pay as you go
 - Thin provisioning
 - Capacity reclaim

The screenshot displays the Hitachi Command Suite 7 interface. The left sidebar shows a tree view of Logical Groups under 'NY', with 'E-Banking' selected. The main panel shows the 'Summary' for the 'E-Banking' logical group, including details like 'No. of Hosts: 0' and 'Total Capacity: 40.00 GB'. Below this is a 'Volumes' table with columns for Volume, Label, Storage System, Serial No., Host, WWN, Port, and Host Group.

Volume	Label	Storage System	Serial No.	Host	WWN	Port	Host Group
00:00:74	ebnk webvol	VSP@172...	53610	172.17.250...	10.00.00.00...	CL3-A, CL4-A	esx2
00:00:75	ebnk webvol	VSP@172...	53610	172.17.250...	10.00.00.00...	CL3-A, CL4-A	esx2
00:00:76	ebnk webvol	VSP@172...	53610	172.17.250...	10.00.00.00...	CL3-A, CL4-A	esx2
00:00:14	ebnk webvol	VSP@172...	53610	172.17.250...	10.00.00.00...	CL3-A, CL4-A	esx2

Start by segregating your consumer applications with Hitachi Command Suite logical groups

- Flexible provisioning capabilities for everything virtualized
 - Rapid storage deployment for physical host servers or virtual machines
 - Thick or thin provisioned storage volumes and pools
 - Minimal number of required provisioning steps



Simplified and rapid provisioning is key

- Comprehensive data migration
 - Sub-volume auto tiering
 - Volume migration for volume-based storage tiering
- External heterogeneous virtualization support
 - Largest ubiquitous storage pool tiering capability
- Nondisruptive to application availability

The screenshot displays the Hitachi Command Suite 7 Mobility interface. The left sidebar shows a tree view of Logical Groups, with 'E-Banking' selected. The main content area is divided into several sections:

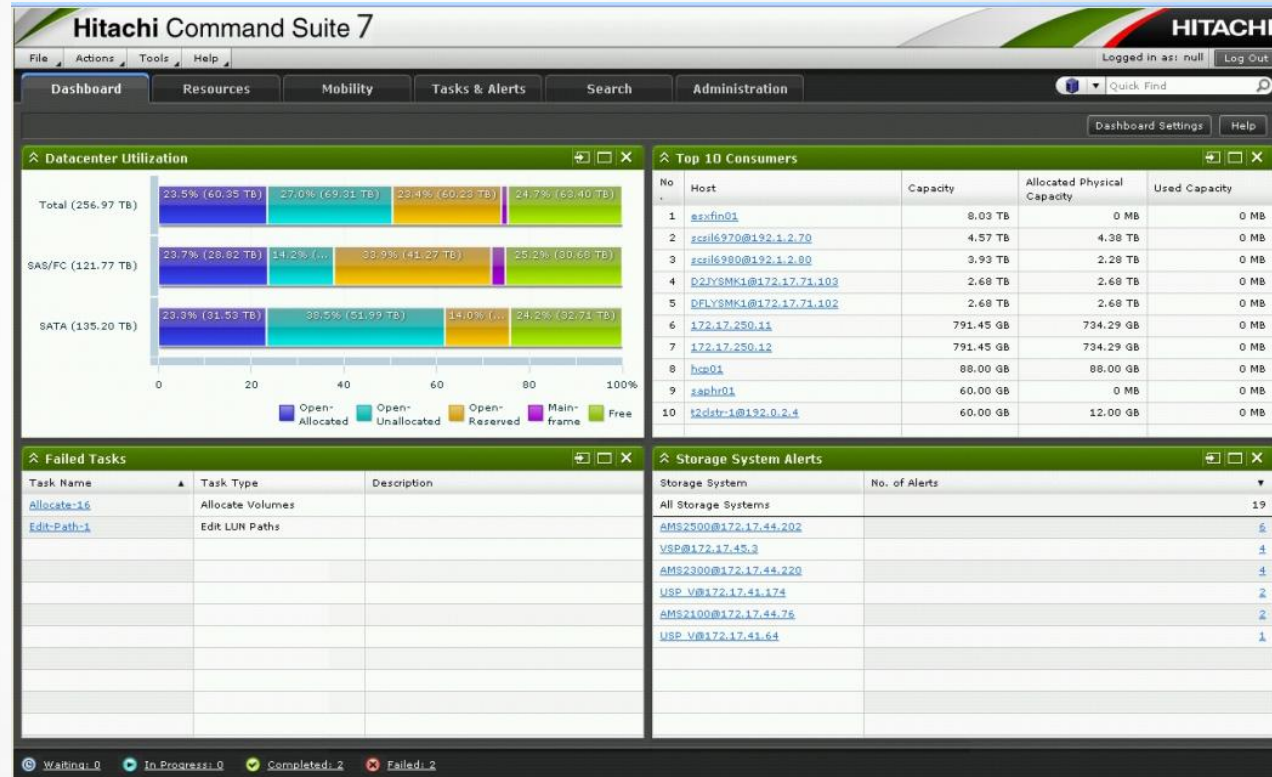
- Dashboard:** A summary table for the 'E-Banking' logical group.
- Drive Type Summary:** A bar chart showing the distribution of drive types.
- Volumes:** A table listing individual volumes with their properties.

Name	E-Banking	Used Capacity		HDT Pool		SSD	-
Description	East Coast E-Banking					SAS 15K	-
No. of Hosts	0					SAS 10K	-
No. of Vols	4					SATA	-
Total Capacity	40.00 GB					External	-
Total IOPS	11157.86			HDP Pool	8.20 GB		
Max. Response Time	367 ms			Basic	30.00 GB		
Last Refreshed	2011-09-24 00:11:32						

Volume	Label	Storage System	Response Time	IOPS	Used %
00:00:74	ebnk webvol	VSP@172.17....	362 ms	3031.19	100%
00:00:76	ebnk webvol	VSP@172.17....	367 ms	3014.48	100%
00:00:75	ebnk webvol	VSP@172.17....	367 ms	3014.02	100%
00:00:14	ebnk webvol	VSP@172.17....	251 ms	2098.17	82%

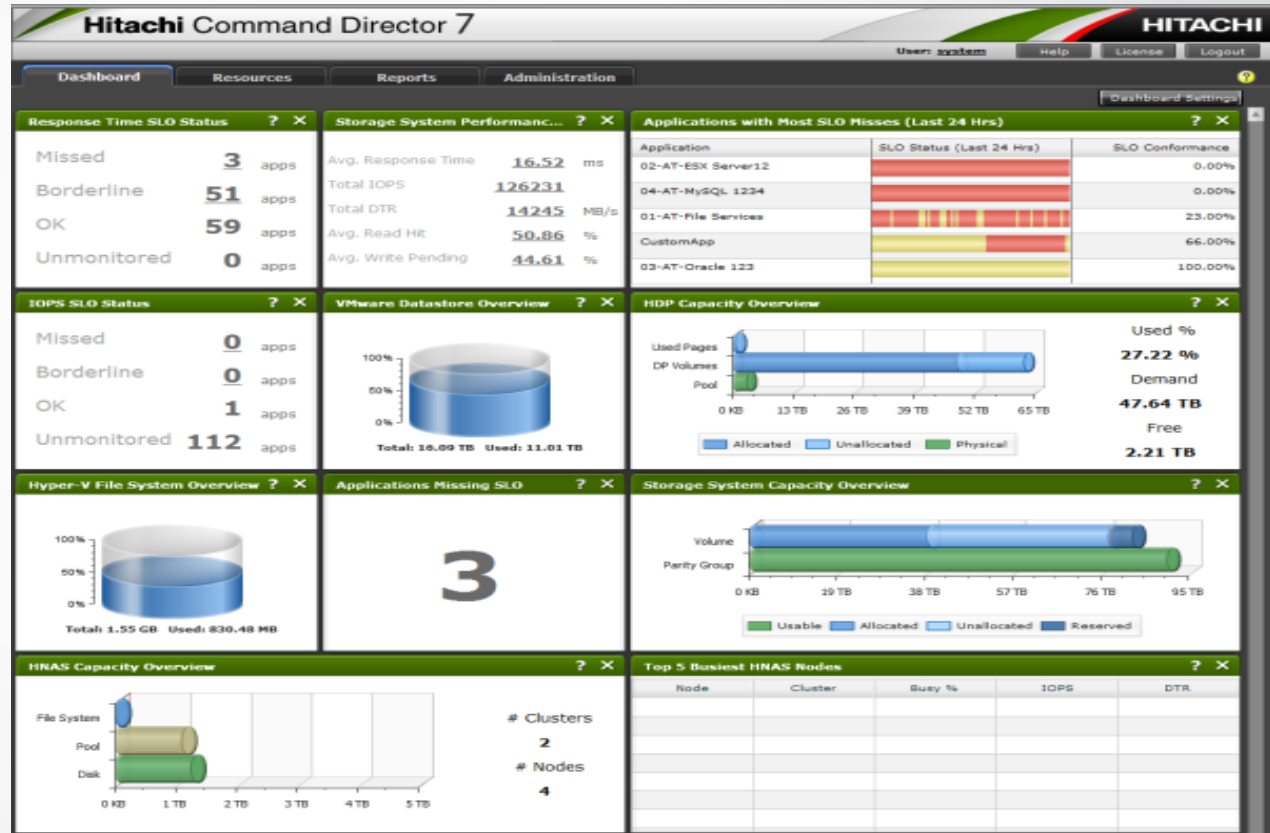
Volume and sub-volume data mobility are both required and complementary

- Address diversified management requirements
 - Increasing infrastructure complexity
 - Both novice and expert users
 - Task organization
 - Incorporate administrative best practices
- Central infrastructure management console
 - Resource configuration
 - Data mobility
 - Monitoring and reporting
 - Performance and capacity analysis



The HCS dashboard is simplified and flexible. Dashboard reports can be relocated and included or excluded as desired, along with column reassignments. Adobe Flex is a best in class GUI design tool.

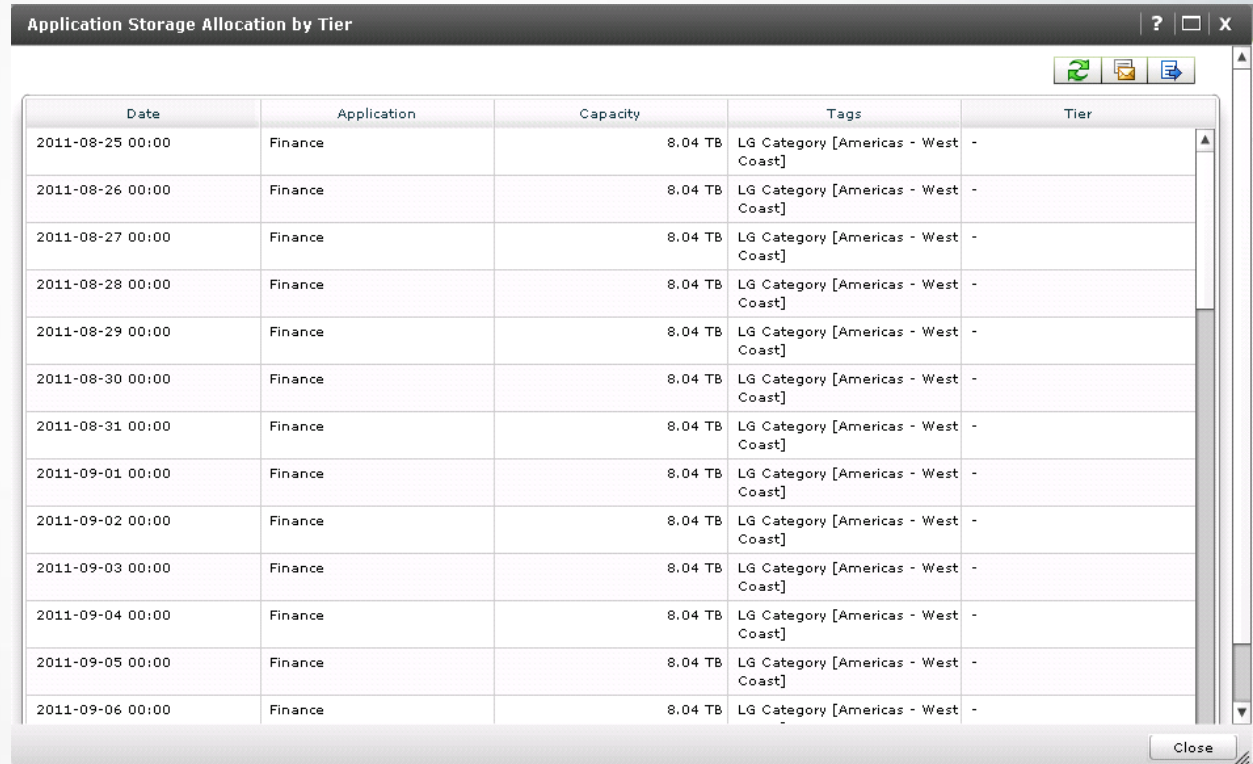
- Service level agreement (SLA) for storage
 - Performance
 - Capacity
 - Costs
- Service level dashboards
 - Business applications and functions
 - Storage systems



Hitachi Command Director provides application SLA performance monitoring and notification

CAPACITY METERING AND CHARGEBACK ENABLEMENT

- Capacity metering
 - Service providers offering differentiated service levels
- Chargeback enablement
 - Reporting models (custom or standard)
- Chargeback models
 - Optimized for performance, capacity or costs
 - Cost accounting and reporting



The screenshot shows a window titled "Application Storage Allocation by Tier" with a table of data. The table has five columns: Date, Application, Capacity, Tags, and Tier. The data shows a consistent allocation of 8.04 TB for a Finance application over a period from 2011-08-25 to 2011-09-06. The tags for all entries are "LG Category [Americas - West Coast]".

Date	Application	Capacity	Tags	Tier
2011-08-25 00:00	Finance	8.04 TB	LG Category [Americas - West Coast]	-
2011-08-26 00:00	Finance	8.04 TB	LG Category [Americas - West Coast]	-
2011-08-27 00:00	Finance	8.04 TB	LG Category [Americas - West Coast]	-
2011-08-28 00:00	Finance	8.04 TB	LG Category [Americas - West Coast]	-
2011-08-29 00:00	Finance	8.04 TB	LG Category [Americas - West Coast]	-
2011-08-30 00:00	Finance	8.04 TB	LG Category [Americas - West Coast]	-
2011-08-31 00:00	Finance	8.04 TB	LG Category [Americas - West Coast]	-
2011-09-01 00:00	Finance	8.04 TB	LG Category [Americas - West Coast]	-
2011-09-02 00:00	Finance	8.04 TB	LG Category [Americas - West Coast]	-
2011-09-03 00:00	Finance	8.04 TB	LG Category [Americas - West Coast]	-
2011-09-04 00:00	Finance	8.04 TB	LG Category [Americas - West Coast]	-
2011-09-05 00:00	Finance	8.04 TB	LG Category [Americas - West Coast]	-
2011-09-06 00:00	Finance	8.04 TB	LG Category [Americas - West Coast]	-

Hitachi Command Director provides a chargeback enablement feature that can be used to feed higher level enterprise-wide chargeback solutions

**Traditional
IT Delivery**

CLOUD
DEPLOYMENT



Private Cloud



Hybrid Cloud



Public Cloud

CLOUD
DELIVERY



Self Service



SLA Mgmt



Billing



Metering

Converged Solutions

GLOBAL
ORCHESTRATION

COMPUTE

NETWORK

Hitachi File and Content Portfolio



Storage Infrastructure and Technologies

STORAGE VIRTUALIZATION
AND MANAGEMENT

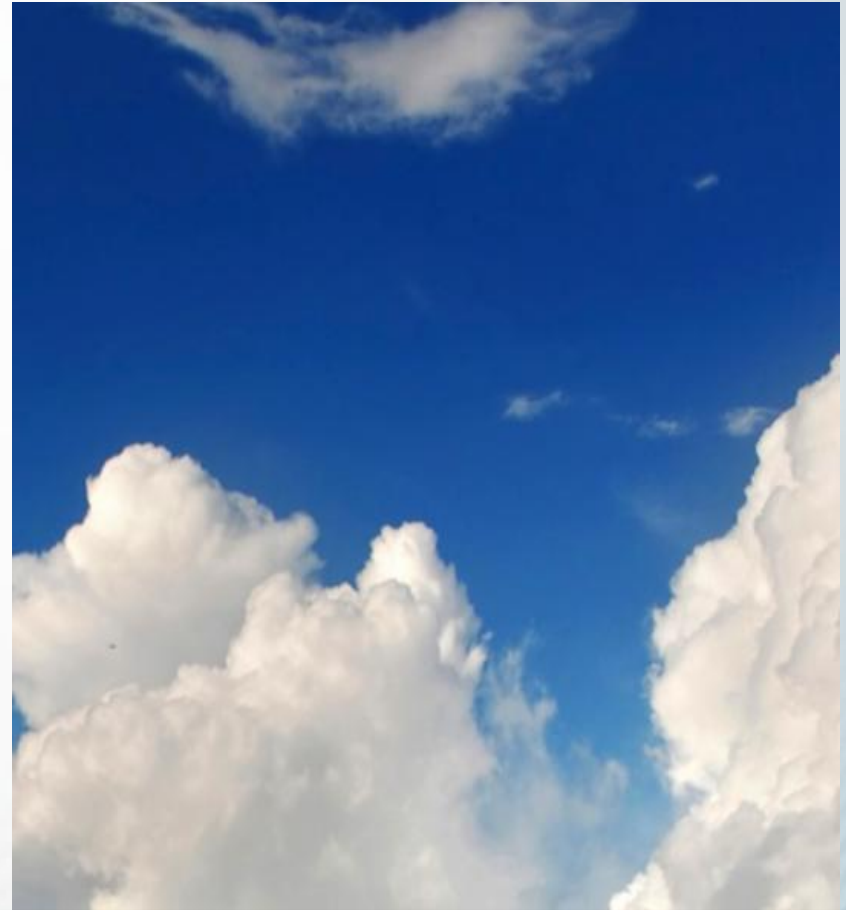


Foundation

TRANSFORM TRADITIONAL I.T. TO A MORE EFFICIENT MODEL

IMPLEMENT PRIVATE STORAGE CLOUD WITHOUT TURNING THE DATA CENTER UPSIDE DOWN

- Don't over complicate
- Leverage existing virtualized infrastructure
- Organize storage consumers into cross-functional logical groups
- Feed service level objective (SLO) policies and capacity metering from base logical construct



Only additional component required – Hitachi Command Director

**WEBTECH
STORAGE VIRTUALIZATION:
DELIVER STORAGE AS AN
UTILITY FOR THE CLOUD**

DEMONSTRATION



QUESTIONS AND DISCUSSION

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Please check www.hds.com/webtech next week for more information and for:

- Link to the recording, the presentation and Q&A (available next week)
- Schedule and registration for upcoming WebTech sessions

THANK YOU