ENTERPRISE VIRTUALIZATION
ONE PLATFORM FOR ALL DATA

WOULD YOU LIKE TO SAVE 20% TO 30% ON YOUR STORAGE SPEND?
We can’t slow down your data growth, but we sure can help you buy less disk to support that growth.

STORAGE ECONOMICS IS SIMPLE.
Buy less disk and put more data on lower cost storage.

REMEMBER?
It takes change, but change will be good.

CONTENTS
- STORAGE VIRTUALIZATION
- DYNAMIC PROVISIONING
- SCALE UP AND SCALE OUT
- MOBILITY AND AVAILABILITY
- SUMMARY
- RESOURCES

SUMMARY
ONE PLATFORM FOR ALL DATA

In an era of explosive data growth, organizations must evaluate potential technology purchases not only on their technical merits but on their economic merits as well.

By addressing capital and operational expenses together, Hitachi Data Systems offers customers a comprehensive and sustainable approach to storage both today and for the future.

The following e-guide showcases how easy it can be to implement virtualization, tiered storage and software to deliver significant economic benefits to the organization.

Homogenous management in a heterogeneous world.
Virtualization helps organizations do three important things that help create an economically and ecologically superior data center:

- **RECLAIM**
  - Hitachi Data Systems approaches storage virtualization by enabling it in the storage controller. Controller-based virtualization gives organizations the ability to manage their existing heterogeneous, multivendor storage assets as a single pool of storage.
  - By providing a single management interface, virtualization enables cost lowering functions such as reduced hardware costs, SAN infrastructure costs and environmental costs.

- **UTILIZE**

- **OPTIMIZE**

Virtualization is the box, the Hitachi Universal Storage Platform® V doesn’t care whether it’s in the box or connected via a fibre channel cable. Hitachi has changed the playing field by separating the commodity media (disks) from the innovation (USP-V intelligent control unit) required to provide storage, data, and content services, providing TOTAL FLEXIBILITY.
STORAGE VIRTUALIZATION IS EASY

VIRTUALIZATION IS IN THE DNA OF THE BOX, IT'S EASY AND IT COMES IN MANY FORMS

- **INTERNAL VIRTUALIZATION**
  Tiering inside the box

- **EXTERNAL VIRTUALIZATION**
  Tiering outside the box

- **LUN VIRTUALIZATION**
  “Thin provisioning and wide striping”

- **ARRAY VIRTUAL PARTITIONING**
  Enabling flexibility in quality of service

- **LOWER COSTS**
- **REDUCE COMPLEXITY**
- **INCREASE UTILIZATION**
- **STORAGE SERVICE LEVEL MANAGEMENT**
- **ENHANCE BUSINESS CONTINUITY**
- **IMPROVE UPTIME**

THE FUTURE HAS BEEN HERE FOR 6 YEARS
VIRTUALIZATION AND SEPARATION OF THE STORAGE CONTROLLER FROM THE DISK ARRAY

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INCREASE STORAGE UTILIZATION

HITACHI DYNAMIC PROVISIONING

Hitachi Dynamic Provisioning (HDP) is software that allows one or many pools of RAID groups to be managed as a common entity. This software enables two key functionalities. Automatic wide striping of data to improve performance and ease of management, as well as thin provisioning of individual LUNs to achieve greater storage utilization. This functionality is not limited to storage physically inside the Universal Storage Platform V (USP-V) frame, it can be delivered for any storage virtualized externally through the USP-V, whether it is HDS storage or third-party storage.

HOW TO IMPROVE STORAGE UTILIZATION

- Provision only what is used – thin provisioning
- Simplify management by allocating virtual storage on demand
- Simplify performance tuning by spreading the I/O across all the RAID groups in the pool via wide striping
- And remember, the Hitachi Dynamic Provisioning storage pool is expandable, nondisruptively

DATA DISPERSION TECHNOLOGY (HITACHI ADAPTABLE MODULAR STORAGE AND USP-V)

- Purchase actual storage capacity which gets put into the pool
- Allocate logical volumes to servers (dotted lines)
- 4KB chunks or “pages” of the pool are assigned as applications write to the logical volumes
- Only need to purchase capacity for what is being used
- HDP storage pool is expandable AND rebalances data
- RECLAIM feature (10% + reclaim)

ASSUMPTIONS

- Average industry utilization 25%-35%
- Target Hitachi utilization 65%+
INCREASE STORAGE UTILIZATION

DYNAMIC PROVISIONING CAPABILITIES
- Simplify provisioning
- Provision only what is used
- Increase performance
- Automate performance optimization
- Automatic load balancing
- Storage reclamation
- Replication savings

BENEFITS
- REDUCE STORAGE EXPENSE
- REDUCED OPERATIONAL EXPENSE
- IT AGILITY

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HOW IT WORKS
TODAY – HITACHI DYNAMIC PROVISIONING (HDP)

Major Retail Chain Reduces Storage Costs While Improving Performance
A large enterprise retail company reported that improved performance and deferred storage purchases were the key benefits of implementing Hitachi Dynamic Provisioning.

Source: Senior IT Manager, Large Enterprise Retail Company
A "thick" volume has a "percent used" (file system view)

A copy to an HDP volume (using Hitachi Tiered Storage Manager (HTSM) will copy the entire space

As a post-process, we can reclaim "untouched" space
- Zero page reclaim (ZPR)
- Any 4K page that is still zeroes is reclaimed back into the pool

Reclaim totals will not equal original "unused" space
- File system fragmentation strategies affect the number of "untouched" pages
- New volumes and larger volumes have a better chance of reclaim
- There will still be some "unused but assigned" space

“CUSTOMERS ARE RECLAIMING BETWEEN 20 AND 50% OF THEIR PREVIOUSLY ALLOCATED, BUT UNUSED STORAGE.”
The choice of scale up or scale out needs to be dictated by the application environment and needs.

**SCALE OUT IS LOOSE COUPLING**
- Resources in one node can not be used to increase the resources in another node
- Additional management overhead to manage workload
- Availability comes from active/passive redundancy

**SCALE UP IS TIGHT COUPLING**
- Resources can be pooled together to give maximum performance and capacity
- Pooled resources provide agility and ease of management
- Scale up can be partitioned to work like scale out
- Has higher availability with multiple resources in a common pool
- Scale up can be loosely coupled for disaster recovery and migration (Hitachi High Availability Manager, HAM)

No compromise is needed between scale up and scale out. The Universal Storage Platform V integrates both architectures to provide performance scaling for any type of workload.

**BENEFITS**
- Availability, scalability and reliability
- Flexible price points of storage T0 to T4 inside or outside the array
- Flexibility to put the right storage at the right place at the right price point.
- Ability to scale capacity inside the box or heterogeneously outside the box
- As we scale OUT we scale UP as the cache and processors act as one
An approach to overcome these limitations is dynamic tiering of data which allows nondisruptive movement. The storage arrays are virtualized into a single pool of heterogeneous storage. One can then define tiers across the pool without physical limitations and move data nondisruptively at any time.

This approach changes the nature of tiering from a “must get it right the first time” approach when an app is first introduced, to an ongoing activity done at the client’s time of choice. Since tiering is easier and continual, data can be continually evaluated and optimized to lower, more cost effective tiers without the risk of disruption. So the need for over-engineering is eliminated.

- Create a single pool of heterogeneous storage
- Define tiers of storage across the pool with out physical array limitations
- Data can be moved between tiers using a consistent tool set - Hitachi Tiered Storage Manager (HTSM) ensures there is no server/application interruption

Why?
- Migration from older array to newer array
- Extend the useful life of an array
- Purchase a LOWER tier of storage and manage or leverage it in the common pool

Capabilities of dynamic tiering:
- Flexibility to make sure the application can find its correct tier to match its needs
- Greater volume of data optimized to lower tiers as tiering is continual
- Architecture is engineered to save money
Data migration is part of an ongoing IT operation that is especially intensive during technology refresh cycles because:

- Migration is highly prone to human errors and typically needs to be done in very small scheduling windows
- Data needs to be migrated across storage tiers and storage subsystems
- Operational costs can be prohibitive
- And application downtime is unacceptable

YOU CAN ENJOY:

- Seamless data migration
- No application disruption
- Low cost storage tiers
- One single pool of heterogeneous storage

NONDISRUPTIVE DATA MIGRATION BETWEEN ARRAYS

HOW ABOUT NO MORE MESSY DATA MIGRATIONS AND PAINFUL DOWNTIME?

- Migrate from one USP-V to another USP-V or future generation product
- Enable High Availability Manager to replicate all data between arrays
- Enable secondary paths to 2nd array
- Force failover of LUNs from 1st array to 2nd

SERVERS AND APPLICATIONS ARE NONDISRUPTIVELY MOVED TO A NEW ARRAY
SAVE MONEY BY INCREASING EFFICIENCIES
Virtualization is now a mainstream technology and is used to increase hardware utilization as well as lower operational costs in the data center. Next, organizations need to begin to adopt and adapt to more efficient, cost effective and business friendly platforms and solutions to deliver more value to the business.

HDS HAS THE TECHNOLOGY TODAY
- Virtualization
- Hitachi Dynamic Provisioning
- Tiered Storage Manager
- Hitachi Content Platform

The Hitachi Data Systems virtualized infrastructure provides one platform for all data and aligns customers for a smooth transition into cloud computing, the next big thing on the server side.

HITACHI DATA SYSTEMS SOLUTIONS ARE DEPLOYED IN 44 OF THE TOP 50 FORTUNE GLOBAL 500® COMPANIES
- Today, we are the leader in storage virtualization with more than 13,500 virtual controllers shipped worldwide, achieved through the use of common storage services throughout an entire heterogeneous storage infrastructure
- It is innovation that makes us the only vendor with a single integrated platform to address the full range of storage requirements including virtualization, common management, tiered storage and common data protection

SIMPLIFY MANAGEMENT
INCREASE UTILIZATION
CONSOLIDATE ASSETS
ENHANCE BUSINESS CONTINUITY
LOWER OPERATIONAL COST
REDUCE COMPLEXITY
THE ANALYST VIEWPOINT

TAKE A LOOK AT OUR SOLUTIONS BRIEFS AND WHITE PAPERS

- Reducing Costs and Risks for Data Migrations White Paper by ESG
- Migration Solution Brief by IDC
- Assessing the Real Cost of Storage by IDC
- How HDS Enables Cloud Storage by ESG

ADDITIONAL RESOURCES

WHY NOT READ OUR OTHER E-GUIDES?

- 6 Essential Strategies for Economizing Your Storage
- Storage Virtualization for Dummies
- Big 5 Benefits of One Storage Platform

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