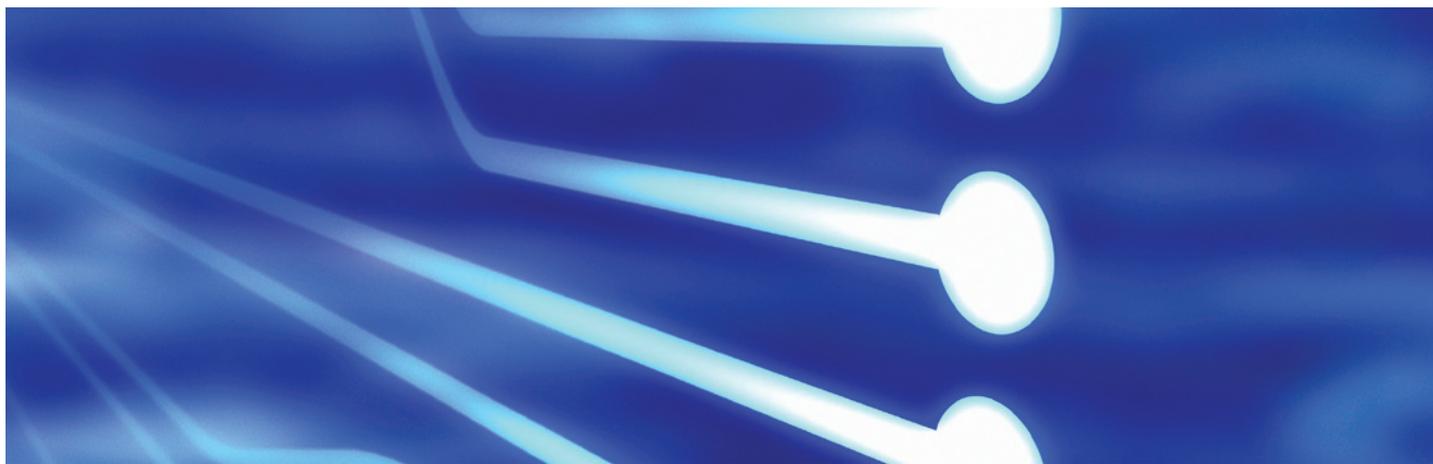




# Hitachi Data Systems and VMware – Delivering End-to-end Virtualization

## Integrating Virtualization Architectures from Servers to Storage



### Making 1+1=3

Smart organizations realize that both server and storage virtualization benefit their environments. Adopting either type of virtualization directly drives the need, applicability and benefits of the other!

Virtualization appeals to organizations on many levels:

- Simplifies complex, heterogeneous environments
- Reduces overhead through consolidation
- Provides “green” savings by minimizing waste in electronic capacity
- Extends asset life
- Enables robust disaster recovery capabilities without having exactly the same environment maintained in multiple locations

Virtualization drives many benefits along the same lines. And, in an integrated, end-to-end virtualization approach for both servers and storage, organizations can gain the benefits of end-to-end utilization, responsiveness and flexibility, truly making 1+1=3 the new math.

*“VMware and Hitachi Data Systems are the industry leaders in virtualization. Together, we will forge new thoughts, products and solutions that will revolutionize how customers think about IT today.”*

— John Mansfield, Senior Vice President,  
Hitachi Data Systems

### When Architectures Collaborate...

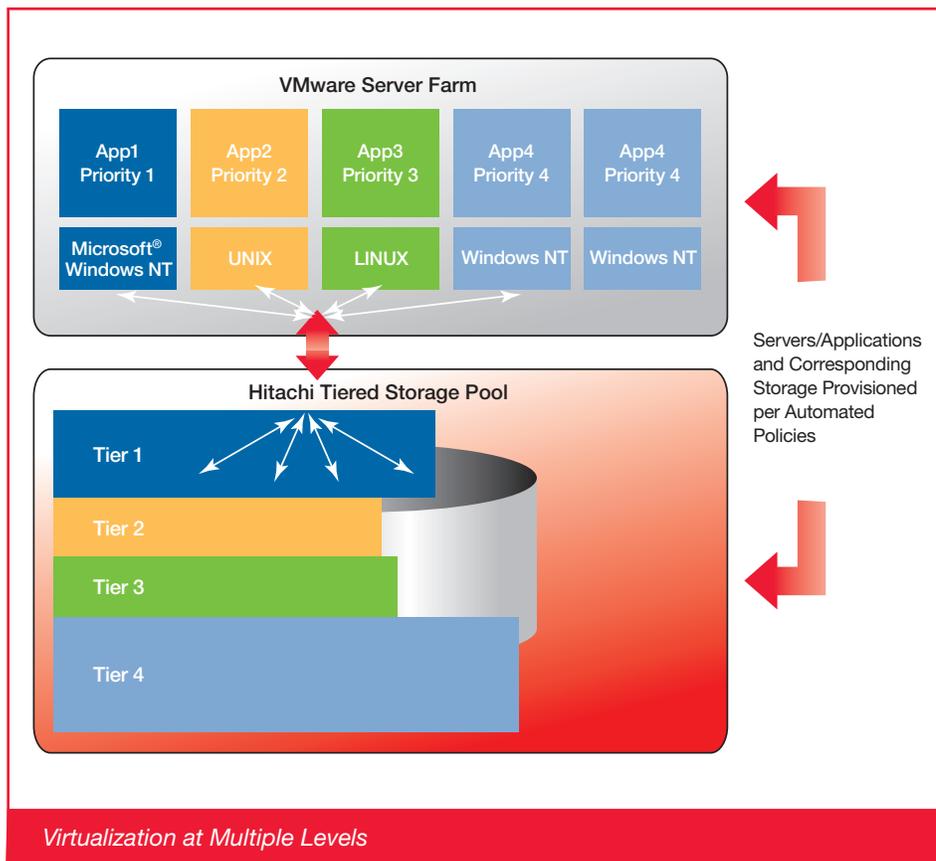
#### Server Virtualization Drives Storage Virtualization

As server virtualization using VMware is implemented throughout an organization, the need for storage virtualization becomes more evident and more urgent.

As depicted in the diagram, a server virtualization pool can not only have multiple applications but also instantly “provision” a second copy of a given application based on demand. If each server virtual machine is provisioned with a fixed physical amount of storage, then storage inefficiencies may occur.

By tying the virtual machine infrastructure to a pool of storage, each virtual machine can be configured with a virtual amount of storage. As each virtual machine requires additional storage, the storage virtualization layer, using the thin provisioning capabilities of Hitachi Dynamic Provisioning software, can allocate storage as needed. As additional virtual machines are created in response to demand, the storage layer can automatically create the appropriate storage allocation automatically.

Hitachi virtualization uniquely complements VMware capabilities by masking the underlying



heterogeneous storage infrastructure. Hitachi storage allocation policies provide the storage mix that delivers the desired quality of service automatically and without intervention.

### Architected for Virtualization = Architected to Complement Each Other

Architected for virtualization, VMware and Hitachi products work well together right out of the box. VMware's server-based virtual machine architecture embodies a similar approach to the storage controller-based virtualization that Hitachi launched in 2003 and has been bringing innovation to ever since. The two architectures deliver compatible and complementary functionality that turbocharges the benefits realized.

## Leveraging Strengths

### Utilization

Virtualization enables the effective sharing of resources siloed under conventional approaches and maximizes utilization. Three major advantages Hitachi Data Systems and VMware offer in maximizing utilization are:

- **Thin provisioning.** Hitachi Dynamic Provisioning software enables organizations to provision storage on an as needed basis. As an application requires storage, Dynamic Provisioning software creates a virtual pool just as the storage is needed. The net impact: dramatic savings in administration, hardware and holding costs.
- **Eco-friendliness.** By increasing utilization, VMware functionality can shut down whole banks of servers. The Hitachi power down capability also enables storage drives to be shut down until the data is needed.
- **Tiering.** Both Hitachi and VMware technologies enable tiering of different applications and users. They match the class of service to the device's capabilities as well as extending the functional life of older assets by moving less critical items to lower tiers. In that way, all applications do not utilize the most expensive and fastest performing resources, thereby saving money.

### Mobility

By hiding the complexity of underlying hardware and software, virtualization maximizes the mobility of entire infrastructures. Three major advantages Hitachi and VMware offer in maximizing mobility are:

- **Management of resources as virtual pools rather than device-specific assets.** By creating clusters of servers and linking them to networked storage systems, both applications and data can be cloned, moved and recalled effectively and efficiently.
- **Classes of service.** Both Hitachi and VMware technologies enable definition and categorization of various service classes mapped to each application and user pool.
- **Hiding complexity:** The abstraction layer hides the complexity of even great numbers of heterogeneous server and storage devices. By hiding complexity, the applications can simply submit data mobility (replication, cloning, migration, backup, etc.) requests without having to understand the individual commands needed. The virtualization infrastructure can handle it.

### Simplicity

Hitachi Data Systems and VMware simplify management. With each company's virtualization feature offerings, organizations have the flexibility to effectively control complex environments; server and storage virtualization simplify entire infrastructures.

The Hitachi Universal Storage Platform™ family can virtualize storage from almost every other vendor. The net result is that VMware and applications do not have to change settings to adapt to underlying hardware.

Both VMware and Hitachi virtualization enable central and departmental level administration. This simplifies an IT infrastructure and cuts management costs. Virtualization technologies provided by VMware and Hitachi Data Systems increase reliability, availability and scalability.



## VMware and Hitachi Data Systems Drive Utilization, Mobility and Mastery!

To summarize, the combined offerings of VMware and Hitachi Data Systems provide our joint customers the following benefits:

- **End-to-end utilization.** Virtualization solutions from VMware for servers and Hitachi Data Systems for storage enable savings throughout an IT infrastructure, reducing complexity, increasing efficiency and trimming costs.
- **Responsiveness.** Automatic debug and response via VMware Virtual Center or Hitachi HiCommand® Tuning Manager software maintain high availability by enabling responsiveness in or near real time.
- **Flexibility.** VMware and Hitachi Data Systems give IT executives the flexibility they need to meet the demands of changing workloads, priorities and needs.

## Hitachi Data Systems and VMware: Visionary Technologies, a Dedicated Partnership

“Revolutionary” is a word that describes the impact VMware has had on server infrastructures. It is also a word often used to describe the technological and market breakthroughs Hitachi Data Systems has pioneered on the storage side. When brought together, such breakthroughs further contribute to a successful, consistently high-performing VMware Infrastructure 3 environment.

### Achieving “End-to-end” Virtualization

Just as VMware became a strong leader in server virtualization, Hitachi Data Systems has also emerged a leader in storage virtualization. Today, over 7,000 virtual storage controllers from Hitachi Data Systems have shipped to customers as part of the company’s ground-breaking Universal Storage Platform array-based storage virtualization architecture. The emergence of the Hitachi storage virtualization architecture has since led many organizations to simplify management and further consolidate existing legacy storage hardware and network storage system resources from other vendors. Thanks to the Universal Storage Platform, such heterogeneous storage resources can now be managed and provisioned from within one virtual pool of storage.

For VMware environments, this means reaping the benefits of end-to-end virtualization — from servers to storage.

The Universal Storage Platform makes adding new storage or incorporating legacy storage systems an easy, nondisruptive affair for existing ESX Server operations or applications. Further, the Universal Storage Platform can automatically provide instant, enterprise-class storage services — including its robust data mobility, data management, replication and dynamic provisioning functionalities — to any underlying storage hardware to which it becomes attached.

### Modular Storage for Mid-tier Environments

Mid-tier environments can also take advantage of Hitachi technology leadership with high-performance yet affordable midrange storage systems: the Hitachi Adaptable Modular Storage and Workgroup Modular Storage lines. These systems perfectly complement VMware departmental or small and medium business environments.

### Fully Certified and Interoperable

Building on its leadership in storage virtualization, Hitachi Data Systems also became the first storage vendor to obtain full VMware certification for its Universal Storage Platform when used in conjunction with VMware Infrastructure 3. Obtaining the first certification under VMware’s external storage virtualization hardware certification program, the Hitachi Universal Storage Platform virtualized storage architecture remains fully tested for interoperability and ultimate support with VMware. A wide range of Hitachi storage solutions, including the Adaptable Modular Storage and Workgroup Modular Storage systems, are also fully supported for interoperability and integration with VMware environments — thanks to the collective and continuous testing efforts of both VMware and Hitachi Data Systems, a VMware Technology Alliance Partner.

### Working Together

Both Hitachi Data Systems and VMware have a strong history of innovation and technology leadership — collectively and individually. When their solutions are combined for the benefit of better performance, availability, cost-savings and risk, there is a synergy of architectures that produces more from the sum of the parts. As technology and cooperative partners, Hitachi Data Systems and VMware are highly committed to serving customers of both partners.

### How to Learn More

To learn more about how your organization can benefit from the combined leadership of VMware and Hitachi in virtualization technologies, please contact your Hitachi Data Systems representative or authorized reseller, or visit [www.hds.com](http://www.hds.com).

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