



Matching server virtualization with advanced storage virtualization

Using HP LeftHand SAN and VMware Infrastructure 3 for improved ease of use, reduced cost and complexity, increased availability, and complete compatibility



Table of contents

Introduction	2
Enhancing VMware with a compatible, virtualized pool of storage	3
Leveraging HP SmartClone Technology	3
Migrating disk volumes between storage clusters.	4
High availability and disaster recovery with HP LeftHand SAN distributed storage architecture.	5
HP LeftHand SAN and VMware: unmatched server and storage capabilities for the virtual data center	6
To learn more	6
Financial services	6
HP Education Services for HP LeftHand SANs	7

Just as VMware Infrastructure 3 software provides a virtualized pool of servers, HP SAN/iQ Software provides a scalable, reliable, high-performance, virtual pool of storage to those servers.

Introduction

In order to meet the challenges of running today's data centers, an increasing number of IT organizations like yours are turning to VMware Infrastructure 3 software. The ability to virtualize the data center and deploy applications across a shared pool of server resources allows them to break free of the limitations they face with aging, silo-based applications. One reason is that virtualization enables consolidation. Another is that running more than one operating system and application per server can help to increase utilization, reduce cost, and help organizations work within the space, power, and cooling constraints of their data centers.

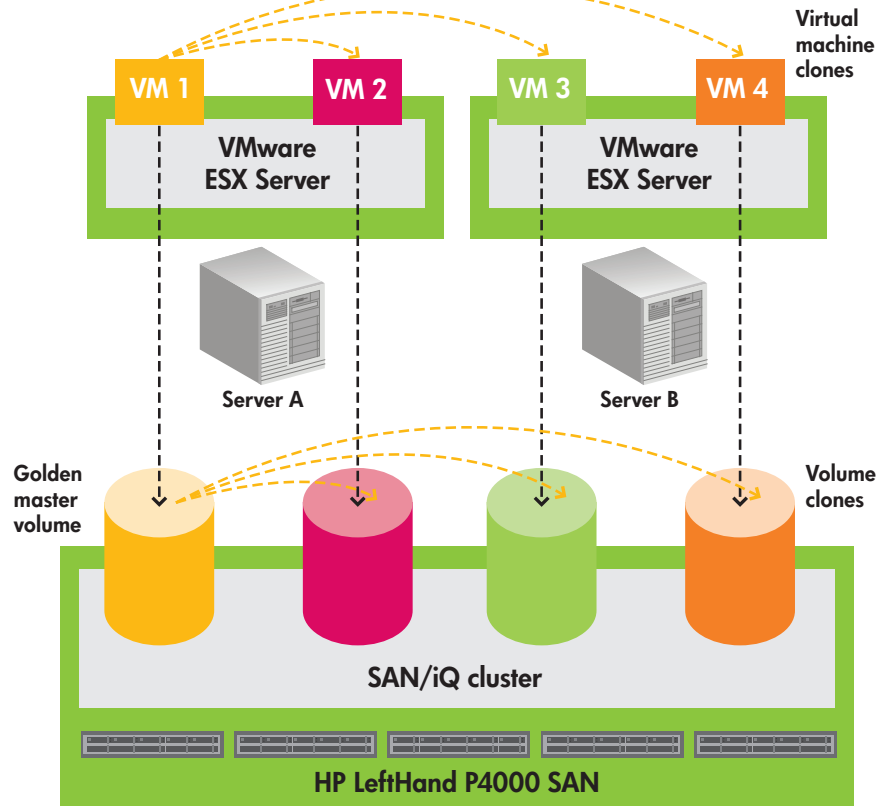
The features that VMware offers on the server side can be enhanced by a storage system that recognizes and enables the added intelligence of a virtualized infrastructure. HP SAN/iQ® Software provides a clustered iSCSI SAN solution with specific features to complement VMware Infrastructure 3. By using the two products together, you can enjoy unmatched availability, reduced complexity, and even better ease of use. Several examples of the ways these two products work better together are discussed in this brief, including the following:

- VMware makes it easy to create new virtual machines to meet the demands of unexpected workload fluctuations, or to create temporary application instances for development and testing. HP LeftHand SANs complement VMware with the ability to create new storage volumes from existing ones (volume cloning) virtually instantaneously, with minimal use of additional storage.

- To balance workloads or to allow servers to be taken offline without affecting service levels, the VMware VMotion feature is able to migrate applications from server to server with zero downtime. HP LeftHand SAN products do the same for storage, allowing volumes to be moved from one storage cluster to another with zero downtime and without modifying the VMware environment.
- VMware HA assists in disaster recovery by automatically restarting failed virtual machines on alternate servers. Similarly, the architecture of HP SAN/iQ Software allows organizations to distribute their storage networks so that access to the virtual machines' storage volumes can continue uninterrupted, even during the loss of an entire data center.

Storage area networks based on HP SAN/iQ Software are standards based, providing plug-and-play compatibility with the IP networks on which they are deployed. HP is a member of VMware's Technology Alliance Partner Program, and its products are certified and included on the VMware hardware compatibility list.

Figure 1. HP SmartClone Technology allows VMware to use volume snapshots that can be written without affecting the original snapshot.



Enhancing VMware with a compatible, virtualized pool of storage

Unlike traditional Fibre Channel-based SANs, iSCSI SANs use IP networks to deliver disk storage to servers. Every network engineer understands IP networks; their ability to leverage common technology and skill sets helps to reduce both capital and labor costs. In contrast to expensive Fibre Channel interfaces and switches, iSCSI SANs use commodity Ethernet hardware, with disk storage appearing to the operating system as SCSI devices.

Just as VMware Infrastructure 3 software provides a virtualized pool of servers, HP SAN/iQ Software provides a scalable, reliable, high-performance, virtual pool of storage to those servers. HP LeftHand SANs use patented clustering techniques to create a storage

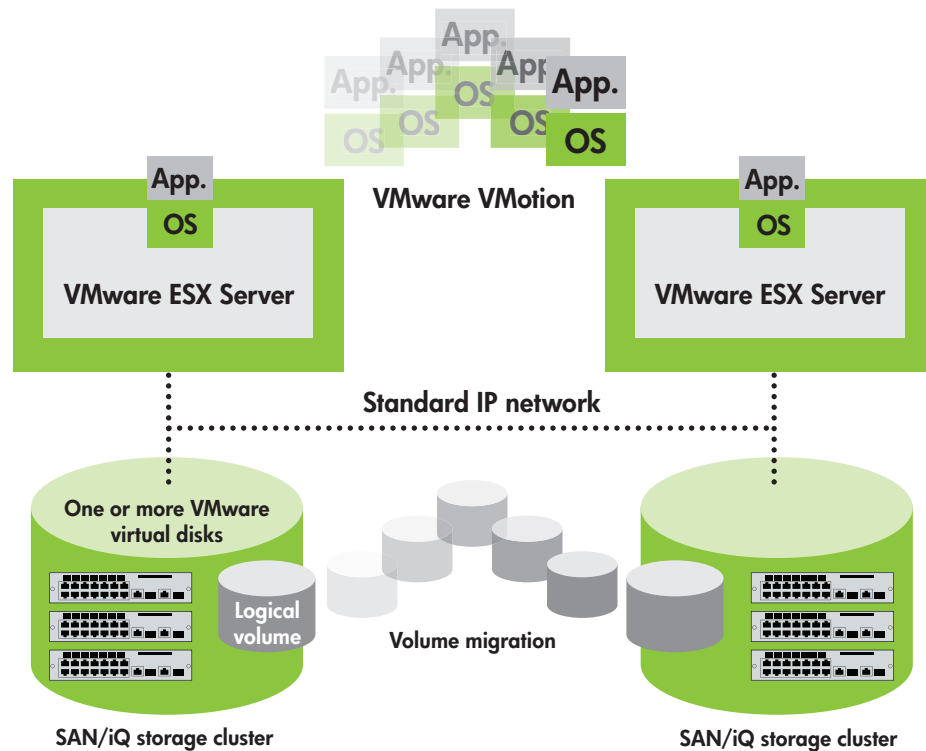
system that distributes incoming requests across servers in the cluster. The intelligence in the cluster itself distributes and replicates storage blocks across the cluster according to user-defined storage policies, including RAID levels and performance targets.

Leveraging HP SmartClone Technology

When virtual machines with large amounts of data are to be copied many times, using volume cloning in the storage cluster is a better solution than replicating the original virtual machines. HP SmartClone™ Technology is a block-level cloning mechanism that supports multiple clones of the same logical volume, each of which can be mounted for read/write operations.

When you use SmartClone functionality to create a new virtual machine, you can create new virtual disks instantly, consuming physical storage only for the disk blocks that are modified. (See Figure 1.) Using this approach, you reduce staff time, increase responsiveness, and make more efficient use of your storage resources.

Figure 2. HP LeftHand SAN volume migration moves logical volumes immediately and transparently to VMware without affecting availability.



The workflow for creating a SmartClone copy of a virtual machine using HP SAN/iQ Software is straightforward:

1. Use the SAN/iQ administrator interface to create a SmartClone copy of the logical volume containing the virtual disk files you need to clone.
2. In VMware VirtualCenter, click Rescan to locate the new storage. The re-signaturing option must be turned on in VMware ESX Server.
3. Add the new virtual disks to the software inventory of Virtual Infrastructure 3.

Migrating disk volumes between storage clusters

VMware VMotion allows your IT to move running virtual machines between servers without taking the operating system or application offline. This makes it easy to dynamically balance workloads for optimum performance and to repair or replace servers without affecting service availability.

HP SAN/iQ technology delivers similar flexibility and availability in storage. Administrators can move storage volumes (or LUNs) containing one or more VMware virtual disk images from one cluster to another with zero downtime, transparent to VMware itself. (See Figure 2.) This empowers administrators to move volumes between clusters to balance workloads, optimize performance, upgrade or retire storage modules, or even move workloads from one data center to another on the same local network.

With most SAN technology, administrators would need to bring down the virtual machine, copy the volume from one system to another, reconfigure the virtual machine to access a new logical unit number, and reboot. With HP LeftHand SAN volume migration, administrators only need to change the properties of the storage volume itself; the volume migrates block by block to the new cluster without changing logical units or requiring the virtual machine to reboot. Because the HP LeftHand SAN approach is transparent even to VMware itself, it can be used either in conjunction with or independent of VMware VMotion.

High availability and disaster recovery with HP LeftHand SAN distributed storage architecture

VMware HA provides cost-effective high availability for applications that do not have built-in high availability (HA) mechanisms, providing you with a base level of disaster recovery capability regardless of the application's complexity. VMware HA continuously monitors the status of the virtual machines (VMs) and automatically restarts failed VMs on secondary servers in the event of a failure. HP SAN/iQ Software technology matches these server capabilities in storage, offering continuous availability that surpasses the capabilities of traditional SAN implementations.

While most other SAN solutions use replicated components and configurations that allow them to operate despite the failure of a single component, they are typically centralized, rather than distributed, and cannot continue running in the face of an entire data center going offline. Traditional SANs offer remote replication to protect against data center-wide failures, but these solutions may not work seamlessly with VMware HA.

HP SAN/iQ Software overcomes these limitations through patented clustering techniques that automatically distribute incoming requests and storage blocks across a set of network storage modules according to the logical volume's storage policy. For example, network RAID level 2 (mirroring) is accomplished by synchronously replicating each block to two network storage modules within a cluster.

With HP SAN/iQ Software, protecting against the failure of an entire data center is as easy as distributing the network storage modules in a cluster so that blocks and their replicas are always stored in two different locations (Figure 2). In the event of a data center failure, the storage cluster manages failover to the surviving components of the cluster, and VMware HA restarts the failed virtual machines on secondary servers. Because the storage system is continuously available throughout the failure, no change in logical unit—or even IP addressing—is necessary.

The beauty of this solution is that it provides a storage and server disaster recovery strategy for organizations of all sizes—and for even the simplest of applications. Small businesses can distribute their storage clusters across multiple closets in the same building; medium and large businesses can distribute their storage clusters across multiple data centers on a campus.

HP LeftHand SAN and VMware: unmatched server and storage capabilities for the virtual data center

Storage systems powered by HP SAN/iQ Software deliver an easy-to-use, flexible, scalable, highly available, and highly efficient storage solution for VMware Infrastructure 3 customers. Matching in storage what VMware provides for servers, HP SAN/iQ Software allows you to move logical volumes between storage devices without taking the corresponding service down. It supports volume cloning for large numbers of temporary virtual machines without the delay and cost of consuming actual storage for each clone. And because it is distributed by design, creating a disaster-resilient storage infrastructure is as easy as choosing which storage modules to configure in each separate location.

To learn more

With the value of VMware Infrastructure 3 software powering so many data centers today, why settle for a storage solution that doesn't match up? Contact HP StorageWorks for more details on these and other solutions for your storage requirements today.

www.hp.com/go/storageworks

www.hp.com/go/p4000

Financial services

HP Financial Services provides innovative financing and financial asset management programs to help customers cost-effectively acquire, manage, and ultimately retire their HP solutions. For more information on these services, please contact your HP representative or visit:

www.hp.com/go/hpfinancialservices

HP Education Services for HP LeftHand SANs

A well-trained IT staff helps make your HP LeftHand SAN Solutions even simpler to use and brings still more agility—and greater value—to your business. Educated customers experience improved solution reliability, fewer end-user support requests, speedier support issue resolution, and faster project implementation.

To help you get the most from your HP LeftHand SAN Solutions, HP offers two levels of HP LeftHand SAN training:

- Basic Training imparts the knowledge you need to understand, manage, and configure your HP LeftHand SAN.
- Advanced Training outlines best practices for HP LeftHand SAN, based on field experience and applied industry knowledge.

Visit www.hp.com/learn/storage for more information.

HP Services

Put the strategic and technical know-how of HP Services experts to work for you: When you buy HP LeftHand SAN Solutions, it's a good time to think about other levels of service and support you may need. You can trust the service professionals at HP to collaborate with you to make technology the difference in your business.

Recommended services

- **HP Support Plus 24 Service**—for around-the-clock, reactive onsite hardware support and over-the-phone software support
- **HP Installation and Startup for HP LeftHand SAN Solutions**—fast, reliable startup, for enhanced server virtualization and business continuance with SAN solutions

Related services

- **HP Proactive 24 Service**—integrated proactive and reactive services, for businesses looking to achieve better performance, higher availability, and greater stability
- **HP Proactive Select Service**—to improve IT performance and manageability, for businesses looking for services flexible enough to cover the IT product lifecycle and adapt to changing needs

When technology works, business works. For more information, contact your HP sales representative or HP-authorized Channel Partner, or visit www.hp.com/hps/storage.

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