Cisco UCS and VMware Virtual SAN for VDI: A Hyperconverged Solution

Benefits

The Cisco and VMware solution provides these main benefits:

- It is 40 percent less expensive than traditional storage.

- It reduces storage complexity for VDI.

- It enables predictable scaling.

- It enables faster desktop operations to improve IT efficiency.

- It offers proven resiliency and availability to deliver greater uptime for applications.

- It offers improved flexibility across the virtual environment.

Achieve greater business agility and worker mobility with software-defined storage, providing superior, scalable performance and pay-as-you-grow affordability for virtual desktops and applications.

Today's organizations are increasingly using desktop and application virtualization to provide more capabilities and better security for their mobile workers. However, if improperly implemented, traditional virtual desktop infrastructure (VDI) can create storage problems, increase costs, and add complexity. The Cisco Unified Computing System™ (Cisco UCS®) and VMware Virtual SAN with Horizon together provide a more effective, hyperconverged solution that delivers enterprise-class features, scalability, and performance, making it an excellent storage platform for desktop and application virtualization.

The Cisco® and VMware software-centric architecture integrates computing, storage, networking, and virtualization resources in an easy-to-deploy solution. Storage is provided by a built-in hypervisor instead of a virtual machine.

This innovative design enables powerful new capabilities. The hypervisor is uniquely positioned in the IT stack to have visibility to see what applications are running at any given time, as well as a global view of the underlying infrastructure. Because it is located directly in the I/O path, the hypervisor can make optimal decisions to match application demands with the underlying physical infrastructure. This dynamic new approach to storage puts the virtualized application in charge of defining its own storage requirements.

The Switch to Hyperconverged Infrastructure

Today's enterprises face a number of critical challenges in virtual storage. Many have invested in expensive specialized hardware, only to find later that proprietary solutions present a barrier to virtualization. Storage solutions may also end up as device-centric silos, with static classes of service, rigid provisioning requirements, lack of detailed control, and frequent need for data migration. In addition, such solutions are often complex and time consuming to manage, demanding a great amount of manual support. The result is a lack of responsiveness in both the virtual environment and the IT staff that supports it.

In the early days of VDI, arrays had to be dedicated to storage to meet requirements for the number of I/O operations per second (IOPS). However, today's organizations are turning to software-defined storage (SDS). SDS allows you to move from hardware-centric operations to application-centric capabilities that provide policy-based automation, commonality across arrays, and controls that are more dynamic. Instead of high-priced, dedicated storage, you can use the local storage on your existing servers. With a single virtualized computing and storage layer, organizations can achieve both significant savings in total cost of ownership (TCO) and better performance.

This open approach also relies on cost-effective industry-standard hardware. Now when you need more desktop or application capacity, you can simply add more solid-state disk (SSD) drives, flash memory, or hard disk drives (HHDs), avoiding the expense of a new purpose-built system or of overprovisioning to meet IOPS requirements. As needs grow, you can easily add VMware Virtual SAN nodes. The Cisco and VMware solution solves the problems of storage cost and complexity with a hybrid or flash-accelerated data store that you can enable with just a few clicks, increasing capacity without the need for a large capital investment.

Cisco UCS and VMware Virtual SAN with Horizon Solution

The Cisco and VMware Virtual SAN with Horizon solution is based on Cisco UCS, a self-integrating, self-aware server system with a single management domain. Its components—blade and rack servers and networking, virtualization, and storage-access resources—are interconnected by a unified I/O infrastructure. This unification allows Cisco UCS to deliver greater computing density, network simplicity, and simplified management in a smaller footprint, reducing operating costs.

Virtual SAN (Figure 1) is a hyperconverged infrastructure (HCI) solution built from the foundation for VMware vSphere virtual machines. It abstracts and aggregates locally attached disks in a vSphere cluster to create storage that is provisioned and managed from VMware vCenter and the vSphere Web Client. Your IT team can use familiar vCenter tools to provision
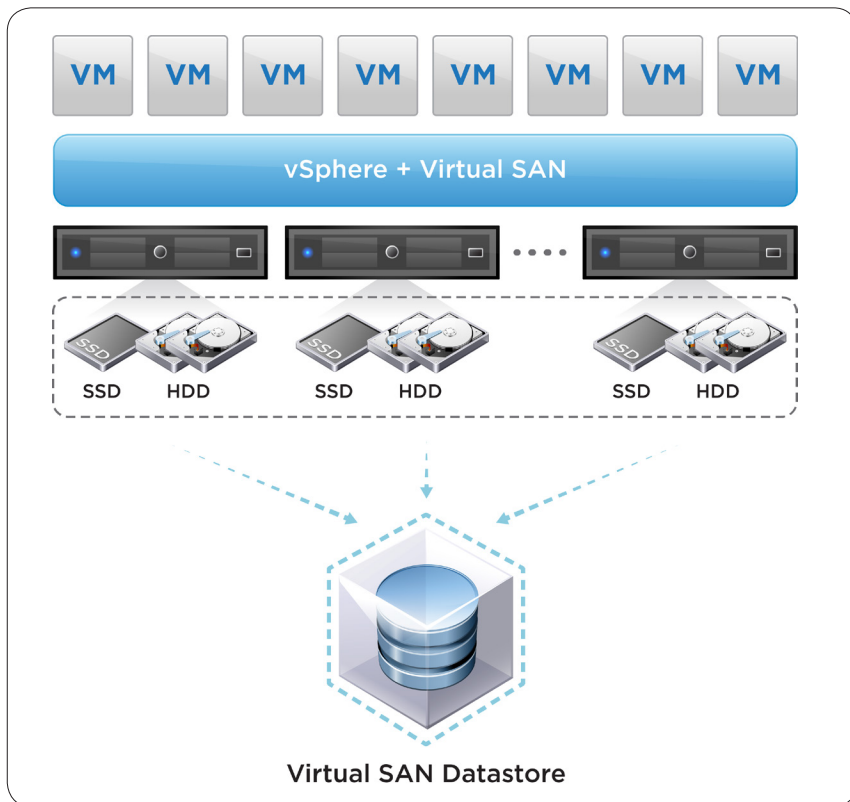

Figure 1. VMware Virtual SAN 6.0

storage and manage automatic storage policies, making storage part of the normal workflow for virtual machine creation and management.

Cisco UCS serves as the platform for the Virtual SAN's hypervisor capability, as well as for storage and computing (Figure 2). It integrates with the entire VMware stack, including features such as VMware vMotion (for live data migration), High Availability (HA), and Distributed Resource Scheduler (DRS). Cisco UCS service profiles allow fast, consistent, single-touch infrastructure provisioning for vSphere and Virtual SAN deployments.
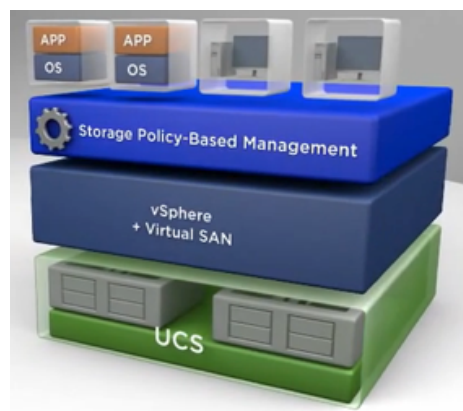

Figure 2. Virtual SAN with Cisco UCS for VDI

Cisco UCS Manager transparently integrates underlying infrastructure with VMware management to let you deploy new servers in a fraction of the time required by traditional solutions. Storage provisioning and day-to-day management of storage service-level agreements (SLAs) are controlled through virtual machine–level policies, which can be set and modified in real time. Virtual SAN provides desktop-

worthy levels of IOPS and latency of less than a millisecond for Cisco UCS, SSD drives, and HDDs.

Virtual SAN Hybrid and All-Flash Architectures

Virtual SAN supports both hybrid and all-flash storage architectures. This solution pools directly attached flash storage and spinning media across multiple servers to create a distributed, shared, and highly available data store: an SDS tier for virtual desktops and applications.

In a hybrid Virtual SAN solution, spinning magnetic disks are used to provide persistent storage capacity for virtual machines, and high-performance, high-endurance flash media (such as enterprise SSD drives and PCI Express [PCIe] flash memory cards) act as a caching tier. This caching-tier buffer reads and writes from the Virtual SAN cluster, greatly enhancing the performance of the spinning disk. In this type of architecture, Virtual SAN clusters on Cisco UCS can achieve up to 40,000 IOPS per server in a cost-effective storage platform.

In an all-flash Virtual SAN solution, the spinning magnetic media is replaced by capacity-oriented SSD drives for the persistent storage of virtual machines and data. The higher-performing flash media intelligently acts as a write-only cache, enhancing the performance of the capacity-oriented SSDs. Because this architecture uses only flash devices, it delivers an extremely high IOPS rate—up to 90,000 IOPS per host—with predictable low latency.

Simplified Management

Virtual SAN hardware deployment is enabled by Cisco UCS Manager software, which simplifies the day-to-day provisioning, monitoring, and management processes. The manager helps ensure the consistent configuration of hardware and best practices to meet network requirements.

Cisco UCS Manager provides unified, embedded management of all software and hardware components of the Cisco UCS infrastructure. This infrastructure includes Cisco UCS B-Series Blade Servers, C-Series Rack Servers, M-Series Modular Servers and Cisco UCS Mini, as well as associated storage and network resources. The manager accelerates IT service rollouts and actively helps prevent error-induced downtime through a model-based SDS approach to management. This policy-based approach to automation delivers greater agility, integration, and scale for infrastructure operations, while reducing complexity and risk. In addition, service profiles and templates enable flexible role- and policy-based management.

Cisco UCS Manager is embedded on a pair of fabric interconnects, enabling role- and policy-based configuration, providing uniform access to network and storage resources, and facilitating a fully virtualized environment. Cisco UCS 6200 Series Fabric Interconnects are designed to offer a 10-Gbps low-latency switching fabric, greater port density, and lower power consumption. All chassis and blades attached to the fabric interconnects become part of a single, highly available management domain.

In addition, Cisco UCS Director integrates with Virtual SAN to allow you to create automated workflows for unified infrastructure orchestration across the entire system. These workflows can install the VMware ESX hypervisor to newly deployed Cisco UCS servers, join those servers to the vSphere cluster, configure the Virtual SAN data store, and deploy virtual machines as IT or end users request them. Cisco UCS Director also allows you to create a Virtual SAN storage profile to define the storage requirements for the virtual machine objects by specifying a set of required storage capabilities. Together, Cisco UCS, Virtual SAN, and Cisco UCS Director provide a total infrastructure-as-a-service (IaaS) solution.

Excellent User Experience for Graphics-Intensive Applications

In virtualized environments, the graphics acceleration needed to obtain an acceptable experience used to be prohibitively expensive. Cisco and VMware have collaborated with NVIDIA to deliver much less costly capabilities for both graphics-intensive virtualized applications and regular virtualized business applications. Virtual desktop deployments on Cisco UCS can share graphics processing units (GPUs) to support knowledge workers and power workers, providing an excellent user experience for general graphics-accelerated applications.

Performance and Reliability

For enterprises to adopt desktop virtualization, performance must meet the expectations of users accustomed to physical devices. In the most recent release of Virtual SAN, performance has been improved, achieving twice the IOPS rate in hybrid environments and four times the IOPS rate in the all-flash configuration, making it well suited for high-performance applications requiring consistent response times and low latencies. It also can scale up to 64 hosts per cluster and run up to 200 virtual machines per host.

Security in Virtual Environments

Security is critical in any mobile environment, and it is a primary reason that today's companies invest in virtual solutions. On top of our industry-leading capabilities, Cisco and VMware provide an additional layer of hardware-based encryption designed for virtual environments, protecting data at rest for sensitive workloads.

Tested, Validated Solutions

Cisco and VMware provide a ready-to-use solution for accelerating deployment of your virtualized environment. Its reference architecture has been validated by Cisco to help ensure optimal server, software, hardware, controller, and networking capabilities for different workload profiles, allowing you to easily select the configuration most suited to your work environment and use case. It also includes four Virtual SAN–ready nodes, which have been preconfigured to run Virtual SAN in a certified hardware form factor. Bundle starter kits and expansion packs are available.

Use Cases

Table 1 on the next page summarizes typical uses cases for the Cisco and VMware solution.

Why Cisco UCS and VMware Virtual SAN?

Cisco and its ecosystem partners offer a powerful set of virtualization solutions designed for mobile environments, combining the security and continuity of remote desktops and applications with the flexibility of today's anytime, anywhere computing. Cisco UCS and VMware Virtual SAN with Horizon take advantage of highly complementary technologies to help you benefit from the flexibility of virtual desktops and applications backed by powerful storage resources. With a flash-optimized architecture and superior virtual machine density, this solution gives you the simplicity, predictability, performance, and resilience you need for midsize to large deployments.

Cisco Capital Financing to Help You Achieve Your Objectives

Cisco Capital® financing can help you acquire the technology you need to achieve your objectives and stay competitive. We help you reduce capital expenditures (CapEx), accelerate growth, and optimize your investment dollars and return on investment (ROI). Cisco Capital financing gives

you flexibility in acquiring hardware, software, services, and complementary third-party equipment—all with just one predictable payment. Cisco Capital financing is available in more than 100 countries. Learn more.

Next Steps

For more information, please read the reference architecture paper here and the paper on the all-flash configuration

here. To learn about Virtual SAN–ready node configurations for Cisco UCS C240 and C220 M4 Rack Servers, please click here. Also, please visit our webpages at www.cisco.com/go/vdivmware and www.cisco.com/go/vdi-cvd.

Table 1 Use Cases

Use Case	Description
Financial services	• New financial services applications give associates more service options based on fast, secure access to data. • Support business-critical applications with up-to-date information. • Facilitate the transition after mergers by deploying new virtual desktops with flexible data access to every employee.
Manufacturing	• Get more reliable mobile access to data across the factory floor and yard. • Use graphics acceleration to support quick-moving product development and enable faster prototyping.
Retail	• Rapidly complete operations to add large numbers of employees due to seasonal employment, mergers, and acquisitions. • Provide mobile access to enterprise storage across individual stores, large sales sites, and branch sites.
Public sector	• Trim employee costs by reducing the amount of time that employees need to be in the office. • Meet telework initiative requirements. • Help enable secure access to support citizen services. • Help ensure business continuity and disaster recovery with rapid access to information even under emergency conditions.