Solution Overview

Cisco UCS with VMware Horizon View: Accelerate Desktop Virtualization Deployments

Contents

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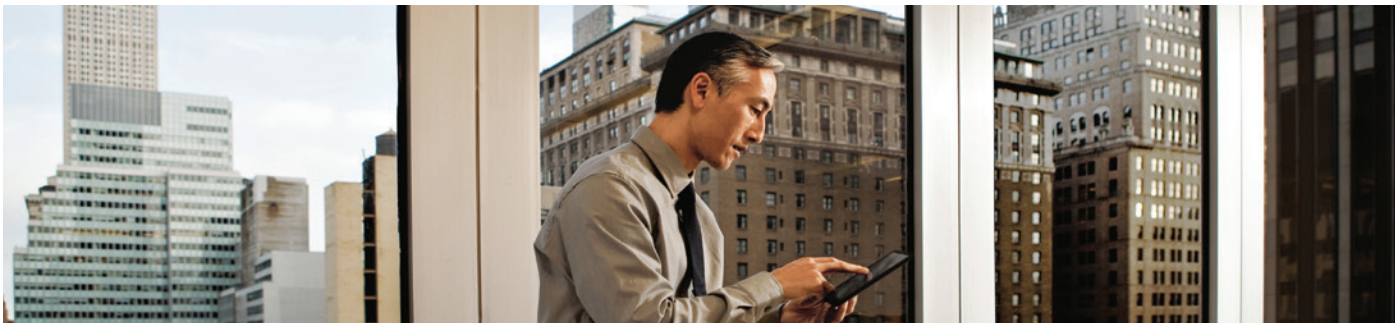

Highlights

Desktop virtualization requires a portfolio of solution architectures to address the full spectrum of business and user needs to effectively deploy virtual desktops and applications.

Cisco offers a suite of solution architectures for desktop virtualization, each optimized for specific constraints and IT delivery models for environments of all sizes:

- **Cisco® On-Board Architecture** for nonpersistent virtual desktops with integrated server-resident storage and management
- **Cisco Simplified Architecture** for persistent and nonpersistent virtual desktops in an appliance-like configuration.
- **Cisco Scalable Architecture** for persistent and nonpersistent virtual desktops in an appliance-like configuration.
- **Cisco Converged Infrastructure** with modularized infrastructure packaging that accelerates procurement and simplifies virtual desktop infrastructure (VDI) management, scaling, and support.

Cisco unified management capabilities provide simple, consistent, scalable management, lowering operating expenses (OpEx).

What You Will Learn

This solution overview summarizes the factors propelling businesses to evaluate new desktop implementation strategies. It reviews the five architectural approaches that we offer for desktop virtualization, and the technology advantage offered by the Cisco Unified Computing System™ (Cisco UCS®) and its tight integration with VMware software:

- On-Board Architecture
- Simplified Architecture
- Scalable Architecture
- Converged Infrastructure

Each architectural discussion demonstrates how the Cisco solutions scale management and infrastructure together to bring simplified, consistent management to every business organization's virtual desktop environment.

Growing Importance of Desktop Virtualization

Desktop IT managers focus on enabling a mobile, flexible, productive, global workforce with performance and collaboration integration that actually enhances the working experience over traditional desktops. For a business to be successful, employees need access to all of their applications and data from any device, at any time, from any location–and this access must be provided cost-effectively to lower both capital expenditures (CapEx) and OpEx.

When providing this level of user access and efficiency, there is an eagerness to adopt desktop virtualization to meet organizational needs. However, several major obstacles have impeded successful deployments using traditional systems and architecture. These obstacles include high acquisition costs, management complexity, and improper planning and sizing that results in poor performance. There is no one-size-fits-all infrastructure that can meet the needs of every user in every business. For example, the desktop and business requirements for

mobile users, call center or training center employees (often categorized as task workers), accountants, marketing, human resources employees (often categorized as knowledge workers), or designers with needs for high-powered graphics are all very different. The business requires a greater level of security for mobile workers because they are predominately accessing the desktop from a network external to the corporate network. Task workers, such as call center employees, interact with the same one or two applications while they work, so desktops that are nonpersistent are cost-effective and work well for these users. On the other hand, knowledge workers tend to use many different applications and work both within the corporate network and from other locations. Knowledge workers need a more flexible and persistent desktop environment. As a result, optimized configurations and architectures that can address different delivery models, user workloads, scalability, and performance needs are needed.

To assist desktop IT managers in their mission and accelerate desktop virtualization deployments, Cisco and our partners have developed four reference architectures that combine best-in-class data center computing, networking, and storage technologies. The reference architectures help to simplify, accelerate, and eliminate the risk associated with desktop virtualization deployments. These Cisco Desktop Virtualization reference architectures include the On-Board Architecture, Simplified Architecture, Scalable Architecture, and Converged Infrastructure. These reference architectures address a spectrum of IT challenges, desktop environments, and delivery approaches to enable high-performance, easy-to-manage, and cost-effective solutions.

The Move to Virtual Desktop Infrastructure

In many cases, the move to desktop virtualization requires the purchase of new hardware and an upgrade of desktop software with new operating system and application versions. The magnitude of these changes has IT departments evaluating their desktop strategy to better address user needs and create a scalable, cost-effective infrastructure that meets security and compliance requirements. Most VDI deployments start small and grow over time. Often a proof of concept (PoC) is deployed for one department. Then, as the IT organization becomes more familiar and confident with the technology, the initial infrastructure is scaled and other deployments follow. As these deployments grow, businesses should expect the first investments in physical and management infrastructure to be compatible and interoperable with the future deployments.

Holistic Management

As with most data center solutions, desktop virtualization is a multilayered solution. Often desktop virtualization is implemented using disparate solution elements and management software for each component–the virtualized infrastructure; desktop virtualization software; connection brokers; display protocols; access and authentication methods; user persona management; and network, storage, and server management. IT departments have every right to expect this multifaceted solution to have simplified, integrated management that lowers OpEx.

Scalable Performance

Upon the delivery of a successful pilot or PoC, the IT organization normally expands the initial deployment. An ideal solution easily scales the initial deployment to

production deployment with consistent performance that delivers an excellent desktop experience for the users.

Cisco Delivers Flexible Architectures for Desktop Virtualization

Cisco and our technology partners have collaborated to create a portfolio of reference designs based on the foundational Cisco Desktop Virtualization Architectures consisting of best-in-class technologies based on building-block components: Cisco Unified Computing System™ (Cisco UCS®) and VMware Horizon View. These reference architectures reduce risk and complexity and offer a clear path to virtual desktop deployments with:

- Lower initial cost
- Reduced system complexity and simplified management
- Scalable performance for IT environments of all sizes

The reference architectures include On-Board, Simplified, and Scalable models for desktop virtualization. In addition, Converged Infrastructure solutions such as FlexPod data center platforms and VCE Vblock Systems provide modular, ready-to-deploy solutions. These designs are suited to organizations of various sizes, ranging from small and medium-sized businesses (SMBs) to large enterprises and service providers.

Cisco UCS: First Unified System for Desktop Virtualization

The Cisco UCS is the virtualized server foundation of all Cisco Desktop Virtualization Architectures. The system goes beyond convergence to bring the benefits of unified computing to the scale-out nature of desktop virtualization environments: simplified management, greater deployment flexibility, and easier scalability. A self-integrating, self-aware system, a Cisco UCS domain consists of a single management domain interconnected by a unified I/O infrastructure. The Cisco UCS domain is designed as a single virtual blade chassis that incorporates and scales across multiple blade chassis, rack servers, and racks. Tight integration with VMware vCenter creates a highly cohesive virtualization cluster that is an excellent foundation for virtual desktop environments (Figure 1).

Radically Simplified Architecture

The system implements a radically simplified architecture that eliminates the multiple redundant devices that populate traditional blade server chassis and result in increased costs and layers of complexity: Ethernet switches, Fibre Channel switches, and chassis-management modules. Cisco UCS incorporates a redundant pair of Cisco UCS 6200 Series Fabric Interconnects that provide a single point of management and a single point of control for all I/O traffic.

Lower Cost of Scalability

Cisco UCS scales with less complexity and at lower cost. Instead of requiring the addition of layers of switching in racks, blade servers, and hypervisors to expand the system, Cisco UCS uses low-cost, low-energy-consuming, and high-performance fabric extenders to connect the data and management planes directly to blade and rack servers. Cisco fabric extenders bring up to 160 Gbps of network, storage, and

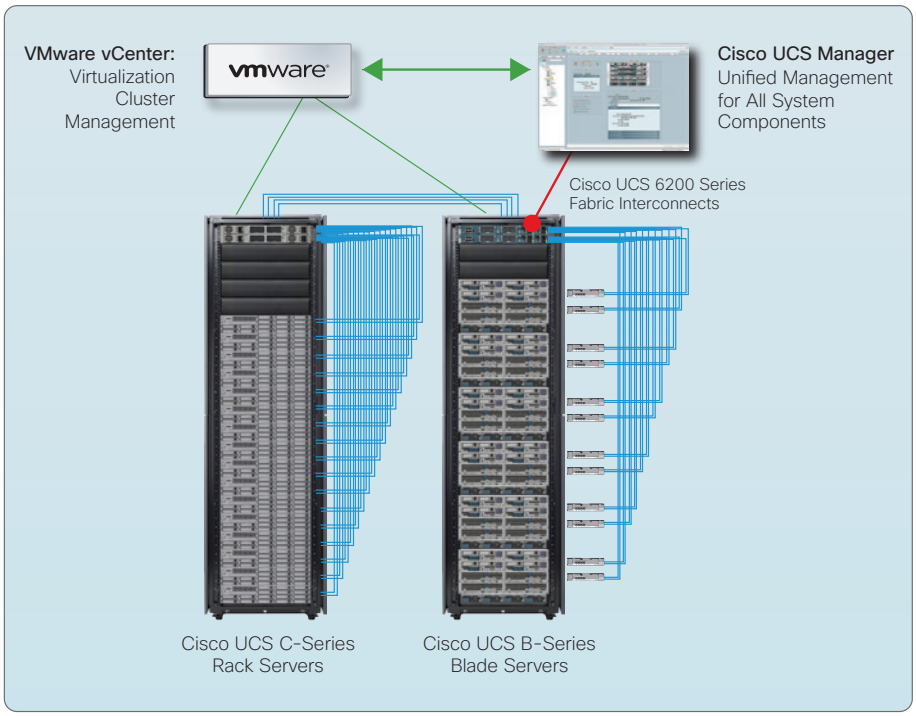

Figure 1. Virtualization Clusters Are Centrally Managed by Cisco UCS Manager with Tight Integration with VMware vCenter

management bandwidth to each chassis and multiple 10-Gbps connections to each rack-mount server. This significant reduction in the number of components enables a lower-cost, more graceful scaling model in which the per-server infrastructure cost, including the cost of blade chassis and switching, is as little as half that of typical blade servers.

Balanced Approach

Cisco UCS provides the right balance of memory, I/O bandwidth, and processing power to support greater desktop density on each physical server without affecting performance. In fact, Principled Technologies tested Cisco UCS with VMware Horizon View and found that a single Cisco UCS B200 M3 Blade Server with 384 GB of memory easily supports 186 virtual "knowledge worker" desktops running Microsoft Windows 7.

For more information about the high density of 186 Microsoft Windows 7 virtual desktops on a single Cisco UCS B200 M3 Blade Server with VMware Horizon View 5 and 175 virtual desktops on a single Cisco UCS B230 M2 Blade Server, please visit:

- http://www.principledtechnologies.com/Cisco/UCS_B200_VDI_0312.pdf
- http://www.principledtechnologies.com/Cisco/UCS_B230_VDI_0112.pdf

VMware Horizon View

VMware Horizon View is the desktop virtualization foundation of the Cisco Desktop Virtualization Architectures. It enables IT departments to simultaneously deliver flexible end-user computing, high levels of desktop data security, and superior scalability and management–all while substantially reducing total cost of ownership (TCO). Management integration between Cisco UCS and VMware vSphere drastically simplifies the physical and virtual infrastructure and management associated with desktop deployments. Robust features, such as a secure mobile workplace and centralized desktop management of branch-office desktops, provide a rich user experience. Radically simplified architectures, storage optimizations, and simplified

management bring a level of cost control to the corporate desktop environment that is unrealized with traditional solutions.

Better Together

Tight integration between Cisco UCS and VMware vSphere and Cisco UCS Manager and VMware vCenter simplifies deployment and ongoing management of the desktop environment.

Cisco UCS Virtual Interface Cards (VICs) are virtualization-optimized converged network adapters (CNAs). Cisco UCS VICs support up to 256 peripheral component interconnect express (PCIe) standards-compliant interfaces that can operate in parallel to increase performance, especially in virtual environments. These PCIe interfaces can be dynamically configured so that both their interface types (whether a network interface card [NIC] or host bus adapter [HBA]) and identities (MAC address and worldwide name [WWN]) are established using just-in-time provisioning initiated from either Cisco UCS Manager or VMware vCenter. Complete network isolation is established between the PCIe devices using the Cisco prestandard implementation of the IEEE 802.1BR Bridge Port Extension standard. This standard extends virtual ports in the system fabric interconnects directly to servers and virtual machines alike. Through the tight integration between Cisco UCS Manager and VMware vSphere, when a virtual machine is connected to a NIC on a Cisco VIC, it remains attached when the virtual machine is moved from server to server. Cisco Virtual Machine Fabric Extender (VM-FEX) technology can be used with the VMware ESXi hypervisor to improve performance by supporting a more direct connection between virtual machines. Cisco testing with our first-generation VICs shows that network throughput can be increased by up to 38 percent (compared to a standard VMware vSwitch) using Cisco VM-FEX in high-performance mode, all while freeing more CPU cycles to deliver better virtual desktop performance.

Further integration between Cisco UCS Manager and VMware vCenter automates the movement of security and quality-of-service (QoS) policy when a virtual desktop moves from one server to another, helping ensure consistent and automatic application of policy even through live migration of desktops.

Cisco On-Board Architecture

Cisco On-Board Architecture At-a-Glance:

Cisco On-Board Architecture is based on a Cisco Solid-State Drive (SSD) and/or flash memory (tier-0 storage) to deliver high performance and cost-effective storage located on the server to host nonpersistent desktops.

Many environments struggle with virtual desktop deployments, particularly when a preexisting, well-designed SAN infrastructure is absent. Deploying a SAN infrastructure can be a daunting and expensive proposition, especially given the cost of equipping servers with SAN HBAs, and where SAN expertise is not present. Even for those with a SAN in place, throughput bottlenecks are common between the virtual desktops and the shared-storage backend they need to access. These bottlenecks often result from an inability to support disk I/O operations per second (IOPS) requirements and the inherent latency of the flow through the server, switched infrastructure, and shared storage. The IOPS bottleneck is most evident during systemwide events such as boot storms and antivirus scans. This problem is further compounded as the number of users increases and the capacity limit of the storage network and controller is reached. At this point, most businesses incur high incremental costs to expand the SAN. The result is escalating cost increases as the system continues to grow.

There is always a cost trade-off between performance and capacity, and one way to address I/O bottlenecks is to choose high-performance storage. This solution can be good for the short term, but then when it comes time to scale the storage, each incremental unit is more costly because of the high-performance requirement. Another viable option to purchasing high-performance shared storage to meet all the desktop needs is to reduce costs by disaggregating the storage into separate high-performance volumes and high-capacity volumes (Figure 2). Storage optimized for capacity can be used to hold user data and profiles, while storage optimized for performance can be used to hold linked clones. This approach balances the need for large amounts of storage where only some of the storage is highly performance sensitive. This approach also reduces the amount of data moving through the network during periods of heavy user login and boot-up (Figure 2).

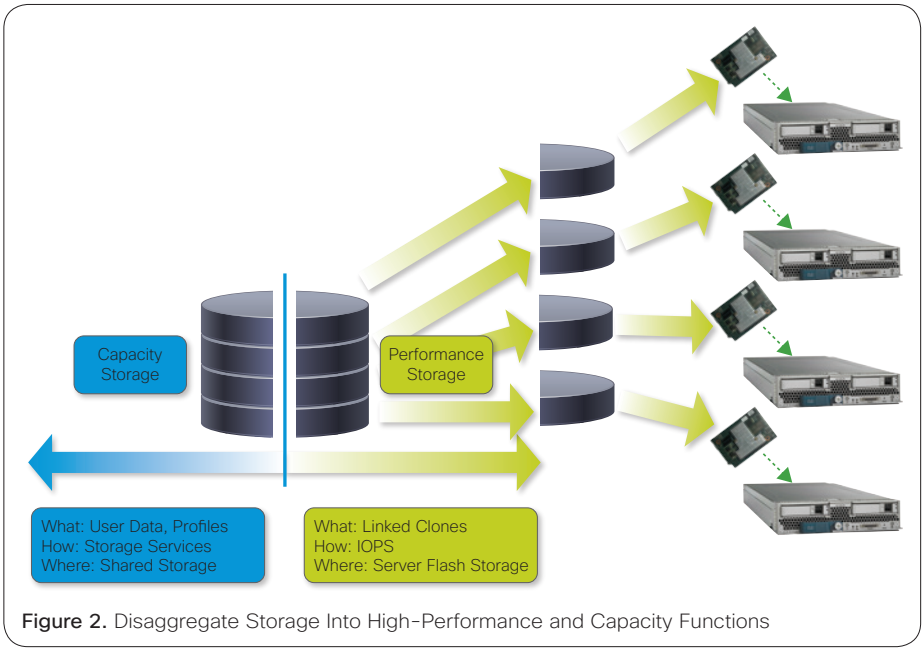

Figure 2. Disaggregate Storage Into High-Performance and Capacity Functions

Architecture

Cisco On-Board Architecture for virtual desktops gives organizations a cost-effective way to disaggregate their storage into high-performance, onboard storage that is very close to the compute resources and lower-performance, lower-cost storage that is on the network. This approach provides high-speed, low-latency, flash-memory-based storage (SSDs and/or PCIe flash-memory modules) directly within Cisco UCS blade servers.

Following this strategy, the virtual desktop linked clones are placed into the flash-memory-based storage for fast access to the operating system and application components. Existing or otherwise cost-effective network-attached or even back-end SAN-based storage can be used to maintain desktop master images, user persona data, and other user data that is not sensitive to IOPS performance or latency (Figure 3). This architecture eliminates the latency incurred when the host accesses back-end shared storage across a network fabric, because the desktop image (or replica) is stored locally on the blade server. IOPS capacity is no longer

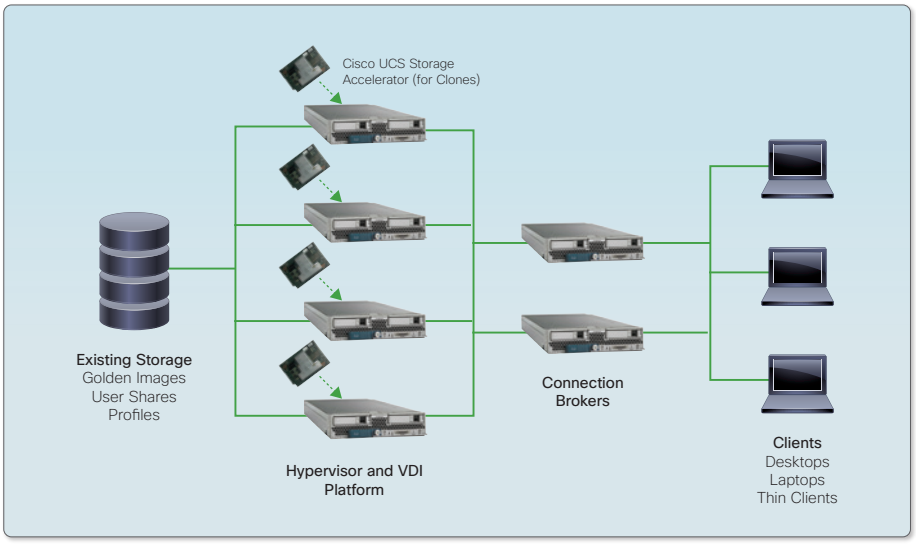

Figure 3. Deployment of Cisco On-Board Architecture Using Nonpersistent Desktops in Conjunction with NAS Storage for Reduced Cost and Complexity

a concern. The system can take advantage of a simpler, server-installed storage footprint that provides expansive IOPS capacity with negligible latency.

Essential Technology

One of the successful implementations of the Cisco On-Board Architecture is based on the Cisco UCS Fusion-io ioDrive2 Adapter. As part of the Cisco UCS Storage Accelerator option for Cisco UCS B-Series Blade Servers, it provides up to 785 GB of server-resident storage that is easily managed as part of the blade configuration—and excellent for linked clones. The Cisco UCS Storage Accelerator is faster, and it requires less power and cooling than traditional storage with spinning disks. In addition, the solution acquisition costs are reduced by up to 50 percent compared to a traditional SAN deployment.

How It Works

When deploying this architecture with VMware Horizon View (Figure 4), the flash storage presents a block device to the hypervisor. Desktop configurations are created by deploying the VMware Horizon View Manager on the Cisco servers. The virtual desktops have an associated virtual disk placed on the flash storage. The virtual disk contains the linked clones of the desktop and the VSwap space. This architecture is excellent for scaling nonpersistent virtual desktops, with each Cisco UCS server supporting approximately 150 desktops. For availability reasons, this architecture is well suited to nonpersistent virtual desktop deployments where the failure domain is limited on the server, and when the user logs out that user's desktop is returned to the pool—ready to be assigned to the next user. Nonpersistent desktops are increasingly used because of the low storage footprint required. They are often used in environments such as call centers, retail, training centers, test configurations, and other task-worker environments. If a server goes down, another server can take over, and the virtual desktops restart in seconds.

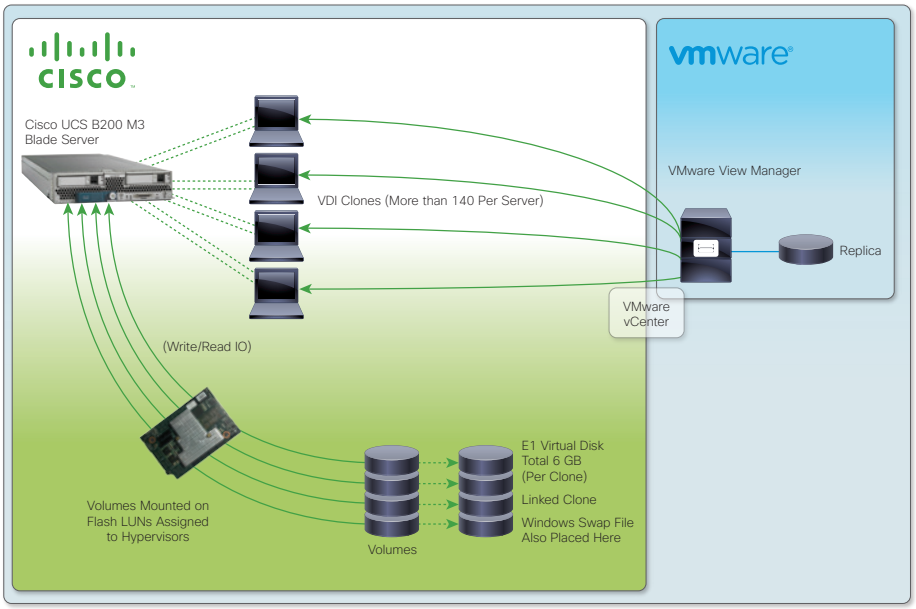

Figure 4. Deployment of VMware Horizon View Using Cisco On-Board Architecture

For more information, refer to Optimizing Desktop Virtualization Solutions with the Cisco UCS Storage Accelerator at: http://www.cisco.com/en/US/solutions/collateral/ns340/ns517/ns224/ns836/ns978/cisco_ucs_stroage_accele.pdf.

Architecture Benefits

The on-board architectural approach offers many advantages, including a dramatic reduction in desktop boot and login times and lower IOPS burden on the back-end shared storage. Perhaps most important is the low incremental cost per additional desktop. Unlike traditional SAN-based design, escalating capital costs are eliminated when the storage network or controller capacity is reached. Each server can support more desktops with excellent user response because of the close proximity of the desktop operating system (stored on high-performance flash storage) to the CPU and memory. As the user base expands, the On-Board Architecture scales linearly and easily to accommodate the growth. Reduced power consumption, along with system-based management that radically simplifies the ongoing management and deployment of additional servers to support additional desktops, reduces operating costs. For organizations not ready to invest in implementing a SAN infrastructure and use nonpersistent desktops, the Cisco On-Board Architecture for Desktop Virtualization is an excellent, cost-effective, and high-performance option.

Cisco Simplified Architecture

Cisco Simplified Architecture At-a-Glance:

The Cisco Simplified Architecture for Desktop Virtualization employs a radically simplified approach using appliance-like configurations supporting either persistent or non-persistent desktops. Attaching the shared storage directly to the Cisco UCS Fabric Interconnect lowers cost and complexity.

IT departments often prefer to deploy persistent desktops for their end users. These desktops help ensure that each worker has a dedicated workspace that can be customized, similar to the physical desktop model. Additionally, many environments prefer the operational model of shared storage. In such situations, a shared-storage infrastructure is recommended to assure user acceptance, assure desktop availability, and minimize service interruption. Small to medium-sized IT departments might prefer to use such an approach that sidesteps the investment required to move to a full SAN fabric infrastructure.

Architecture

For such environments, we offer the Cisco Simplified Architecture for Desktop Virtualization, which employs an appliance-based model for virtual desktop deployments. This architecture simplifies the shared-storage implementation by eliminating the need for an intermediate switch layer between storage and the server. Instead, shared storage connects directly to the Cisco UCS Fabric Interconnect (Figure 5). Cisco Simplified Architecture supports storage solutions from various Cisco ecosystem partners and offers a lower initial cost, making it well suited to organizations that do not have an existing investment in enterprise-class SAN infrastructure.

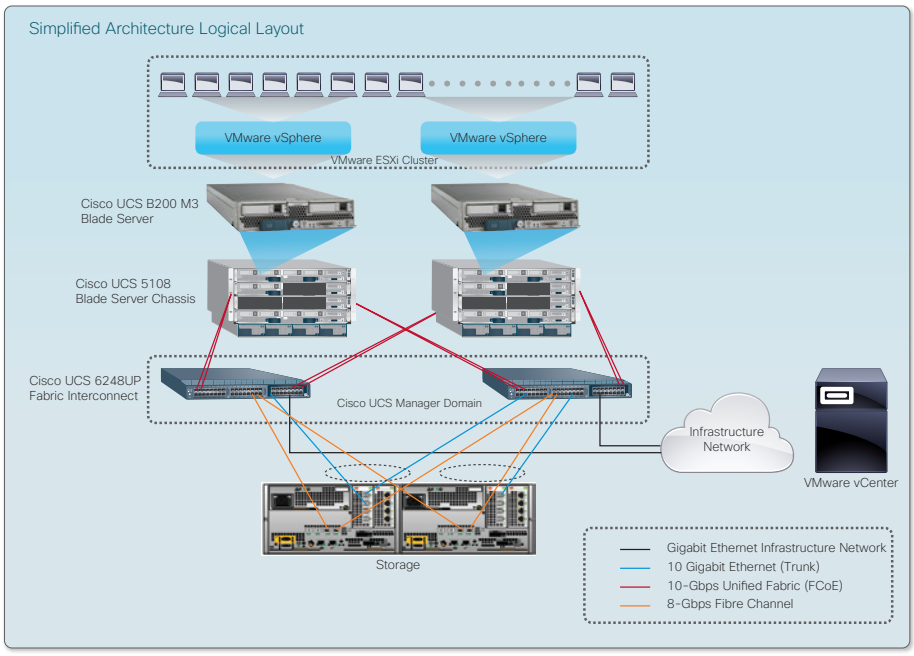

Figure 5. Cisco Simplified Architecture for Desktop Virtualization

Essential Technology

Cisco Simplified Architecture allows the storage appliance to connect directly to the Cisco UCS Fabric Interconnect. This approach eliminates the need for upstream Fibre Channel and Ethernet switches and associated management (Figure 4). Instead, the Cisco UCS servers use direct-connect-based storage connections to the appliance ports, up to 8 Ethernet ports for Ethernet-based Small Computer System Interface over IP (iSCSI) or network attached storage (NAS), and upstream ports, up to 16 Fibre Channel (FC) ports for Fibre Channel and Fibre Channel over Ethernet (FCoE) connections for Fibre Channel storage. For the Ethernet ports connected to the storage appliance, the Cisco UCS can support concurrently, block, and file protocols on the same port. This approach is ideal for deployments that use block-level access for boot and file shares for data. The fabric interconnect provides radically simplified management for the entire infrastructure, including implicit Fibre Channel zoning and zoning services. As needed, storage multipathing can be implemented on the servers to ensure no single point of failure. This architecture provides the benefits of a shared-storage model at a lower initial capital investment

and lower operational costs because there are fewer components and management points. It should be noted that the number of virtual desktops this architecture can support, as well as its ability to scale, is limited to one Cisco UCS and the amount of storage that can be directly attached to the system. Consequently, this architecture makes an excellent starting point to move into a SAN, providing greater scalability.

How It Works

When the Cisco Simplified Architecture with VMware Horizon View solution (Figure 6) is deployed, desktop configurations are created using the VMware Horizon View Manager, propagated to the Cisco server, and placed in the virtual disk space located on the shared storage. The virtual disk contains the desktop linked clones and VSwap space. This architecture is excellent for supporting both persistent and nonpersistent virtual desktops that need to scale up to approximately 10,000 virtual desktops. The number of desktops this architecture can support depends on the size of the linked clones and the deployed storage capacity limits. As would be expected with a shared-storage implementation, the Simplified architecture fully supports VMware vMotion migration to balance workloads, perform server maintenance, or keep desktops active during a hardware failure.

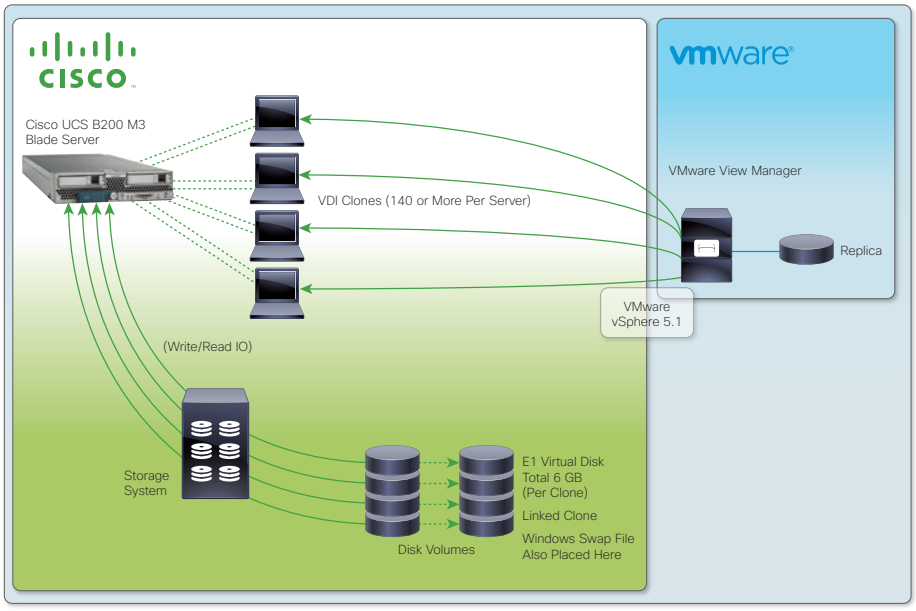

Figure 6. Deployment of VMware Horizon View Using Cisco Simplified Architecture or Cisco Scalable Architecture

Architecture Benefits

The Cisco Simplified Architecture supports a high density of both persistent and nonpersistent virtual desktops without the costs associated with purchasing and supporting an entire SAN infrastructure. The entire hardware infrastructure is managed from a single point, with integration points into VMware vCenter management. This architecture accelerates server deployments, helps ensure continued data security, and greatly reduces complexity and the time and staff needed to manage the infrastructure. It is an excellent starting point for organizations

Cisco Scalable Architecture At-a-Glance:

One Architecture: Cisco Scalable Architecture is a prevalidated, flexible, enterprise-class VDI architecture that scales from 100 to multiple tens of thousands of persistent or floating desktops.

that want to deliver the entire desktop experience users have come to know and appreciate, and is typically associated with knowledge workers.

Cisco Scalable Architecture

Many organizations implement desktop virtualization in phases, deploying perhaps a hundred desktops at a time. These environments require a single architecture that can easily scale with their deployments and ongoing growth. Such environments require the flexibility to accommodate both persistent and nonpersistent virtual desktops, supporting multiple different worker use cases with the utmost resiliency and scalability using a completely shared-storage approach. The Scalable Architecture is optimal for organizations with an existing enterprise SAN investment to which the VDI workload can be added.

This architecture is targeted for:

- Organizations having exiting SAN storage
- New, large-scale VDI deployments
- Businesses employing a cloud or shared infrastructure approach where VDI is one of the workloads

Architecture

The Cisco Scalable Architecture for desktop virtualization (Figure 7) has successfully demonstrated high performance in dense, large-scale environments. This resilient, scalable architecture uses a switched, shared fabric-based approach with a shared-storage infrastructure and scalable domain with many Cisco UCS servers. Organizations can start with a small pilot or PoC, and simply add servers and storage

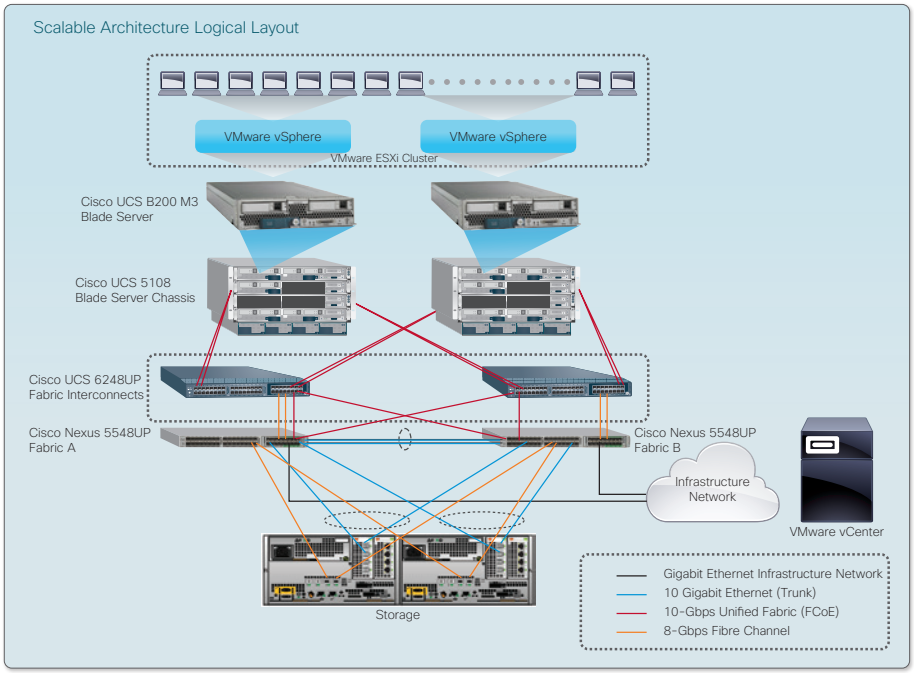

Figure 7. Cisco Scalable Architecture for Desktop Virtualization

to scale to tens of thousands of both persistent and nonpersistent virtual desktops. Businesses can use any combination of storage protocols to implement the shared-storage infrastructure, including Fibre Channel, FCoE, iSCSI, and NAS. In addition, scalable management can be provided by using Cisco UCS Manager and Cisco UCS Central Software. Organizations can manage up to 160 Cisco UCS servers and associated networking and storage interconnects using a single Cisco UCS Manager domain and manage multiple Cisco UCS deployments including geographically distributed deployments with Cisco UCS Central Software. Both Cisco UCS Manager and Cisco UCS Central Software are discussed in greater detail in the section "Scale Management as Virtual Desktop Deployments Grow" on page 16.

Essential Technology

The Cisco Scalable Architecture offers enterprise-class capabilities to support large numbers of virtual desktops, including no single point of failure with N+1 components and pathing redundancy for desktop workload and N+N redundancy for management components. The redundant fabric interconnects in Cisco UCS provide server aggregation and management with Cisco UCS Manager. Governance domains, or a separation between server, network, and storage administrative roles, can be easily defined within Cisco UCS Manager and Cisco Software, allowing consistent configuration and management processes to be propagated throughout the infrastructure.

Storage access support is provided by up to eight 10-Gbps Ethernet ports and sixteen 8-Gbps Fibre Channel ports out to the storage network. Support for active-active network Virtual PortChannels (vPCs) on the access networking layer, and storage multipathing are provided on the servers. Best practices recommend dual links for all peer links for redundancy.

Fast Login: Two Thousand VMware Horizon View Virtual Desktops Ready to Log In in Less than 20 Minutes (More Information)

How It Works

Similar to the Cisco Simplified Architecture, when the Cisco Scalable Architecture is deployed with VMware Horizon View (Figure 6), desktop configurations are created using the VMware Horizon View Manager, propagated to the Cisco server, and placed in the virtual disk space located on the shared storage. The virtual disk contains the desktop linked clones and VSwap space.

When an entire Cisco UCS system is deployed with VMware Horizon View for desktop virtualization, numerous Cisco UCS servers are dedicated to a particular virtual machine (VM) or virtual desktop-management domain, each supporting approximately 2,500 virtual desktops as building blocks (Figure 8). Using up to 10 building blocks, a single Cisco UCS domain can support up to 25,000 virtual desktops, with all associated infrastructure managed from a single point of management. As would be expected with a shared-storage implementation, the Scalable Architecture has full support for VMware vMotion migration to balance workloads, perform server maintenance, and keep desktops active during a hardware failure.

Cisco Scalable Architecture Can Support up to 196 Desktops on a Single Cisco UCS B230 M2 Blade Server (More Information)

Architecture Benefits

The Cisco Scalable Architecture enables a high density of both persistent and nonpersistent virtual desktops in an enterprise-class, highly available environment. The entire hardware infrastructure can be managed locally with Cisco UCS Manager or scaled to global management with Cisco UCS Central, with support for more than

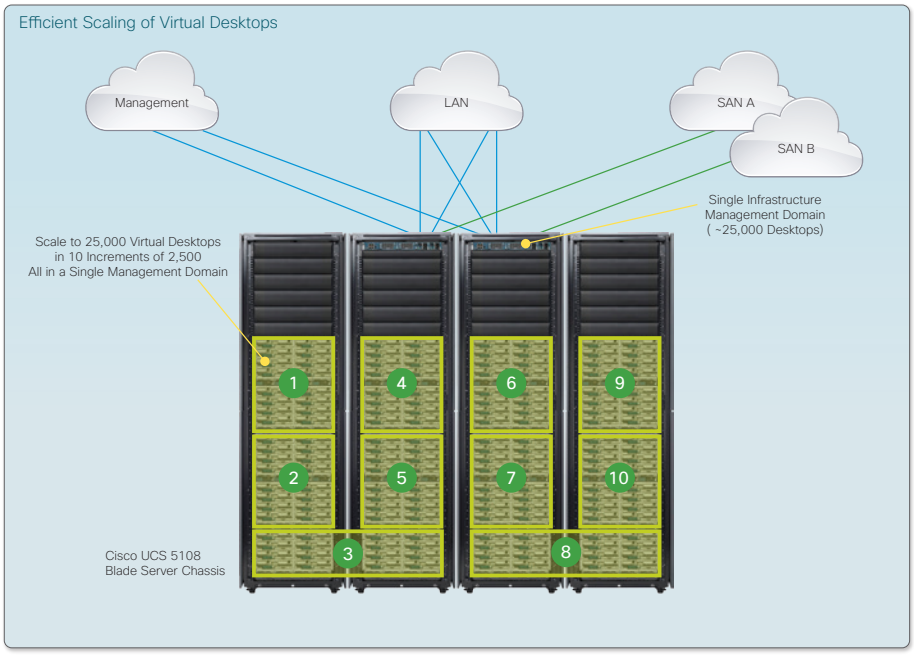

Figure 8. Deployment of Cisco Scalable Architecture Integrated with VMware Horizon View

a million virtual desktops worldwide. The consistency of management and policy, performed through role-based experts, reduces the complexity of large deployments and accelerates local server deployments for unequalled service. The integration between Cisco UCS Manager and VMware vCenter helps ensure continued data security and QoS, even through desktop motion to another server. These capabilities reduce the time and staff needed to manage this flexible, scalable infrastructure. As a result, the Scalable Architecture is an excellent choice for businesses that want to start small, implement desktop virtualization in phases, and scale over time to support thousands of highly available desktops. Businesses can deliver an entire, familiar desktop experience using a building-block approach.

Cisco Converged Infrastructure At-a-Glance:

This prevalidated, flexible, enterprise-class VDI is built on NetApp FlexPod and VCE Vblock Solutions.

Converged Infrastructure

Businesses looking to implement virtual desktops often struggle with the time it takes to size, test, deploy, and manage the infrastructure, and they tend to have preferred storage vendors. Many concerns are expressed, such as: "We do not have several months for a proof-of-concept deployment; we need VDI now", and "We cannot deal with the complexity of using multiple vendors".

Solutions

For organizations with such requirements, Cisco offers the Converged Infrastructure for desktop virtualization. Built on the technologies of ecosystem partners NetApp and the Virtual Computing Environment (VCE) coalition, these solutions use the architectures of VCE Vblock Systems and NetApp FlexPod. The result is a conveniently packaged, prevalidated infrastructure approach that modularizes data center components into easily consumable building blocks that can be added for scale. Each unit of infrastructure offers self-contained computing, storage, and

"I didn't virtualize my desktops, I virtualized my users."

George Reed
Chief Information Officer
Seven Corners

http://www.cisco.com/en/US/solutions/collateral/ns340/ns517/ns224/seven_corners.html

BlueWater sold Hudson County its first Vblock System to upgrade its older infrastructure and virtualize its data center. Because Vblock Systems are preintegrated and pretested in a controlled factory environment away from Hudson County's IT operations, BlueWater was able to assemble the infrastructure and immediately enable VDI services to 50 to 100 desktops within days of the system's arrival on site.

"Hudson County can now offer the same responsive, high-quality desktop experience to all county employees, regardless of where they are located, or what device they use to connect to the VDI solution."

Vinu Thomas
Director of Core, Data Center/ Virtualization, and Cloud Computing Strategy
BlueWater Communications Group

http://www.vce.com/asset/documents/bluewater-casestudy.pdf

network fabric resources coupled with virtualization software. The support model is converged to provide support coverage with one number to call.

Deployment with FlexPod

VMware Horizon View built on FlexPod is a prevalidated, best-in-class VDI design that accelerates virtual desktop deployments with predefined configurations that scale from 500 to many thousands of virtual desktops. This highly modular solution reduces deployment time and associated risk and cost while boosting IT and end-user agility. Gone are the days when virtual desktops take hours to boot. With NetApp FAS Storage Systems with FlashCache, you can boot and log in to your desktop quickly and effortlessly. To assure service levels are maintained, a consistent QoS is set and monitored at each layer of the infrastructure, even at scale.

Deployment with VCE Vblock Systems

VCE Vblock Systems are complete, preintegrated, and optimized solutions. VCE integrates and tests each system before it is delivered to accelerate deployment and ensure predictable performance. These powerful VDI solutions provide integrated management for the rapid provisioning and decommissioning of virtual desktops, modular scalability, and a resilient and validated architecture. VCE Vblock with VMware Horizon View tightly integrates Cisco UCS, EMC storage, and VMware Horizon View components and optimizes the solution for efficient, effective virtual desktop deployments.

Cisco Converged Infrastructure Benefits

Businesses that take advantage of these converged infrastructures benefit from:

- Reduced risk through prevalidation
- Ordering simplicity
- Rapid deployment
- Simplified support
- Modular scalability
- Integration of enterprise-class components

Along with these benefits, businesses gain simplified, smooth support through a single support number.

Scale Management as Virtual Desktop Deployments Grow

Simplified management is essential to successful desktop virtualization initiatives. It can greatly reduce the number of service calls and overall TCO of the desktop ecosystem. Cisco UCS is known for the simplified management offered by Cisco UCS Manager and Cisco UCS Central Software.

Cisco UCS Manager

Cisco UCS Manager manages all Cisco UCS components as a single logical chassis with complete visibility over the entire infrastructure, including onboard storage used by virtual desktops. This role-based management system is embedded in the system fabric interconnects to provide the same, simple and consistent configuration, for a

system of any size, from a single server to 160 servers, blades, or rack form factors. The Cisco UCS Manager GUI enables point-and-click provisioning of new servers in a matter of minutes, and allows IT organizations to rapidly meet user demands as the environment scales.

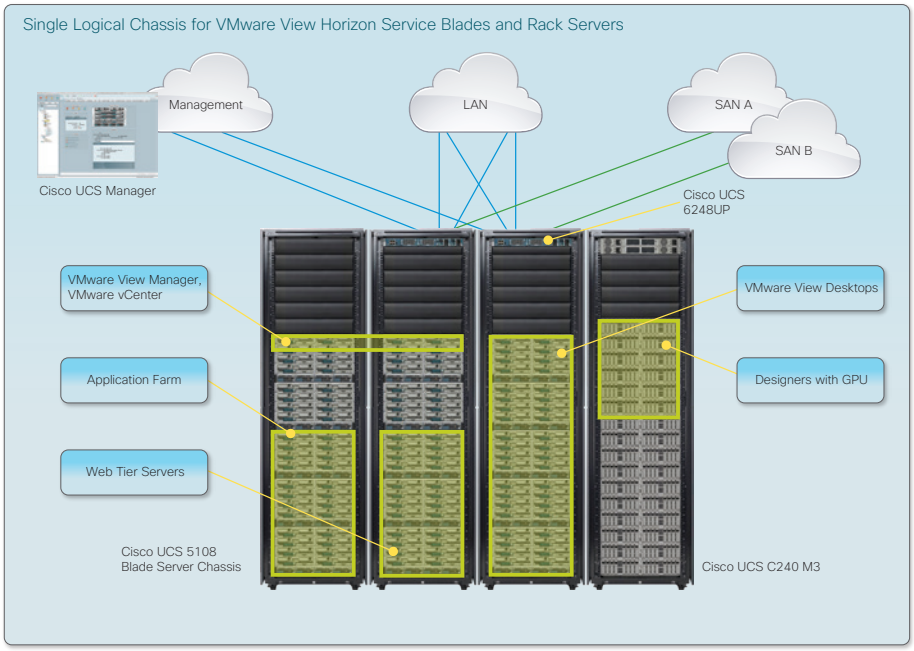

Figure 9. Cisco UCS Manager Integrated with VMware Horizon View to Provide Simplified and Consistent Management of Entire Virtual Desktop Environment

Having a single management domain enables organizations to have a single cohesive view into their virtual desktop systems, application servers, management servers, and even high-end designer systems, all within a single management plane (Figure 9).

Cisco UCS Central Software

Cisco UCS Central Software allows IT organizations to manage multiple Cisco UCS deployments locally or in multiple locations for global management scalability. The software creates a unified management domain for IT administrators, spanning thousands of servers across a single data center, multiple data centers, and around the world. Offering the same model-based architectural framework as Cisco UCS Manager, Cisco UCS Central Software provides a familiar design across all domains (Figure 10). In addition, Cisco has extended the XML application programming interface (API) to enable global automation among Cisco UCS domains.

Cisco Cloupia—High-Level Management

Cisco Cloupia takes the management paradigm to a new level, making VDI environments very easy to deploy, monitor, and manage. Unified management, provisioning, and automation for the entire converged infrastructure, software-to-storage, is available through a single-pane-of-glass interface for consistent management across private, public, and hybrid clouds (Figure 11).

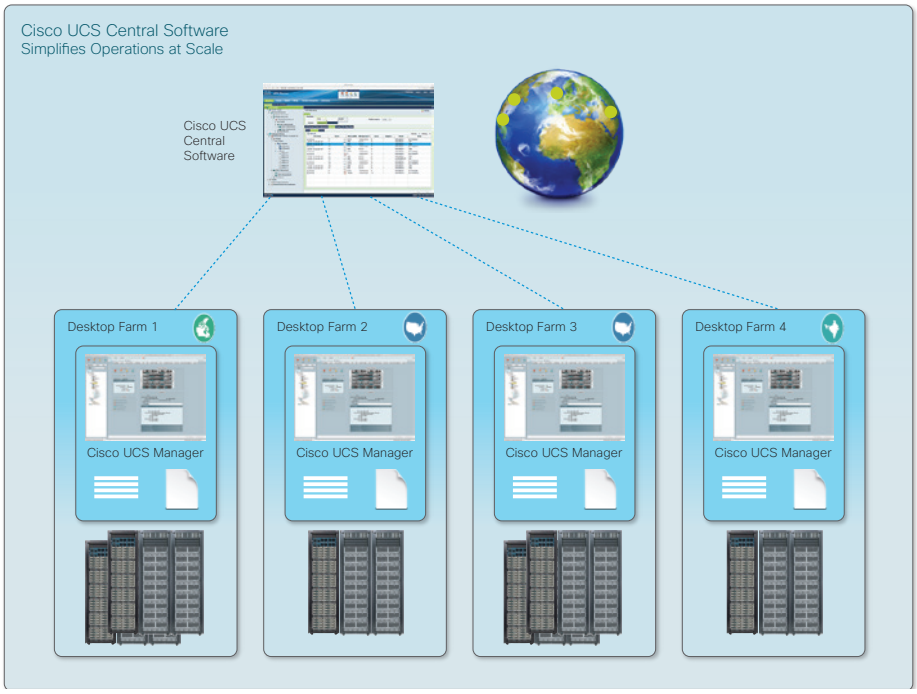

Figure 10. Cisco UCS Central Software Uses Cisco UCS Manager to Simplify Global Operations for Larger Deployments, Locally or in Multiple Locations

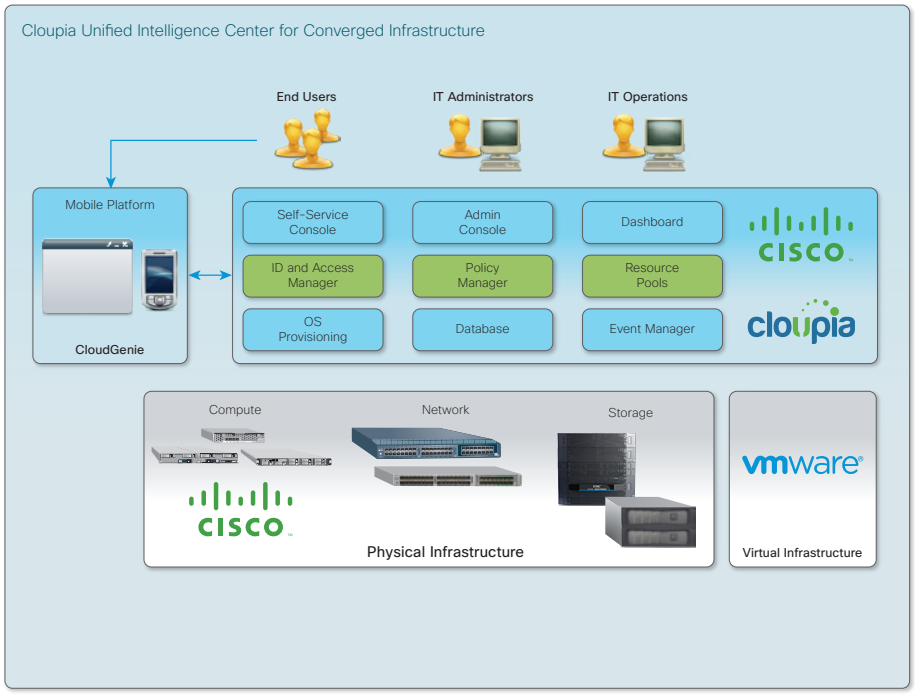

Figure 11. Simplify and Centralize the Management of the Converged Virtual Desktop Environment Using Cisco Cloupia

Cisco Cloupia delivers effective unified converged infrastructure management through these capabilities:

- Centralized management console that provides a comprehensive view of the converged infrastructure stack
- Native performance monitoring across all converged infrastructure resources, providing visibility into bottlenecks
- Support for VCE Vblock, FlexPod, and VSPEX, facilitating the use of industry-leading converged infrastructure solution brands
- Model-based orchestration capability, building and executing repeatable workflows without complex custom scripts
- Highly secure management of multitenant environments

Cisco Desktop Virtualization Solutions Portfolio Solves Traditional VDI Problems

Cisco desktop virtualization architectures help desktop IT managers by providing the blueprint for an infrastructure that enables a mobile, flexible, productive, global workforce that actually enhances the working experience over traditional desktops. This approach is accomplished with simple, resilient architectures that meet your business size and budgetary needs now and into the future. The linear scalability of both the infrastructure and management can take you from 10 to tens of thousands of desktops using the same model and taking advantage of administrative knowledge and experience.

Our approach provides the right balance of memory, I/O, and CPU resources for high-performance, cost-effective virtual desktops that deliver effective and efficient end-user support. The radical simplicity of the design enables rapid provisioning of both virtual and physical servers with integration between VMware vCenter and Cisco UCS Manager. With these validated and converged infrastructure solutions, IT organizations can accelerate virtual desktop deployment, reduce complexity, simplify management, and reduce call-center activity—all leading to lower acquisition costs and lower TCO.

For More Information

For more information, please refer to the following references:

- VMware Horizon View
- Cisco Validated Designs and Reference Architectures with VMware Horizon View
- Cisco Design Guides with VMware Horizon View
- Cisco Desktop Virtualization Solutions with VMware Horizon View (Solution Brief)
- Cisco Converged Infrastructure solutions:
  - NetApp FlexPod
  - VCE Vblock solutions
- Cisco UCS Manager
- Cisco UCS Central Software
- Cisco Cloupia

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