Cisco and VMware Joint Solution Brings Unprecedented Innovation to Create Flexible Virtual Environments

Cisco Unified Computing System and VMware vSphere Enable Rapid Application and Infrastructure Deployment with Greater Security, Availability, and Performance Leading to Increased Return On Investment (ROI) and Reduced Total Cost of Ownership (TCO).

Executive Summary

Virtualization has helped to alleviate the pressure on IT departments to do more with less by allowing them to deploy more applications, and scale existing ones, with greater staff and infrastructure efficiency. Virtualization's primary benefit is greater utilization of resources and consolidation of multiple servers into a single server, increasing flexibility and agility.

IT departments have had varied success with traditional virtualization implementations. The mixture of virtualization software with siloed server, networking, and storage hardware has limited the efficiency of the entire solution. Traditional architectures have made managing security and Quality of Service (QoS) more difficult, not less. In addition, management complexities are causing strain between administrative domains within the IT department.

The joint solution of Cisco Unified Computing System™ and VMware vSphere specifically addresses these challenges. This innovative solution combines industry-standard technologies to create a radically simplified, high-performance data center infrastructure with integrated, embedded management. Through innovation and flexibility, this solution speeds application and virtual infrastructure deployment, increases application performance, and supports increased availability, security, and business continuity.

VMware vSphere software and the Cisco Unified Computing System together provide outstanding support for the virtual server environment and enable rapid application and infrastructure deployment with greater security, availability, and performance, leading to significant business benefits of increased Return On Investment (ROI) and reduced Total Cost of Ownership (TCO).

Data Center Challenges

Virtualization technology has brought many benefits to data centers, but traditional architectures have led to many challenges:

- **Inflexible Infrastructure That Inhibits Rapid Deployment:** The traditional infrastructure that supports virtualization platforms is often not as flexible as the virtualization software residing on it. Every server has state associated with it, such as network connectivity (MAC addresses), storage connectivity (Worldwide Names [WWNs]), and firmware revisions.

Operating system types and levels depend upon the state of a given server. In a traditional deployment, the server state is static. This monolithic stateful infrastructure makes change management in the malleable virtualized environment cumbersome, if not impossible.

- **High Cost of Implementing Networked Storage:** Another challenge for data centers moving to virtualization is the requirement for networked storage to support advanced virtualization features. A move to networked storage provides uniform access to data, which supports the capability to move application workloads from one physical server to another. The initial costs to implement networked storage can be daunting. Fibre Channel storage, for example, requires multiple networks and the associated adapters, cables, switches, and management interfaces.
- **Increased Management Complexity:** Traditional architectures are burdened by multiple points of device management, including network adapters, storage adapters, Ethernet switches, Fibre Channel switches, and chassis-management modules, making the environment more complex than necessary. For example, prior to virtualization, security was easier to manage. With only one application per physical server, all connectivity and traffic was visible on physical networks. Now many applications run virtual machines on a single physical server, obscuring the network traffic between virtual machines residing on the same server. To properly secure a server and its networks, there must be visibility into network links on a per-virtual-machine basis. Visibility into these connections is also required to provide QoS management to the application workloads.
- **Overlap of Administrative Domains:** One of the greatest challenges of virtualization implementations has been organizational rather than technological. With the architectural changes brought by virtualization, the traditional administrative boundaries overlap, sometimes resulting in conflict among administrative groups. For example, virtual switches are software entities, which are typically within a server administrator's domain. These virtual network components thus often do not implement the best practices established by network administrators on their physical networks and switches; often, server administrators take on network administrator roles that they are not qualified to perform. Instead of promoting collaboration, this overlap has resulted in conflict.

Together, these challenges delay application and infrastructure deployment, hindering the efficiency and agility that is the promise of virtualization. With these challenges in mind, Cisco and VMware have built a joint solution to simplify the environment, promote collaboration, and enable flexibility and agility to help customers achieve the lowest total cost per application workload.

An Innovative Solution

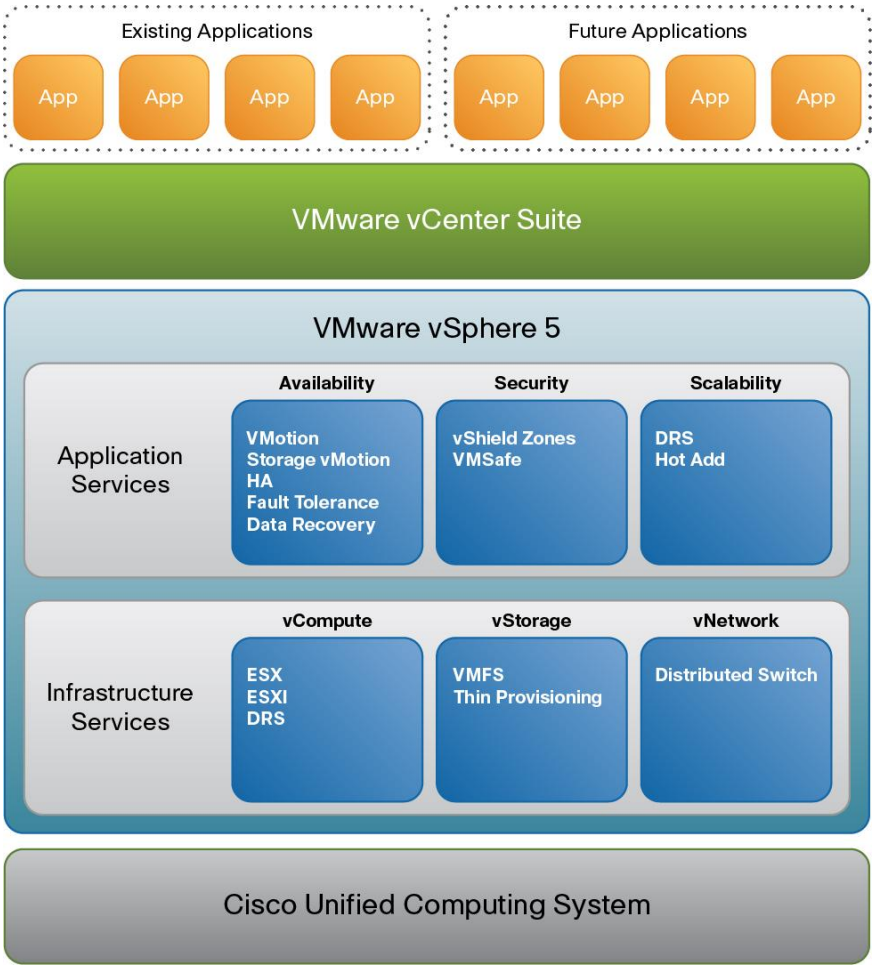
The Cisco Unified Computing System and VMware vSphere joint solution combines an industry-leading virtualization software platform with a high-performance, highly flexible, and cost-effective hardware platform. The Cisco Unified Computing System was designed specifically to support the needs of virtualized environments, increase agility, and reduce TCO.

VMware vSphere

VMware vSphere brings the power of virtualization to the IT infrastructure - the next evolutionary step in IT computing - and a highly trusted virtualization platform. With a proven virtualization solution as the foundation, VMware vSphere and Cisco Unified Computing System can quickly respond to

evolving business needs. The technology underpinnings of the solution include VMware vSphere vCompute services, which efficiently virtualize server resources and aggregate them into logical pools that can be precisely allocated to applications; VMware vStorage services, which remove the complexity of back-end storage systems and enable highly efficient utilization of storage in virtual environments; and VMware vNetwork services, which enable optimal administration and management of networking in virtual environments (Figure 1). This powerful combination of services transforms data centers with a dramatically simplified infrastructure and enables the next generation of flexible, reliable IT services. Application services can be enabled simply and uniformly for any application running in VMware virtual machines, providing IT with simple built-in controls over application service levels.

Figure 1. VMware vSphere Integrates Three Core Services - vCompute, vStorage, and vNetwork - on the Cisco Unified Computing System

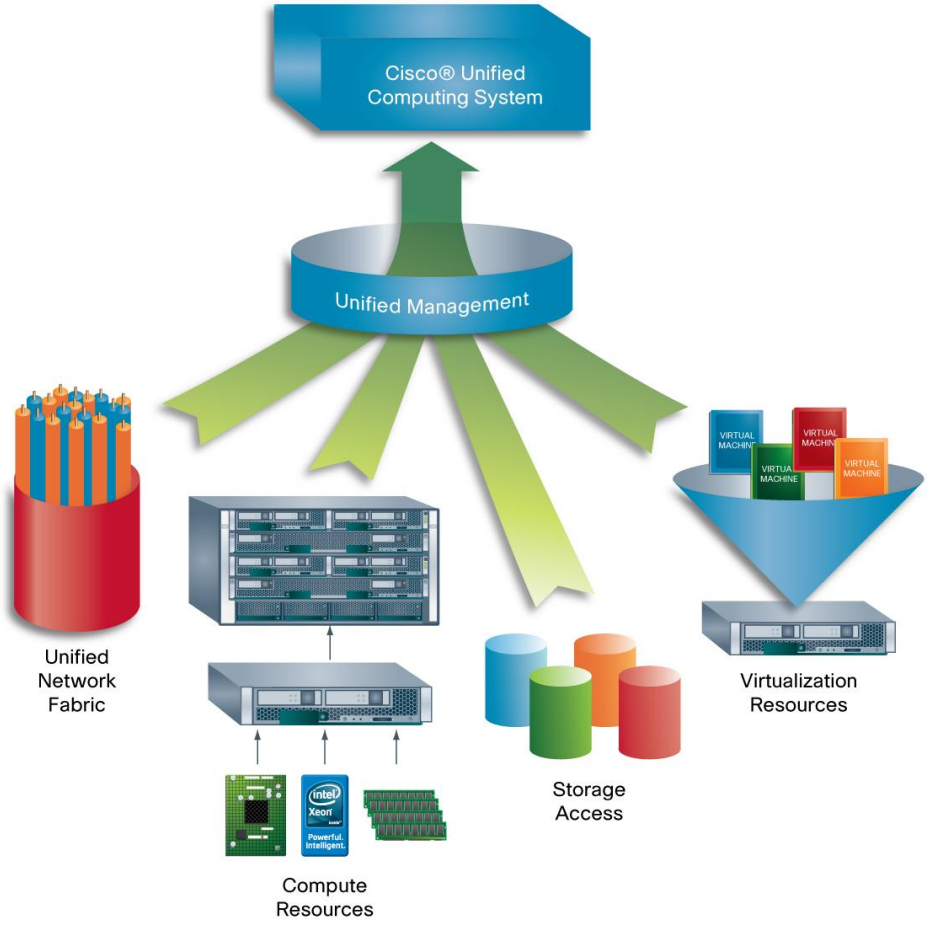


Cisco Unified Computing System

The Cisco Unified Computing System is a next-generation data center platform that unites compute, network, storage access, and virtualization into a cohesive system designed to reduce TCO and increase business agility (Figure 2). The system integrates a low-latency, lossless 10Gigabit Ethernet unified network fabric with enterprise-class, x86-architecture servers. The system is an integrated, scalable, multichassis platform in which all resources participate in a unified management

domain. The system is inherently stateless, with Cisco service profiles dictating every aspect of server provisioning - from I/O configurations to firmware revisions and settings - to speed virtual infrastructure provisioning. Cisco® UCS Manager, in conjunction with Cisco vCenter, streamlines virtual application deployment by coordinating the creation and management of virtual network devices and the virtual links that connect them. Cisco VN-Link technology for the first time gives visibility into, and manageability over, the network links that connect virtual machines, supporting security and QoS management independent of a virtual machine's physical location. The technology's first hardware implementation in the form of Cisco virtual interface cards speeds network throughput by up to 30 percent when used with VMware VMDirectPath technology. Cisco Extended Memory Technology makes virtual infrastructure more cost effective by supporting higher consolidation ratios than can otherwise be achieved using low-cost two-socket servers.

Figure 2. Cisco Unified Computing System Unites Compute, Network, Storage Access, and Virtualization into a Cohesive System



The Combined Solution: Better Together

The combined solution uses virtualization at every level of both the hardware and software stack to radically simplify the environment. This simplification speeds application and virtual infrastructure deployment, secures virtualized applications, and improves application availability and performance while also decreasing capital and operating costs, preserving flexibility to support any operating

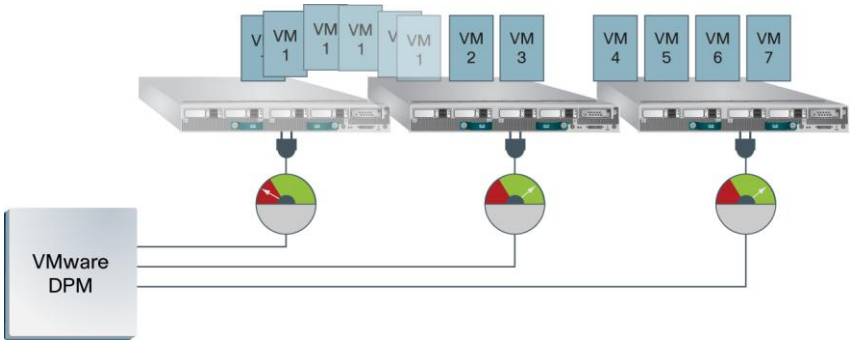
system and application. The remainder of this section discusses the strengths of the VMware and Cisco solution and highlights specific areas where the combined solution brings exceptional value to business.

High-Performance Virtual Computing Infrastructure

The Cisco Unified Computing System leads the industry in virtualization performance, with the highest VMware VMmark benchmark result (35.83 tiles) of any blade server anywhere[1]. Cisco Unified Computing System servers are powered by Intel processors with Intel Virtualization Technology (VT), enabling near-native performance running multiple virtual machines with different operating systems and associated application workloads. In addition, VMware VMDirectPath technology takes advantage of Intel VT for Directed I/O (VT-d), allowing the virtual machine's operating system to access devices directly, without going through the VMware vSphere hypervisor. VMware VMDirectPath can be used for application workloads that require extremely high I/O performance, giving IT departments the flexibility to run critical business applications within a virtual environment, standardizing the base infrastructure.

The Cisco Unified Computing System supports Intel Power Management technologies through the Advanced Configuration Power Interface (ACPI). VMware Distributed Power Management (DPM) uses the ACPI to monitor and modify the power state of the processor. VMware DPM used in conjunction with VMware Distributed Resource Scheduler (DRS) continuously optimizes power consumption by co-locating virtual machines during light workload periods (such as nights and weekends) and turning off unused servers. When the virtual machine demands increase or are expected to increase (as, for instance, in the morning), VMware DPM automatically brings servers back online to accommodate workload requirements dictate (Figure 3).

Figure 3. VMware DPM Consolidates Virtual Machines and Powers Off Unused Compute Resources



[1] Per- server scores posted on www.vmmark.com as of March 12, 2010. VMware® VMmark™ is a product of VMware, Inc. VMmark uses SPECjbb2005® and SPECweb2005®, which are available from the Standard Performance Evaluation Corporation (SPEC). SPEC and the benchmark names SPECjbb and SPECweb are registered trademarks of the Standard Performance Evaluation Corporation. The Cisco UCS B250 M2 server score of 35.83 with 26 tiles was made available at http://www.vmmark.com on March 16, 2010. All other results were obtained from http://www.vmmark.com as of March 15, 2010: the Cisco UCS B200 M1 Blade Server result of 25.06 with 17 tiles reported January 12, 2010; HP ProLiant DL385 G6 Server result of 15.54 with 11 tiles reported June 2, 2009; and Dell PowerEdge M905 Server result of 22.90 with 17 tiles reported June 19, 2009.

Large Memory Capacity for Higher Consolidation Ratios

The combination of compute power managed by VMware vSphere and Cisco Extended Memory Technology provides the foundation for the Cisco UCS B250 M2 Extended Memory Blade Server's high virtualization performance of 35.83 tiles.

Virtualization is not just about sharing CPU resources. All resources are shared in a virtualized environment. One resource that is often overlooked in calculating application workload capacities, and that can have a significant effect on workload performance as well as consolidation ratios, is memory. Many virtualized environments are memory bound and require organizations to upgrade to more expensive four-socket servers simply to support the memory they need.

To address this challenge, the Cisco Unified Computing System transparently extends the memory to twice what is typically available with traditional two-socket servers to provide a memory footprint of up to 384GB, the largest available on a server based on Intel Xeon 5600 series processors. This additional memory combined with VMware vSphere memory management techniques enables companies to increase consolidation ratios beyond what is otherwise achievable on a two-socket server. A cost-effective memory footprint of 192GB can be created using 4GB DIMMs, further increasing the efficiency of virtualized environments.

This technology gives IT departments a flexible, cost-effective hardware platform specifically designed to enhance the virtual infrastructure created with VMware vSphere software. This flexibility leads to higher consolidation ratios, enabling greater business efficiency and lower costs.

Simplified Infrastructure Built to Use a 10Gbps Unified Fabric

The Cisco Unified Computing System uses a low-latency, lossless 10Gbps unified fabric to simplify I/O access and reduce the number of adapters, cables, and upstream switch ports, while reducing management complexity. Figures 4 and 5 illustrate the differences in components and complexity between a traditional blade server infrastructure and the Cisco Unified Computing System. Using two blade server chassis, or 16 blade servers, the Cisco Unified Computing System significantly reduces the number devices and points of management (see Table 1).

Table 1. Number of Devices and Management Points in a Traditional Blade Server Compared to the Number in the Cisco Unified Computing System

Devices and Management Points	Traditional Blade Server	Cisco Unified Computing System (2 Chassis and 16 Blade Servers)
Network adapters (per blade)	2 to 4	1
Chassis-resident switches	4	0
External access layer switches	4	0
Chassis management controllers	1 to 2	0
External management servers	2	0
Total points of management	13 to 20	1

Figure 4. Traditional Blade Server Architectures Require Up to Six Devices In Each Chassis in Addition to External Management Controllers and Access-Layer Switches

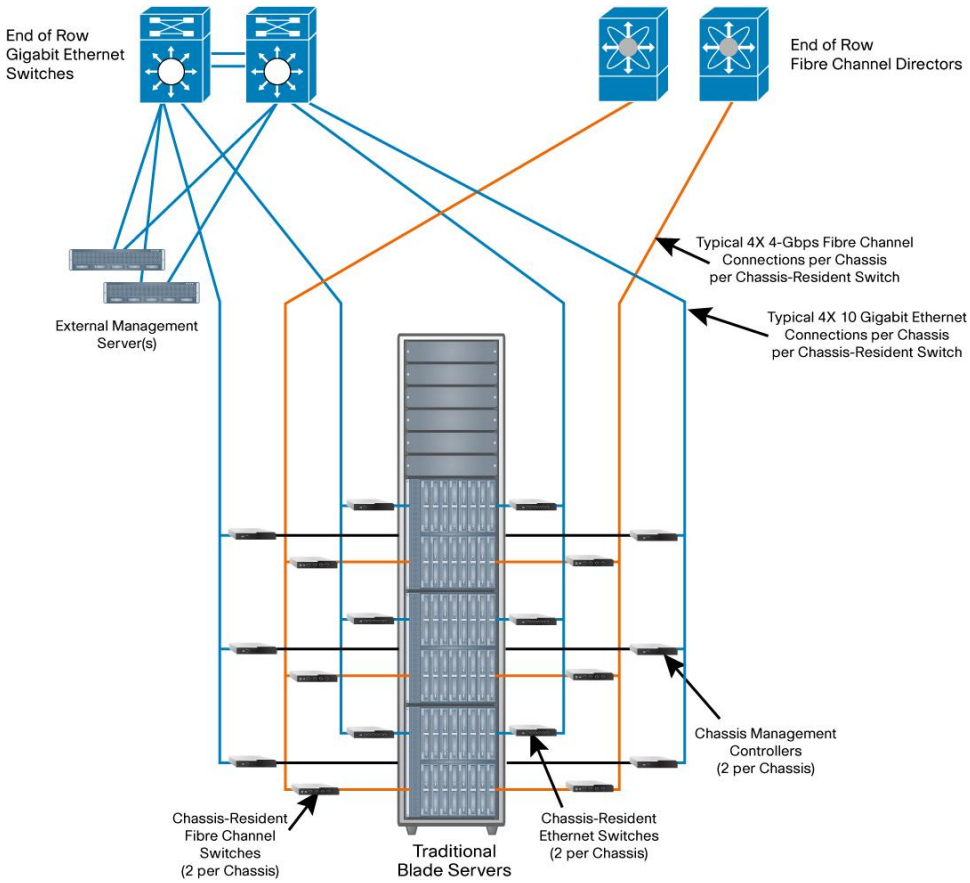
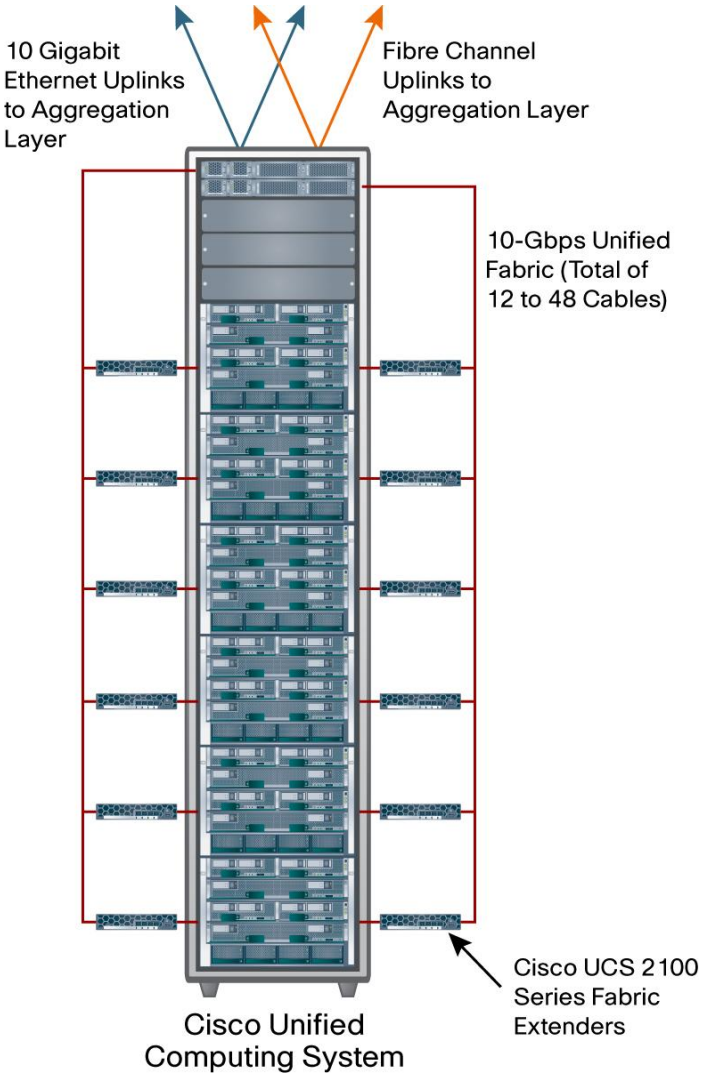


Figure 5. Cisco Unified Computing System Uses Fabric Extender Technology to Bring the Unified Fabric to Each Blade Chassis, Resulting in No Points of Management



Rather than burdening the hardware configuration with multiple parallel networks each of which must be purchased, configured, managed, updated, powered, and cooled, the Cisco Unified Computing System uses a standards-based, low-latency, high-bandwidth 10Gigabit Ethernet and Fibre Channel over Ethernet (FCoE) network for all traffic, communications, and storage. The Cisco Unified Computing System simplifies connectivity to the enterprise LAN and SAN by interconnecting Cisco Unified Computing System servers as a single system and linking that system directly to the Ethernet and Fibre Channel aggregation layer.

The unifying of fabrics combined with VMware vSphere significantly reduces the costs associated with implementing networked storage, requiring fewer adapters and cables, radically simplifying management and support of the entire virtual infrastructure, and maintaining the flexibility of the environment.

Cisco VN-Link and VMware VMDirectPath Technologies: Visibility, Management, and Network Performance

Cisco and VMware are the first in the industry to provide visibility and management of network links all the way to the virtual machines themselves, along with direct hardware access that speeds network throughput by up to 30 percent. No other solution can provide capabilities such as these.

Cisco VN-Link Technology

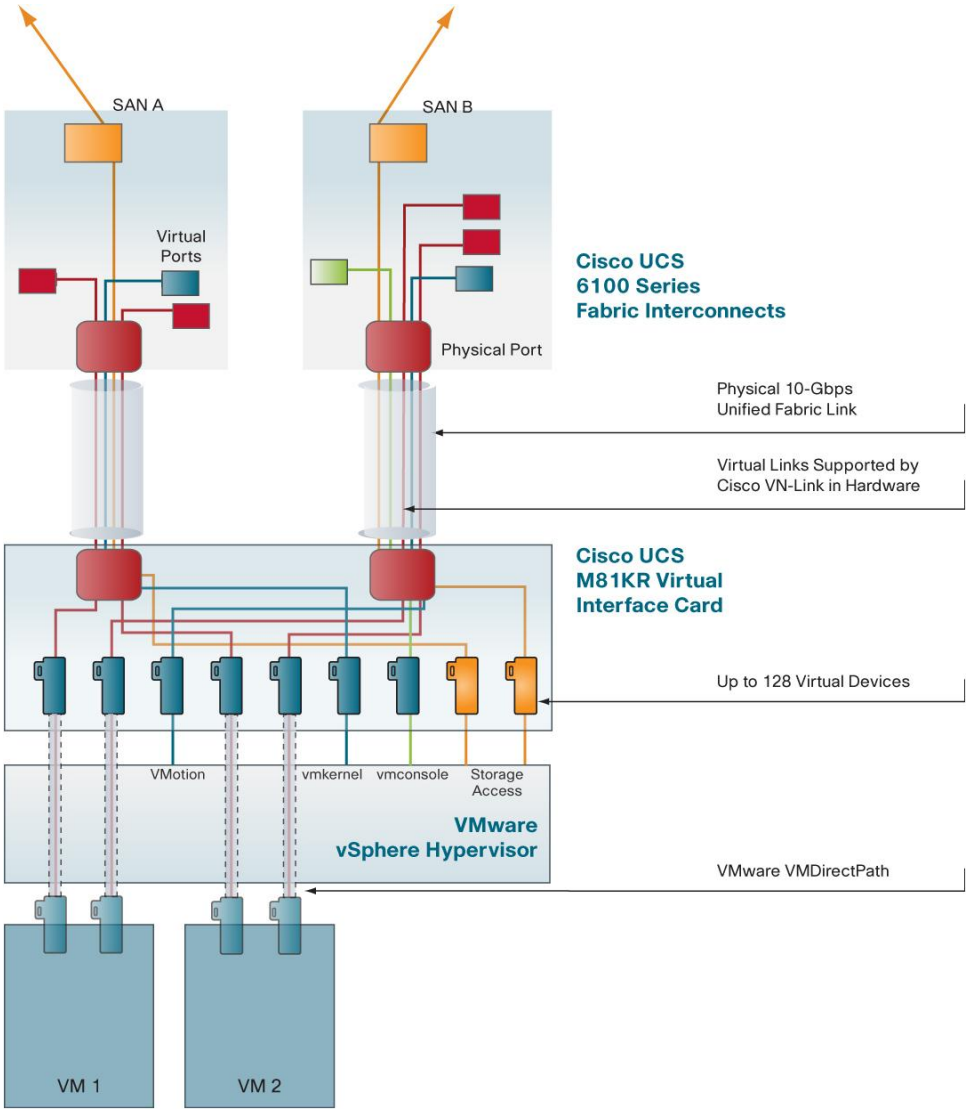
Cisco VN-Link technology provides network visibility to individual virtual machines, including the capability to uniformly apply security and policy on a per-virtual machine basis, alleviating organizational conflicts introduced by the new virtual environment. The technology provides:

- Role and policy-based configuration of network, storage, and security by maintaining a virtual machine-focused management model for increased efficiency
- Mobile security and network policy that automatically moves with a virtual machine when it migrates from one system to another without operator intervention, helping ensure policy compliance
- Alignment of the operating and management environments for both virtual machine and physical device connectivity while maintaining the VMware operational model, enabling collaboration among administrative domains (server, storage, and networking) across organizational boundaries

Hardware and Software Implementations

The innovative, patented Cisco VN-Link technology is implemented in software through Cisco Nexus® 1000V Series Switches and in hardware through the Cisco UCS M81KR Virtual Interface Card (VIC). Figure 6 shows how a virtual interface card can be used to support all the I/O requirements of a traditional VMware deployment - including VMware VMotion, vmkernel, vmconsole, and storage access - using only a single virtual interface card.

Figure 6. The Cisco Virtual Interface Card Supports VMware vSphere I/O Best Practices with Only a Single Card



The Cisco Nexus 1000V Series can be used with Cisco C-Series Rack-Mount Servers and third-party servers to provide the benefits of Cisco VN-Link technology across the data center. Within the Cisco Unified Computing System, the hardware implementation of VN-Link with the Cisco UCS M81KR VIC delivers hardware-accelerated performance while virtualizing the I/O interfaces of each blade server equipped with the card.

As shown in Figure 6, the Cisco UCS M81KR VIC supports I/O best practices for VMware vSphere that would otherwise require at least three Network Interface Cards (NICs) for VMware VMotion, vmconsole, and vmkernel, along with at least two more NICs for virtual machine production traffic and two Fibre Channel Host Bus Adapters (HBAs) for VMware storage access. The card virtualizes I/O devices and their settings so that all network interfaces and HBAs are created and configured on demand to support both the VMware vSphere hypervisor and individual virtual machines.

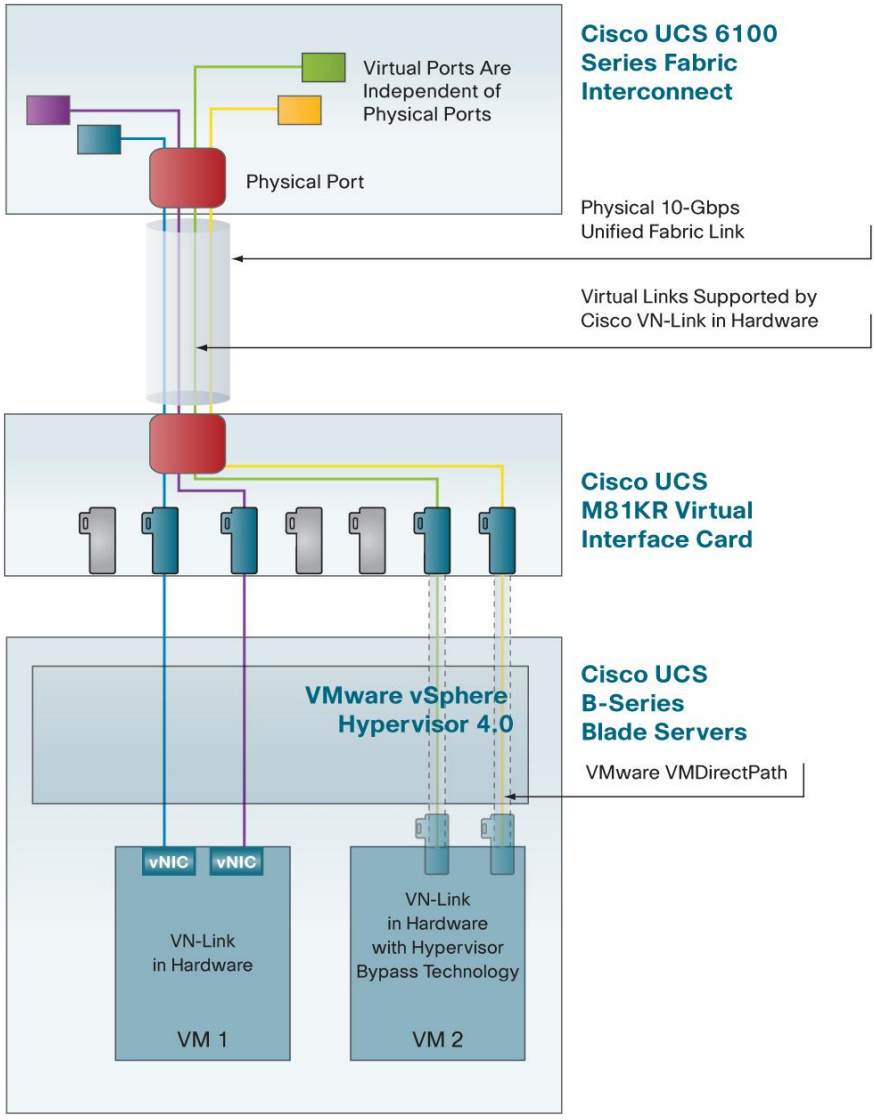
Direct Device Access

Using Cisco VN-Link technology and VMware vSphere, individual virtual machines can interface directly with their own dedicated NICs, bypassing the hypervisor and increasing bandwidth utilization by up to 30 percent. Furthermore, Cisco UCS Manager coordinates with VMware vSphere software so that these NICs migrate with the virtual machines using them, making virtual machine isolation, security, and QoS characteristics consistent regardless of virtual machine location.

When simplifying the virtualized environment by eliminating software switching, virtual machines can access the virtual interface card's NICs in one of two ways: through the VMware vSphere hypervisor, as shown by virtual machine 1 in Figure 7, or using Hypervisor Bypass Technology with VMware VMDirectPath, shown by virtual machine 2 in Figure 7.

Use of VN-Link with Hypervisor Bypass Technology, implemented with VMware VMDirectPath, allows the virtual machine to communicate directly with the physical port without going through the VMware vSphere hypervisor. Hypervisor Bypass Technology provides up to 30 percent greater network throughput than software-based implementations and reduces the CPU overhead of software switching. Additionally, Cisco's testing has shown that run times for network-bound applications can be reduced by up to 40 percent. Offloading the CPU frees capacity for greater virtual machine density, further reducing the cost per application workload.

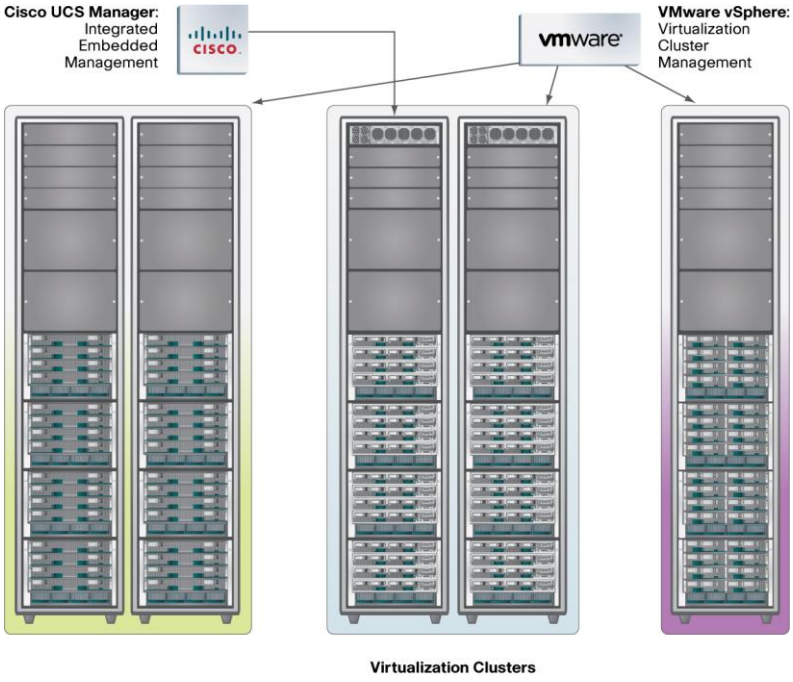
Figure 7. Cisco UCS M81KR VIC with VN-Link in Hardware Access Through the VMware vSphere Hypervisor and Using Hypervisor Bypass Technology



Integrated Embedded Management

The solution's tightly integrated management facility helps reduce the number of interfaces and amount of training required to create and administer the entire virtual environment. Demonstrating Cisco and VMware's commitment to simplify management, the Cisco Unified Computing System offers a single point of management per domain, and VMware vCenter Server supports 1000 VMware ESX servers with 10,000 virtual machines, with VMware vCenter running in linked mode (Figure 8).

Figure 8. Cisco UCS Manager and VMware vCenter Managing Three VMware vSphere Clusters



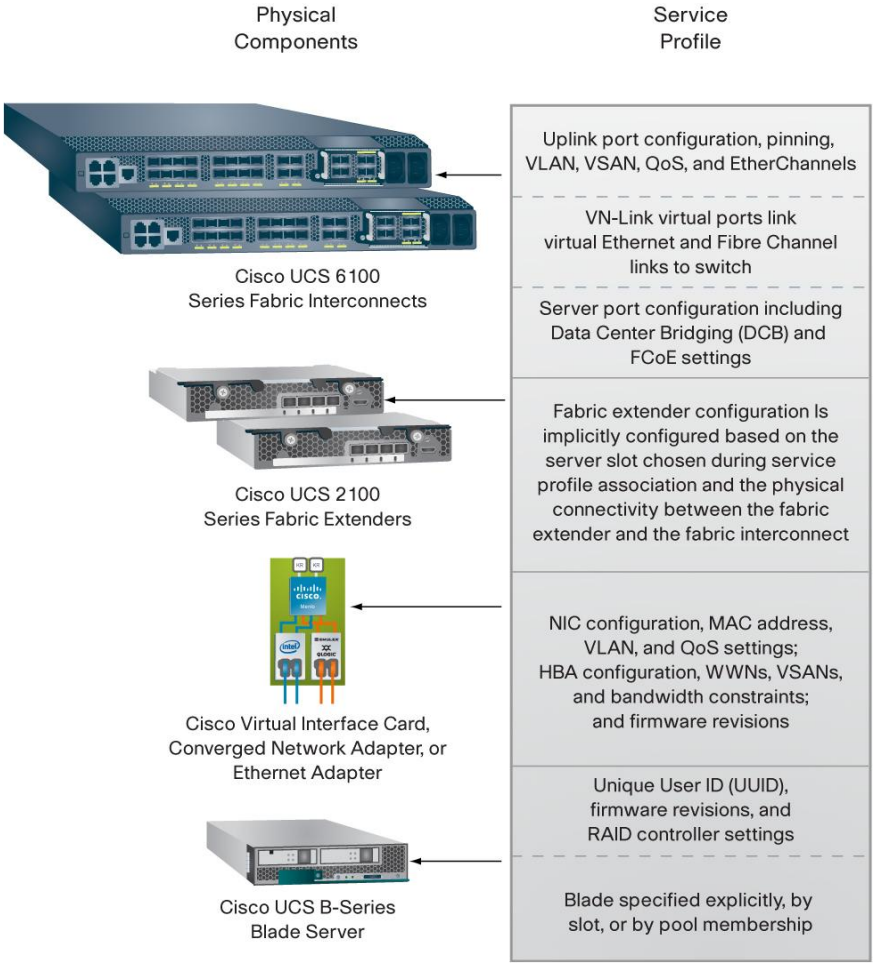
This level of scalability is enabled through VMware vCenter templates and the use of Cisco service profiles and templates. Cisco service profiles and templates provide policy-based provisioning at the hardware level, facilitating easy, accurate, and consistent provisioning of physical server resources for one or dozens of VMware instances. This approach eliminates a class of errors that can lead to downtime, increasing availability and reducing costs by allowing virtualization pools to expand efficiently and dynamically.

The capability of Cisco service profiles to dictate server identity and connectivity as well as firmware revisions and settings results in automated updates that further speed:

- Virtual infrastructure deployment
- Reprovisioning of servers in or out of a virtualization pool
- Maintenance of servers to meet evolving compliance standards

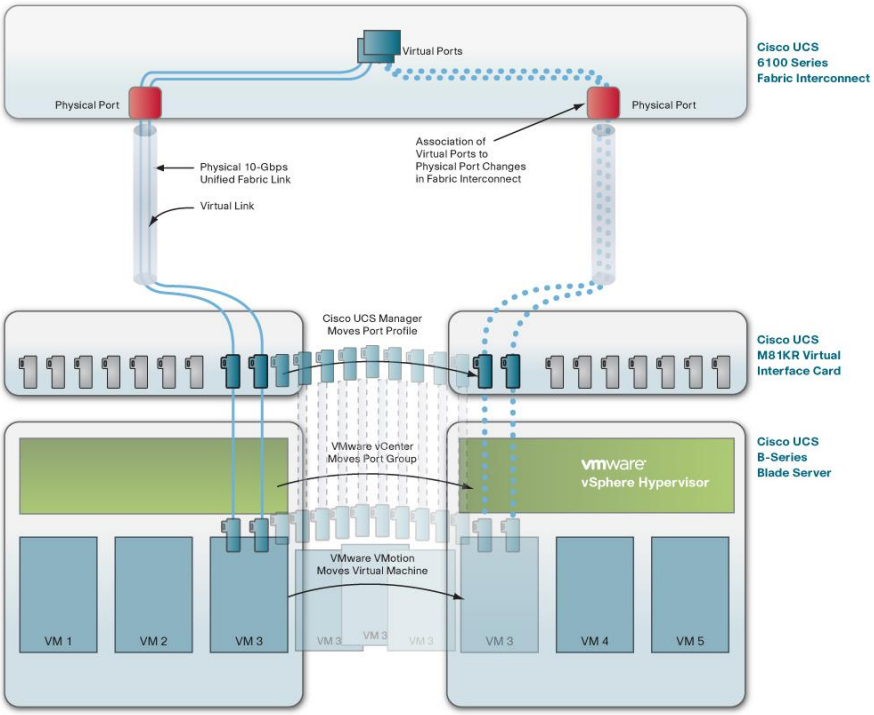
This automated, policy-based management handles firmware and settings for every hardware component, resulting in consistent compliance and making the need to update individual components with separate element managers a thing of the past. Cisco service profiles provision every element in the hardware stack, preparing a server for VMware vSphere or reprovisioning it for another purpose, with click-of-the-mouse simplicity (Figure 9).

Figure 9. Cisco Service Profiles Bring Click-of-the-Mouse Simplicity to the Provisioning of Physical Servers for VMware vSphere



The solution supports role- and policy-based management for clear delineation of administrative domains through Cisco service profiles and port profiles, fostering communication and collaboration. This approach eliminates the costly, time-consuming, and error-prone manual assembly of virtual and physical components when adding new applications or scaling the environment. VMware vCenter and Cisco UCS Manager, illustrated in Figure 10, coordinate network port attributes for virtual machines. Administrators no longer have to manually adjust network attributes after a virtual machine migration using VMware VMotion or VMware DRS. Network attributes move with the virtual machine to preserve network policies for consistent QoS and security.

Figure 10. Cisco UCS Manager and VMware vSphere Coordinate Virtual Machine Movement So That Network Attributes Remain Constant Independent of Virtual Machine Location



Standards-based XML interfaces facilitate additional integration with high-level third-party tools, such as BMC BladeLogic, that interface with both VMware vCenter and Cisco UCS Manager. This feature enables use of a single pane to manage the entire environment, enabling immediate response to changing business conditions.

Business Benefits

The Cisco and VMware solution integrates many innovative technologies pioneered by both companies. These innovations, as well as technology leadership, offer significant business benefits, making data centers and IT departments more effective and efficient, and increase ROI and reduce TCO, making companies more competitive in the market.

Increased Return on Investment

ROI calculations have two components: the costs associated with purchasing and implementing a solution, and the business benefit gained from the solution. The greater the business gain and the lower the costs, the higher the ROI. The combined VMware and Cisco solution reduces the initial costs and amplifies the business benefits gained.

The combined Cisco and VMware solution reduces Capital Expenditures (CapEx) significantly compared to the traditional one-application-per-system configuration:

- Fewer systems needed to run the business applications; VMware's conservative estimate is a 10:1 reduction in systems when virtualization is implemented with VMware vSphere
- Support for greater virtual machine density, reducing the number of physical systems required to support business applications

- Less data center floor space, power, and cooling needed because there are fewer servers; in some cases, this reduction has saved companies millions of U.S. dollars in avoided expense to build a new data center
- Shared cluster of systems for high availability and fault tolerance rather than duplicated systems, reducing the cost of implementation
- Significantly reduced infrastructure needed to support a disaster recovery site; instead of replicating an entire infrastructure at a remote location, enterprises can use dramatically fewer systems at the disaster recovery site, and even applications that continue to run one application per system can failover to a virtual machine at the disaster recovery site

Notably, the Cisco and VMware solution builds on these CapEx reductions and further reduces CapEx in comparison to other virtualized systems (blades or servers):

- Unified fabric results in fewer adapters, cables, switches, and points of management, and simplified architecture eliminates blade-resident switching.
- Cisco Extended Memory Technology supports greater consolidation ratios, and Cisco virtual interface cards and VMware VMDirectPath enable high-performance networking.
- The Cisco Unified Computing System enables greater physical consolidation - a smaller footprint - and thus less space, less power, and less cooling, resulting in cost savings.
- Cisco service profiles enable pay-as-you-grow, or just-in-time provisioning of physical and virtual infrastructure; organizations do not need to overprovision the environment to accommodate projected growth.
- Fewer spare or failover systems need to be purchased. Because any system can be configured to match another system's attributes using Cisco service profiles, spares can be made available to any cluster or any purpose instead of being dedicated to a single cluster or application.

Lower Total Cost of Ownership

Lower TCO means a more effective and efficient data center. The VMware and Cisco solution markedly reduces TCO through:

- Increased resource utilization through physical-to-virtual device consolidation
- Simplified modular architecture: build as you grow
- Simplified, automated, integrated management, increasing the number of servers each administrator can manage, with fewer components and points of management
- Role- and policy-based management that encourages collaboration and communication between administrative domains, making administrators more effective and efficient and enabling them to focus proactively on strategic goals rather than just day-to-day details
- Consistent automated provisioning of both physical and virtual infrastructure with Cisco service profiles and VMware vCenter templates, resulting in fewer errors, less downtime, and less work during nights and weekends, and thus lower costs
- Stateless hardware and software infrastructure, making components fungible and thereby reducing service costs and spares costs

- Rapid application and infrastructure deployment, reducing the time and costs associated with bringing infrastructure and applications online

The Cisco and VMware solution focuses innovative technologies on providing significant financial and organizational benefits to companies.

Streamlined Application and Virtual Infrastructure Deployment

IT departments are constantly challenged to deploy applications as rapidly as the business units they serve want. VMware vSphere DRS creates a uniform pool of resources that can be used to deploy applications. VMware DRS dynamically load balances server resources to deliver the right resource to the right application based on business priority, allowing applications to be deployed, grow, or shrink as needed. The pool decouples application deployment from server purchases, allowing applications to be deployed first, and the virtualization pool itself scaled up and down as workload requirements dictate.

Cisco UCS Manager speeds the expansion and contraction of virtual infrastructure, increasing an organization's business agility. Cisco service profiles rapidly and accurately provision servers so that they can be incorporated into a virtualization pool within minutes, and blade server slots can be preassigned to service profiles so that a server is configured as soon as it is inserted in its slot. After a virtualization pool is established, Cisco UCS Manager and VMware vSphere software work together to make virtual machine deployment fast and consistent, with network policies predetermined through port profiles that are visible through VMware vSphere port groups.

Secure Virtualized Applications

Security has been a concern that has prevented organizations from moving all their applications to virtualized environments. Until now, administrators have been forced to adopt security policies that are often not as strict as desired to facilitate virtual machine mobility. Today, Cisco and VMware are unique in the industry in providing the capability to establish per-virtual machine network security and QoS policies and to keep them associated with virtual machines as they move from one physical server to another. The combination of Cisco VN-Link technology and VMware vShield Zones enforces security policies in the shared environment while maintaining trust and network segmentation of users and sensitive data.

Increased Application Performance

The Cisco Unified Computing System and VMware vSphere combined solution increases application performance significantly over other similar solutions, achieving the industry-leading performance with a VMware VMmark benchmark score of 35.83. The combination of streamlined VMware vSphere vCompute, vStorage, and vNetwork components with Cisco Unified Computing System help increase application performance:

- VMware vCompute uses the Cisco Unified Computing System's Intel Xeon processors to deliver more of the processor's power to applications. The fact that Cisco set an industry-leading benchmark score for the VMware VMmark benchmark testifies to the power of the combined solution.
- VMware vStorage uses the VMware Virtual Machine File System (VMFS), a high-performance, clustered file system that reduces the complexity of storage hardware for applications. VMFS allows efficient sharing and controls concurrent access to storage by

virtualized servers. Thin provisioning allows storage purchases to be deferred until they are really needed, helping reduce storage spending by up to 50 percent. Storage access is an integral part of the Cisco Unified Computing System, providing high-speed access to shared storage over IP networks or FCoE.

- VMware vNetwork establishes interfaces to support digital virtual switches, and the Cisco Nexus 1000V Switch is the first third-party product available. The Distributed Virtual Switch (DVS) interface simplifies and enhances the provisioning, administration, and control of virtual machine networking in VMware vSphere environments, including control over security and QoS on a per-virtual machine basis. When VN-Link in hardware is implemented through the use of Cisco virtual interface cards, greater network throughput can be achieved with fewer CPU cycles devoted to switching.
- VMware vCenter includes VMware vCenter CapacityIQ to size application workloads based on performance requirements; VMware vCenter AppSpeed for application-aware performance monitoring and management; and VMware DRS to provide the maximum amount of resources to high-priority applications when needed.

Improved Application Availability

The combined solution provides exceptional application availability by facilitating planned downtime and reducing the effects of unplanned downtime.

- **Planned Downtime:** VMware VMotion eliminates the need to schedule application downtime for planned physical server maintenance, instead providing live migration of virtual machines to other servers with no disruption to users or loss of service, and with Cisco VN-Link technology moving network security and QoS attributes and policies with the virtual machines. VMware Storage VMotion performs live migration of virtual machine disks with no disruption to users or loss of service. The low latency and high bandwidth of the Cisco Unified Computing System unified fabric contributes to the performance of VMware Storage VMotion.

- **Unplanned Downtime**: VMware High Availability (HA) provides cost-effective, automated restart within minutes for all applications in the event of a hardware or operating system failure. VMware Fault Tolerance (FT) provides continuous availability, without any data loss or downtime, for any application. The low-latency nature of the 10Gbps unified fabric supports the demands of state synchronization with ease.

Improved Business Continuity

VMware vCenter Site Recovery Manager (SRM) automates data center failover to a remote site in the event of a disaster, and Cisco service profiles can be used to quickly reproduce the physical infrastructure at the remote site, reducing the chance of error. Cisco service profiles contribute to the ease of failback by automating server configuration on a new or repaired physical infrastructure. After the original infrastructure is restored, VMware vCenter SRM moves the virtual machines in a predetermined order.

Conclusion

Together, the Cisco Unified Computing System and VMware vSphere software speed application deployment through flexible resource pools that can quickly adapt to secure applications and improve availability with fewer points of management and less cost, eliminating barriers to virtualizing even the most mission-critical applications. Integration of the Cisco Unified Computing System and VMware vSphere software provides click-of-the-mouse simplicity augmented by role- and policy-based management that fosters better communication between administrative domains while automating and streamlining application and infrastructure deployment. The innovative Cisco VN-Link technology and its first hardware-accelerated implementation enables organizations to manage security and QoS on a per-virtual machine basis, increasing throughput by up to 30 percent to reduce costs. Cisco VN-Link technology, combined with VMware DRS, balances workloads across a pool of resources with enhanced mobility and security, increasing utilization and ROI while maintaining service levels. The stateless design of the Cisco Unified Computing System further enhances mobility by simplifying the movement of application server profiles to physically different servers.

The benefits of the VMware and Cisco combined solution are unique in the industry today, avoiding the limitations inherent in servers with older architectures, which struggle to support virtualization initiatives. By using the Cisco and VMware solution, you can dramatically reduce the fixed costs of your data center to free badly needed funds for investment in strategic data center initiatives that support the demands of the business. The alliance between Cisco and VMware delivers an innovative, secure, high-performance solution specifically designed to simplify infrastructure while increasing virtualization benefits.

For More Information

Please visit http://www.cisco.com/go/vmware.

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