SOLUTION PROFILE

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Inspire the Next

Maximize the Value of Your Virtualized Data Center

A Certified, Validated and Tested Architecture for VMware from Cisco and Hitachi Data Systems

Virtualized data center infrastructures demand a solid foundation that delivers scale, resilience, flexibility and efficiency. Hitachi and Cisco, today's leading advocates of data center infrastructure virtualization, have teamed to develop a blueprint for large-scale data center virtualization that satisfies these demands. Hitachi Unified Compute Platform Select for VMware vSphere with Cisco® UCS gives you an integrated stack of certified, validated and tested compute, network and storage components. Use this solution to design and build a virtualized data center infrastructure that lowers capital and operating expenses and delivers the highest performance, availability and efficiency in the industry.

Scalability and High Performance in a Single Footprint

Hitachi Unified Compute Platform (UCP) Select for VMware vSphere with Cisco UCS is a complete, end-to-end reference stack for VMware vSphere 5 that delivers the highest performance, availability and efficiency in the industry. It uses industry-leading components from Hitachi and Cisco, and is designed around Hitachi Virtual Storage Platform (VSP), Cisco Unified Fabric network and Cisco Unified Computing System (UCS). These compute, network and storage resources are natively integrated with VMware vSphere 5, creating a simple, flexible and cost-effective parts list for in-house deployment of your virtualized data center architecture.

Hitachi Virtual Storage Platform is natively integrated with the vSphere 5 API engine and is the only storage system in the industry to offer a 100% data availability warranty. Native integration means multiple VMware ESXi servers can offload workloads, such as VMotion, to the Hitachi storage controller. This frees resources on the server, reduces traffic on the network and dramatically improves infrastructure efficiency.

A certified end-to-end reference stack for VMware vSphere 5 from Hitachi and Cisco brings unequaled value to the virtualized data center.

Using only tested and validated components, UCP Select for VMware vSphere with Cisco UCS reduces the risk of introducing new technologies to your data center. Each component is certified for interoperability. This gives you the confidence to size the infrastructure to satisfy today's requirements and the assurance of growing incrementally as needs change.

UCP Select for VMware vSphere with Cisco UCS: Advantages

UCP Select for VMware vSphere with Cisco UCS is composed of Hitachi Virtual Storage Platform, Cisco Unified Fabric and Cisco Unified Computing System (see Figure 1). In joining forces, Hitachi and Cisco have created an architecture that offers unequaled value in the virtualized data center. The solution provides you with:

- **Easy-to-Design, Easy-to-Build VMware Infrastructure.** UCP Select for VMware vSphere with Cisco UCS adheres to all best practices for native vSphere 5 integration. This enables in-house IT experts to quickly and easily configure and deploy an infrastructure to service VMware, eliminating the need for complex, proprietary hardware integration.
- **Cloud-Ready Flexibility.** UCP Select for VMware vSphere with Cisco UCS sizes resources to match demand and dynamically adjusts to accommodate changing infrastructure needs. This gives you the flexibility, scalability and performance required to support private, public and hybrid cloud-based delivery of business workloads.
- **High-Density Consolidation of Tier 1 Applications.** Hitachi Virtual Storage Platform natively supports VMware vStorage API for Array Integration (VAAI) in vSphere 5. This lets VMware ESX servers offload I/O-intensive workloads, like vMotion, to the Hitachi storage controller. Together with increases in VMware vSphere 5 Virtual Machine File System 5 (VMFS-5) LUN capacity, this enables high-density consolidation of virtual machines (VMs) on Cisco UCS servers.

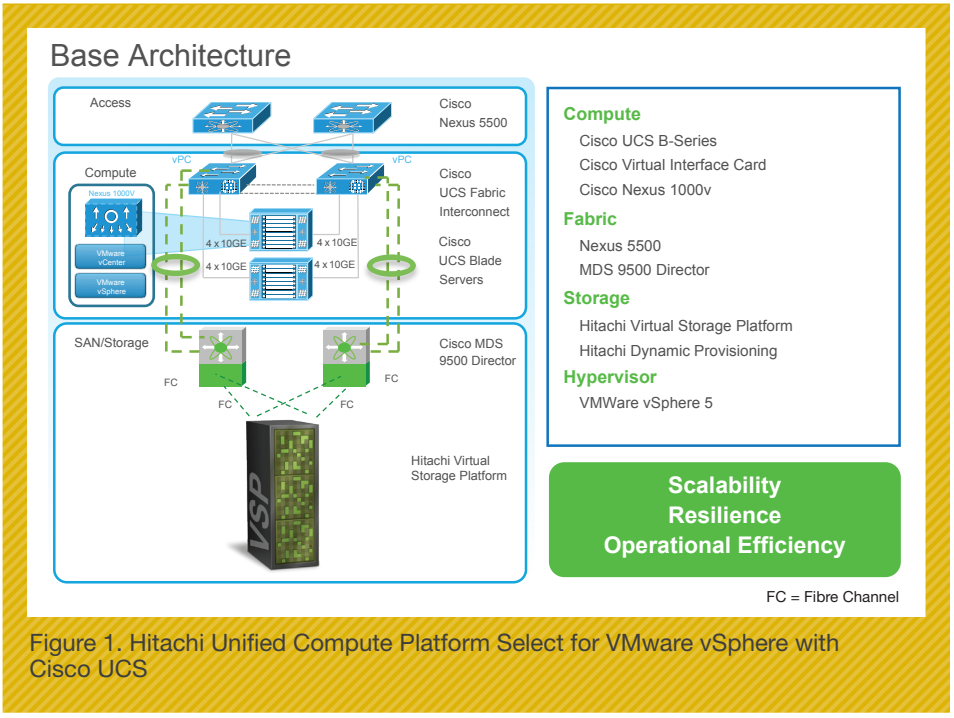

Figure 1. Hitachi Unified Compute Platform Select for VMware vSphere with Cisco UCS

- **Scalability.** UCP Select for VMware vSphere with Cisco UCS components provide the scalability to accommodate dynamically changing workloads. Hitachi Virtual Storage Platform uniquely delivers 3-dimensional scaling: up, out and deep. In addition, the Hitachi controller virtualizes multivendor storage systems, which gives older technologies access to the controller's advanced features. This includes native support for vSphere 5 APIs. Cisco virtual network adapters, embedded in Cisco UCS, combine with flexible unified port configuration and innovative fabric extender technology to ensure consistent, best-in-class network performance and reliability, even as new workloads are added.
- **No Single Point of Failure.** UCP Select for VMware vSphere with Cisco UCS contains no single points of failure. The Cisco Unified Fabric uses multiple, fully redundant SAN data paths dynamically, without the need for fine-grained SAN management. Hitachi Virtual Storage Platform is the industry's most robust enterprise-class storage system and benefits from a fully redundant switching architecture.
- **High Performance.** Each component of UCP Select for VMware vSphere with Cisco UCS is designed for high performance. Built on the Hitachi 5th-generation Hi-Star™ crossbar switch architecture, Hitachi Virtual Storage Platform is the industry's highest performing storage architecture. Cisco UCS servers continually raise the bar on performance, with over 60 new record-setting benchmark studies in the past 3 years alone. Cisco UCS Unified Fabric delivers low-latency, lossless 10Gb/sec Ethernet connectivity.
- **Reduce, Reuse, Recycle.** Hitachi storage virtualization technology coupled with Hitachi Dynamic Provisioning reduces the storage needed for each VM and eliminates the need to manage many small VMFS volumes. Older modular storage systems virtualized by the Hitachi controller inherit support for native vSphere 5 APIs. This extends their useful lifespan in the virtualized data center.

Quality Components in a Tested and Validated Framework

The value of UCP Select for VMware vSphere with Cisco UCS is enhanced by the quality of the companies and technologies involved and the level of interoperability

testing performed to achieve validation. Hitachi and Cisco set the standard for technology leadership and high customer satisfaction. The 2 companies have tested and qualified all Hitachi storage platforms, from Hitachi Adaptable Modular Storage 2100 through Hitachi Virtual Storage Platform, on the Cisco UCS server platform. Over 90 combinations of operating system, host bus adapter (HBA), storage and networking components have been tested. Every component of the reference architecture benefits from innovative design and advanced feature sets, which are specifically geared to address critical business needs.

Hitachi Storage

Hitachi Virtual Storage Platform is the most intelligent and powerful enterprise storage system in the industry. Based on the Hi-Star crossbar switch architecture, Virtual Storage Platform supports massive scalability, up to 192GB/sec aggregate internal bandwidth, 255PB of internal and external storage and up to 1TB of directly addressable cache.

Hitachi Virtual Storage Platform emphasizes high availability, with capabilities that include: heterogeneous asynchronous remote replication over any distance; copy-on-write snapshots; nondisruptive microcode and hardware updates; automatic failover with redundant, hot-swappable components; dual data and control paths connecting every component; active-active dual-ported disk drives; and mirrored cache for all write data.

Differentiating features of Hitachi Virtual Storage Platform include:

- **The Industry's Only 3-D Scaling Storage System.** 3-D scaling is the unique ability of Virtual Storage Platform to scale in 3 dimensions: up, out, and deep. Scale up to 192GB/sec aggregate internal bandwidth, up to 2,048 SAS 2.5 in. drives or 1,280 SATA 3.5 in. drives and 256 flash drives. Combine multiple Virtual Storage Platform systems in a single logical unit for scale out. Extend advanced functionality of the controller to up to 120 virtualized 3rd-party storage systems to scale deep.
- **Industry-leading Storage Virtualization.** Hitachi Virtual Storage Platform is able to virtualize multivendor storage systems, letting them inherit the advanced features of the Hitachi storage controller. For VMware infrastructures, this means giving new life to storage systems incompatible with VMware vSphere 5. Hitachi Dynamic Provisioning virtualizes the controller's RAID arrays, enabling just-in-time provisioning of disk resources and optimal use of available capacity.
- **Native support for VMware vStorage API for Array Integration (VAAI).** VAAI is a set of vSphere 5 primitives for offloading data-related processing from ESX servers. This frees host resources to support higher-density VM deployments. Virtual Storage Platform offers native support for VAAI APIs, increasing performance and availability for all UCP Select for VMware vSphere with Cisco UCS components and enabling any 3rd-party tools that support vSphere 5 VAAI APIs (see Figure 2).

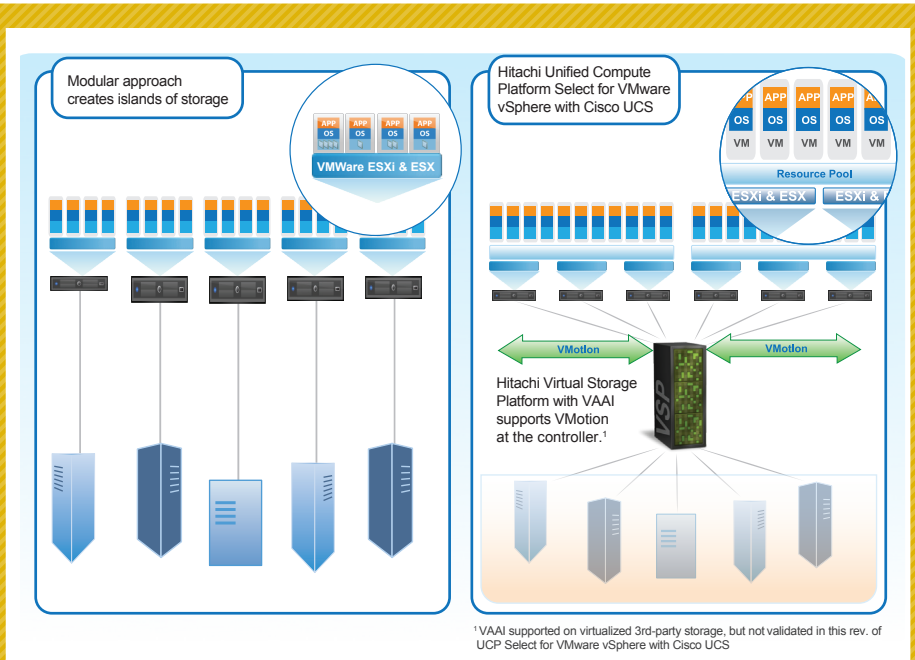

Figure 2. Hitachi Virtual Storage Platform integrates natively with VMware vStorage API for Array Integration (VAAI), delivering scalability, flexibility, availability and management simplicity advantages.

Cisco Infrastructure

The Cisco Unified Fabric and Cisco Unified Computing System (UCS) are pillars of the Cisco Unified Data Center. UCS unites compute, storage, network and management resources to simplify IT operations and deliver comprehensive optimization for virtualized environments. Cisco UCS and Unified Fabric components include:

- Low-latency, lossless 10 Gigabit per second Ethernet (Gb/sec Ethernet) unified network fabric.
- High-performance blade- or rack-mounted x86-architecture servers powered by Intel Xeon processors.
- Cisco Intelligent Automation for Cloud (CIAC), a self-service provisioning and orchestration solution for cloud computing and data center automation; it enables secure, on-demand and highly automated operations for virtual and physical infrastructures across compute, network, storage and applications.
- Line-rate, low-latency, lossless, 10Gb/sec Ethernet fabric interconnect switches.
- I/O modules (fabric extenders), which provide up to sixteen 10Gb/sec Ethernet connections between the UCS blade chassis and fabric interconnects.
- Myriad network adapters, including adapters optimized for virtualization, converged network adapters (CNAs) for access to the unified fabric and compatibility with existing driver stacks, Fibre Channel HBAs and high-performance Ethernet adapters.
- Embedded centralized management for up to 20 UCS blade chassis and 160 blade servers in a single compute domain.
- The UCS fabric computing architecture, which eliminates the need for multiple sets of adapters, cables and switches, per blade chassis, for LANs, SANs and

high-performance computing networks; this lowers data center total cost of ownership (TCO) and increases business agility.

The Cisco Nexus Family includes a virtual services appliance, virtual switch, fabric extender and a choice of physical switches. Cisco MDS 9500 Family of Multilayer Fabric Switches, directors and SAN management software provide industry-leading availability, scalability, security and management in an integrated multiprotocol platform.

Cisco UCS provides a low-latency, lossless, virtualization-aware network to carry all VM traffic. Security isolation, visibility and control are equivalent to a physical network. Fabric extenders pass network traffic to parent fabric interconnects, where it is centrally processed and managed. The Unified Fabric design allows dynamic changes in I/O configuration, without the need to install adapters or recable racks and switches.

A simplified and secure infrastructure, Cisco UCS delivers advanced features, such as virtual storage area networks (VSANs), link encryption and port channels. These allow administrators to logically, securely and functionally partition a single physical LAN or SAN fabric or switch into multiple domains, each with its own security policies and fabric services. At the same time they can use load-sharing technology to optimize link utilization. Together, these features give significantly improved network flexibility to support greater business agility.

VMware Virtualization Platform

VMware vSphere is the industry's most complete virtualization platform. VMware vSphere infrastructure services transform IT hardware into a high-performance shared-computing resource, with application services that help IT organizations deliver the highest levels of availability, security and scalability.

vSphere enables IT organizations to delay costly and disruptive data center expansion projects by consolidating multiple VMs on a single physical server without sacrificing performance or throughput. Administrators use vSphere to create powerful, multicore VMs and VM clusters that span multiple physical servers to support even the most demanding application workloads. Comprehensive virtualization of server, storage and networking hardware significantly reduces management complexity.

VMware vCenter Server provides a scalable and extensible platform for proactive virtualization management. The VMware vCenter Server platform includes components that work together to give the enterprise a scalable virtualization management hub. Management servers provide central management points for hosts and VMs. Inventory and performance information is stored in a database, and agents provide connectivity between the host and management server.

A Cloud-Ready Infrastructure

Fast-growing volumes of information and increasing data center complexity are spurring many organizations to look for flexible, scalable and reliable ways to deliver IT services on demand. Cloud solutions are an enticing option, with characteristics that include self-service, pay-per-use and the ability to dynamically scale resources as needed. Implementing a fully virtualized architecture is an important first step toward deploying private clouds within the company data center, public clouds that provide general access to data in a publicly hosted facility, or hybrid clouds with the capabilities of both public and private.

Hitachi Unified Compute Platform Select for VMware vSphere with Cisco UCS is the ultimate foundation for cloud computing. A validated reference architecture, it supports predictable, low-risk cloud deployment and abstracts the underlying infrastructure from applications and information. Cloud solutions built on UCP Select for VMware vSphere with Cisco UCS offer improved agility, increased efficiency and reduced cost of delivery.

Accelerate Data Center Transformation

As the data center transitions from a cost center to a business-enablement resource, IT organizations require technologies that respond quickly to business needs while reducing costs and increasing efficiencies. They also need vendors, who provide the assurance that their products will work together, so new technologies can be integrated into the data center quickly and safely. UCP Select for VMware vSphere with Cisco UCS offers a collaborative, tested, comprehensive, cloud-ready solution framework. This solution demonstrates a long-term commitment to helping you design and build the data center that provides the flexibility to satisfy your organization's needs today and the scalability to meet its challenges tomorrow.

For More Information

For more information about Hitachi Virtual Storage Platform, visit: www.HDS.com.

For more information about the Cisco UCS, visit: http://www.cisco.com/go/ucs.

For more information about the Cisco Nexus Switches, visit: http://www.cisco.com/go/nexus.

For more information about the Cisco MDS 9500 Family, visit: http://www.cisco.com/go/mds.

For information about VMware products, visit: www.VMware.com/products.

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