Strategic Alliance Partner

Simplified Data Center Architecture to Meet Complex, Changing Business Requirements

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Contents

Corporate Headquarters:
Cisco Systems, Inc., 170 West Tasman Drive, San Jose, CA 95134-1706 USA

Executive Summary

Enterprises have always been challenged with shifting priorities, such as the following: how to do more with less, how to reduce costs, how to pace with rapid growth, and how to remain secure and available. The difficulty for an enterprise is in attempting to shift its IT infrastructure to accommodate the cyclical changes in economic climate. The plans and actions required for one enterprise IT are not always correct for another. Cisco and NetApp have partnered to deliver a comprehensive solution that allows enterprise IT to choose one data center infrastructure that seamlessly shift and adapt to those cyclical challenges. Ultimately, the unified data center provides the following benefits:

- Reduced capital and operating costs
- Increased business agility
- Increased business resilience

Cisco's Unified Computing System simplifies the way servers, networks, storage, and applications are deployed. Cisco Unified Computing System consolidates the compute resources, cabling, and I/O of the traditional server, network, and storage networking components. This simplification, coupled with NetApp's consolidated data management and storage platforms offers enterprise IT the savings, flexibility, and modularity to meet any challenge the enterprise encounter.

This document details the challenges that enterprise IT faces, and the Cisco and NetApp technologies and products used to design a unified architecture to tackle those enterprise IT challenges.

Introduction

Data center design is at an evolutionary crossroad. Massive data growth, challenging economic conditions, and the physical limitations of power, heat, and space are exerting extreme pressure on IT staffs. Finding architectures that can take cost, complexity, and associated risk out of the data center while improving service levels has become a major objective for most enterprises.

Specifically, data center IT staff must address the following data center challenges:

- Improve asset utilization to reduce or defer capital expenses
- Make data and resources available in real-time to provide flexibility and alignment with current and future business needs
- Reduce power and cooling consumption to cut costs and align with green business practices
- Reduce deployment time for enterprise applications

The following sections highlight each of these challenges and offer solutions developed by Cisco and NetApp.

Evolution to the Unified Data Center

IT challenges are always present. Today, due to cyclical economic shifts, IT is focused on cost reduction. In tomorrow's economy, the challenge may be keeping pace with rapid growth, security due to new legislation, or availability in the face of natural disaster. These are merely symptoms of a larger challenge. The larger issue is architecting an infrastructure and service delivery system that enables the data center to respond to present and future challenges seamlessly, while being fully prepared to shift to the next challenge, without disruption.

This new architecture for simplified, consolidated resources and management does not come at the price of having to change the enterprise's existing business process. Each portion of the resource stack from applications to servers, network, and storage can still be managed by the groups currently tasked with those functions, with all the current safeguards the business requires.

The move toward server virtualization and consolidation is causing modifications in the way that data centers are being architected, built, and managed. A unified Cisco and NetApp solution addresses the broader data center challenges including helping the enterprise IT get power, cooling, cabling, and space utilization under cost control, as well as increasing compute and virtual machine capability, agility, and resiliency.

Cost Reduction

Current data center architectures are built around complex, disparate server and storage systems. Deploying dissimilar server, SAN, and network solutions, each with its own platform and management, results in a separation of infrastructures. As projects and business units are developed to support business goals in a traditional data center, the majority share of IT spend is generally invested in the application, database, compute servers, IP networking, storage networking, and raw storage. Each of these separate infrastructures brings the potential for underutilized and captive resources, requiring multiple provisioning toolsets, a variety of data management models, and different teams of people.

Recently, we have seen the beginning of a trend to increase these efficiencies at the server level, by introducing server virtualization technologies; enterprise data centers have been able to recover some lost compute utilization. This single point virtualization, while a good start, is just the beginning of potential standardization, consolidation, and further savings driven by infrastructure virtualization.

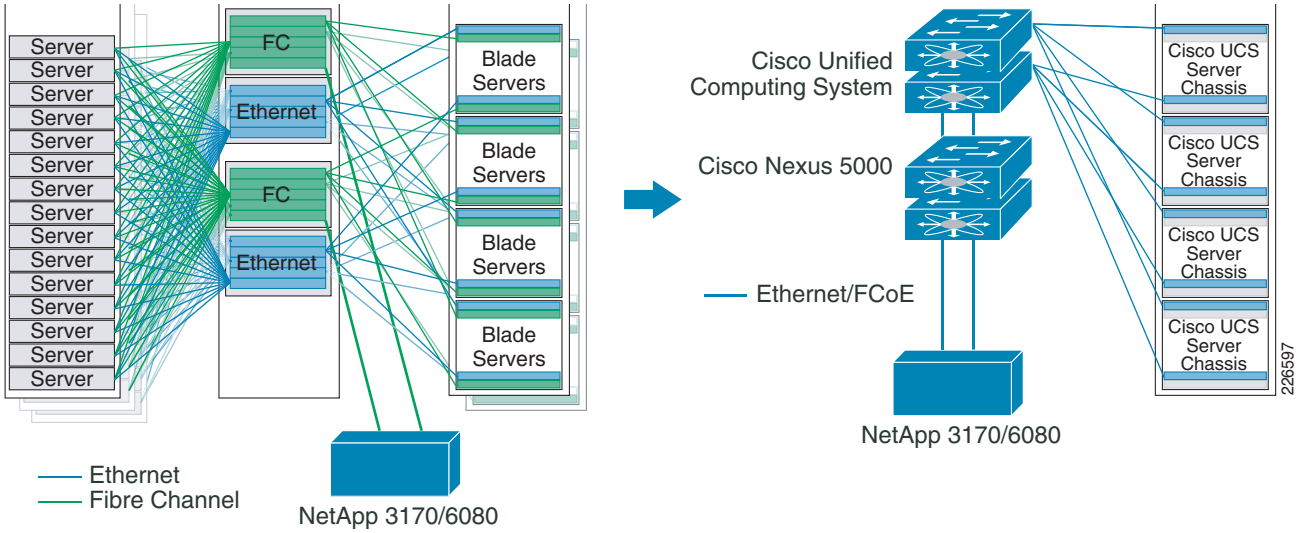
Simplify the Architecture

Cost savings begin with drastically simplifying the entire data center architecture. Cisco combined with NetApp simplifies and integrates the compute, network, and storage infrastructures into an easily managed entity.

The Cisco Unified Computing System is the first step and represents a simplification over the way that servers and networks are deployed today. It reduces the number of network access-layer switches by eliminating the switching inside the blade server chassis. It integrates compute resources around a unified I/O fabric that supports both standard Ethernet protocol as well as Fibre Channel using Fibre Channel over Ethernet (FCoE) encapsulation. The system eliminates the limitations of fixed I/O configurations with an I/O architecture that can be changed through software on a per-server basis to

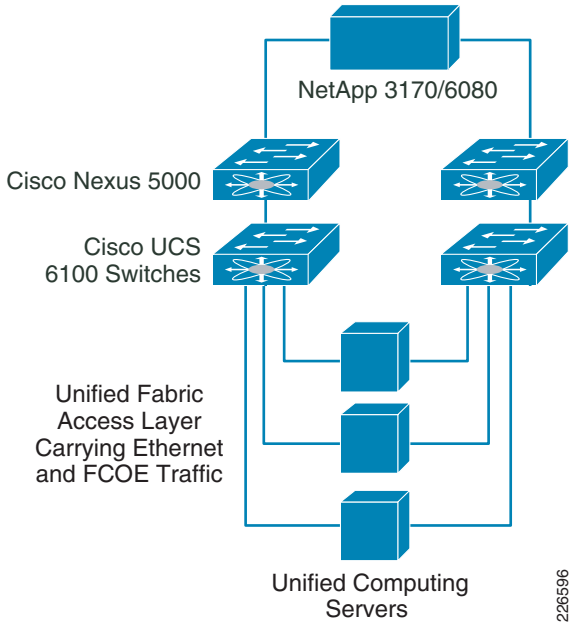
provide needed connectivity using a just-in-time deployment model. This radical simplification results in fewer switches, cables, adapters, and management points, all of which help to reduce cost, complexity, power, and cooling overhead. See Figure 1.

Figure 1 Simplified Architecture



This type of simplification continues down into the storage resources provided by NetApp. NetApp's Unified Storage architecture connects directly to Cisco's Unified Computing System using FCoE (see Figure 2). This simple, high bandwidth, multi-purpose connection further eliminates un-needed complexity in your data center. Along with the connection simplicity, you gain all the benefits of FCoE from end-to-end.

Figure 2 NetApp Unified Storage Architecture



In addition to FCoE, the Netapp Unified Storage architecture offers access to data resources via industry standard protocols, including NFS, CIFS, iSCSI, and Fibre Channel. If an enterprise's applications have unique requirements for one of these storage connectivity types, there is no need for additional complexity or hardware.

Simplify Management

Once the infrastructure has been standardized, simplified, and consolidated, the next logical step toward permanent cost reduction is to reduce the complexity associated with monitoring and provisioning. Cisco Unified Computing System (UCS) Manager unifies the system as a single, redundant, uniform pool of resources that can be configured on demand for the task at hand. The manager is embedded into the network fabric and automatically discovers resources as they are installed into the system, adds them to inventory, and can automatically provision every aspect of the servers and their I/O connectivity, putting them into use in minutes, rather than hours or days.

From a provisioning perspective, Cisco Unified Computing System resources are abstract in the sense that their identity, I/O configuration, MAC addresses and World Wide Names, firmware versions, BIOS boot order, and network attributes (including QoS settings, ACLs, PIN groups, and threshold policies) all are programmable using a just-in-time deployment model. The manager stores this identity, connectivity, and configuration information in service profiles that reside on the Cisco UCS 6100 Series Fabric Interconnect. A service profile can be applied to any resource to provision it with the characteristics required to support a specific software stack. A service profile allows server and network definitions to move within the management domain, allowing complete flexibility in the use of system resources.

In the same way that Cisco has simplified compute and network management with the Unified Computing System management interface, NetApp has delivered the unification of data storage and data management in SANScreen and Provisioning Manager. SANScreen allows for easy and comprehensive management of the storage connectivity and platforms, while Provisioning Manager continues the theme of Unified Computing System profiles, to quickly provide repeatable best practice-based deployments for attached storage.

SANscreen drives up the efficiency of storage management by extending data center automation to storage with its real-time, multiprotocol, service-level views of the data center's storage environment. This allows integration of NetApp storage in an end-to-end unified data center architecture.

Provisioning Manager speeds the creation of new storage resources and improves capacity management. Storage administrators can use Provisioning Manager's policy-based automation to create repeatable, automated provisioning processes. Like Cisco Unified Computing System profiles, these processes are faster than doing the job by hand, easier to maintain than scripts, and help minimize the risk of data loss caused by misconfiguration.

Efficiency is further enhanced by allowing for role-based access control within UCS Manager for a particular specialization that otherwise would have required purchasing a management tool for each area (SAN, network, and compute). As much as server virtualization has proven the efficiency gains for server resources, Cisco Unified Computing System offers this level of virtualization and individual control throughout the compute and network architecture. The virtualization concept flows from end-to-end, including storage. NetApp MultiStore® vFilers allow administrators to virtualize the storage management to reach previously unheard of efficiency gains. MultiStore® provides multitenancy through secure of resources so you can consolidate many applications, domains and security zones on a single array without risk. Additional benefits of this containerization include the ability to easily move applications to different NetApp arrays and providing simplicity in disaster recovery and capacity planning.

Gaining Additional Efficiency from a Consolidated Infrastructure

The Cisco Unified Computing System consolidated infrastructure offers additional benefits for NetApp data management and IT cost reduction. One of the ways Cisco Unified Computing System can be architected is using NetApp storage as both the boot mechanism for the various operating systems and as the data storage for the applications. This booting across the Unified Computing System fabric allows administrators to remove a source of traditional overhead and inefficiency. Gaining the following time and cost benefits is as easy as creating a Unified Computing System profile that points to a NetApp boot volume.

Data Deduplication

One major cost reduction tool is data deduplication (see Figure 3). The average Linux, Unix, or Windows disk volume contains thousands or even millions of duplicate data objects. NetApp deduplication technology eliminates redundant data objects and references only the original object. This results in an immediate storage space efficiency benefit.

Figure 3 Data Deduplication

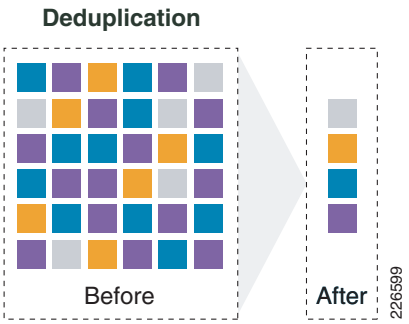


Figure 3 illustrates the deduplication process, with duplicate blocks, or objects on the left, and the result of deduplication on the right, where only one copy of duplicate objects is kept. Deduplicated blocks contain a pointer to the original.

These efficiencies reduce the initial and on-going storage acquisition costs , while also reducing the time and complexity of storage maintenance. These deduplication efficiencies extend to all NetApp storage, including remote replication and backup to virtual tape libraries. This offers the Cisco Unified Computing System administrator the ability to deploy hundreds or thousands of servers (both physical and virtual) on the Cisco Unified Computing System platform without requiring an equivalent amount of additional storage capacity. This benefit is not limited to just the deployed operating systems on the Unified Computing System platform, it also extends these efficiencies to all data created in the data center.

Zero-Cost Provisioning

Aggregating the data center's operating systems and data volumes into the NetApp Unified Storage solution allows further cost and time savings by using FlexClone technologies. FlexClone allows IT staff to create best practice-based operating system and application 'golden images' then immediately clone these during a new deployment to the Cisco Unified Computing System platform. These clones do not require any additional space until they are modified, and even then, only the modifications consume additional storage space. The savings in time, storage spend, and risk reduction are significant. Cisco Unified Computing System profiles coupled with the instant nature of FlexClones allows IT staff to deploy fully validated application environments in minutes, without wasting any precious compute or storage resources.

Thin Provisioning

Determining how much storage to allocate to applications and operating systems is a very complicated process. Once set, it can be difficult to expand this allocation; therefore, administrators typically err on the side of caution, and allocate more than is currently needed. Thin provisioning, another NetApp value-add, allows administrators to allocate the space they think the application will need over the application lifetime. However, this allocation only consumes the space used by the data, there is no wasted idle space reservation. In the Cisco Unified Computing System environment, administrators can rapidly deploy applications and even full environments without the fear of fully allocating their storage resources. This allows IT staff to fully use both their Cisco Unified Computing System compute resources and NetApp storage.

Business Agility

Customers of enterprise IT demand high-service velocity to adapt to their ever-changing business environments. A Cisco and NetApp unified infrastructure solution reduces the time to service customers, whether it is adding new storage, new servers, or rapidly redeploying existing resources to meet growth or strategic changes. Customers need their information infrastructure to be agile enough to respond quickly to changing business needs and service levels.

On Cisco's Unified Computing System, service profiles not only decrease operational costs but also increase business agility by quickly aligning computing resources with rapidly changing business and workload requirements. They can be applied to any compute and network resource within the management domain which creates a highly dynamic environment that can be molded to suit rapidly changing needs in today's data centers. In addition, profiles can be created once, using best practices, and then deployed many times. This templating allows an organization to bypass the research due-diligence typically required with each new change, since it has already been completed once and verified. All workloads become truly portable, whether virtualized or not. IT organizations can quickly adapt to changing business requirements or workload fluctuations by just-in-time provisioning of resources to meet changing needs. Timeliness and accuracy is increased through consistent and automatic deployment of configuration settings.

When Cisco Unified Computing System profiles are combined with several agility features resident on the NetApp supplied storage, the velocity of changes is dramatically increased. Rapid cloning, combined with thin provisioning and deduplication, allows an administrator to a create full application environment in minutes at a scale from one to thousands. Rapid change is also more feasible in a combined NetApp and Unified Computing System environment, since the cost associated with creating and decommissioning environments for projects is negligible. All unused resources are immediately released back into the pool for new projects to use. Most of these features can be accomplished with a simple series of clicks, everything from the zero-cost cloning of large numbers of virtual servers, tiered-storage creation, and data access control.

Agility in a combined Cisco and NetApp architecture extends beyond the tactical and into the strategic planning of an enterprise. Enterprises gain the ability to non-disruptively scale up or scale out their infrastructure as it is needed. Combining pooled resources, with the monitoring capabilities of Cisco Unified Computing System and NetApp Provisioning Manger, capacity planners have all the information they need to make sound strategic decisions.

Business Resilience

Assuring the constant availability of information resources has gained an even higher level of necessity with the new focus on a globalized workforce, and the enabling technologies backing the Web 2.0 trend. No longer is a 2-to-4 AM maintenance window acceptable, since that time will be disruptive to a portion of the workforce somewhere. Additionally, Web 2.0 technologies require that resources be available 24/7/365 to enable the rich interaction between the disparate information sources that are driving the efficiency gains from this technology.

Cisco's Unified Computing System coupled with NetApp storage not only saves cost and increases business agility, it also is a critical solution for keeping an enterprise operational. The fully redundant, scalable, and investment-protecting design enhances business resiliency by tightly integrating into various high availability technologies across the entire infrastructure. From a compute and network perspective, this includes redundant power supplies, network fabric interconnects, and the ability to migrate virtual machines dynamically and maintain their state with system profiles.

NetApp storage builds upon the compute and network resiliency of the Cisco Unified Computing System design. Local availability of resources and data are enhanced through several NetApp technologies including active-active storage controllers, RAID-DP, and clustering technologies. These features assure that no controller, disk, or system failure will result in unplanned downtime.

Consistency of application data is the key aspect of NetApp functionality. Features such as Snapshot, SnapVault, and SnapLock allow low-cost instant point-in-time copies of enterprise data, with the ability to mark data as unalterable. These and other NetApp features ensure an enterprise's data is always available and has the integrity required for peace of mind or legal compliance. These features are available to be seamlessly integrated directly into enterprise applications such as Oracle, Microsoft Exchange, SAP, and many more. This integration allows administrators to create their application environment once, deploy it using Cisco Unified Computing System profiles, and achieve data resilience without additional planning or workload.

Data backup is another critical component in availability and integrity. In a consolidated environment like Cisco Unified Computing System, tape-based backup can no longer keep pace with the volume of data and the uptime requirements. NetApp Virtual Tape Libraries (VTL) can attach directly into the Cisco Unified Computing System environment, and offer up to ten petabytes of backup storage.

Enterprise class resilience goes beyond local availability—true high availability requires geographic redundancy. Geographic redundancy is another solution where NetApp brings a significant value to a Cisco Unified Computing System environment. NetApp storage can be used to connect Unified Computing System environments that are separated by distance. MetroCluster is a unique solution that combines array-based clustering with synchronous mirroring to deliver continuous availability and zero data loss. This allows Cisco Unified Computing System compute resources to offer continuous availability, reduce the impact of change management, and protect against site-based downtime. MetroCluster is just one of many data protection features available to the Cisco Unified Computing System environment.

Unleashing the Power of Applications in a Virtualized Data Center

This section discusses how the solution benefits can be realized with widely used enterprise applications such as Microsoft Exchange.

Messaging is a key enterprise application. Users rely on it heavily and it has fundamentally changed how business is conducted. Microsoft Exchange supports a vital part of a company's operation; therefore, it is expected to be always available. Messaging environments must be efficiently maintained as any interruption in service impacts employee productivity, collaboration, business operations, and ultimately revenue.

Cisco and NetApp have developed an extensive portfolio of solutions for Exchange 2007 that can address these business requirements. By bringing together compute, network, and storage into one cohesive virtualized entity, Microsoft Exchange 2007 roles can be deployed and modified rapidly, while providing maximum availability should a planned or unplanned outage occurs.

The following is a traditional use case scenario:

Step 1 Exchange administrator determines CPU, storage, memory needs for various server roles.

Step 2 Server administrator allocates *X* CPU time or *X* servers of a specific type.

Step 3 Server administrator allocates *X* GB of memory.

Step 4 Storage administrator allocates *X* GB of storage capacity, often over provisioning resulting in unnecessary costs.

Step 5 Network administrator assigns VLAN, IP subnet information, and passes on to the server administrator.

Step 6 Each area is sanity checked independently to verify operation.

Step 7 If Exchange administrator needs to make system changes, the process repeats itself which is time consuming, uses resources inefficiently, and lacks agility.

Step 8 Time to deploy: days or weeks.

The following is a Cisco and NetApp unified data center solution:

Step 1 Exchange administrator determines storage and memory needs for various server roles.

Step 2 Cisco Unified Computing System, application, and storage administrators collaboratively discuss requirements and develop a series of profiles to be deployed through the Cisco UCS Manager.

Step 3 All requirements (storage, memory, and networking) are deployed with a series of mouse clicks without having to wait for other subject-matter experts to provision.

Step 4 No wasted resources; all CPU, network, memory, and storage are allocated on a just-in-time basis.

Step 5 Any requirement changes can be done through the profiles and rapidly redeployed through Cisco Unified Computing System or NetApp.

Step 6 Additional deployments can follow the same validated profiles and can be deployed in minutes.

Step 7 Time to deploy: hours or minutes.

This use case illustrates how the combined solution of the Cisco Unified Computing System and NetAPP Unified Storage can provide benefit in all three major challenges in IT.

Cost Reduction in Exchange 2007

In a typical Microsoft Exchange 2007 deployment, the resources (servers and storage) would be siloed, with a large amount of underutilization and over-provisioned storage for mailboxes, logs, and the operating system. Because it is quite laborious in most environments to change resource requirements after the initial provisioning, this results in a wasted storage space that could be allocated to another function. Additionally, storage management features on the NetApp storage allow these volumes to be thinly provisioned, and deduplicated allowing for growth based on actual use, not initial estimates.

With Cisco and NetApp, substantial cost savings can be achieved for Exchange by eliminating the extensive storage requirements and allowing dynamic changes as business needs present themselves. Cisco UCS Manager can facilitate this dynamic provisioning by providing a single view into an enterprise's entire infrastructure.

Business Agility in Exchange 2007

Once an Exchange environment is created using Cisco Unified Computing System profiles and NetApp Provisioning Manager, IT staff can deploy new Exchange installations in minutes. All of the time spent in gathering best practices, architecting the deployment, and validating the installation has already been done. Both NetApp and Cisco can effectively aggregate resources that quickly and flexibly allocates them for improved business responsiveness. Server and storage resources can be dynamically allocated to the defined service profile, allowing IT staff to manage the system at a higher level of abstraction.

The use of virtualization on the Cisco Unified Computing System platform further enhances business agility. For example, using virtual machines allows the user population to be split into multiple smaller Exchange mailbox virtual machines without requiring additional server hardware. Each mailbox virtual machine can then be configured with its own unique design requirements. Once again, the virtual machine settings can be captured in a service profile that can quickly be modified or redeployed as needed. Now, every time a new Exchange environment needs to be created due to company growth or acquisition, it is just a few clicks away.

Business Resilience in Exchange 2007

The Cisco and NetApp solution brings several layers of resiliency to Microsoft Exchange 2007. From a Cisco Unified Computing System perspective, any Microsoft Exchange 2007 role (CAS, hub, mailbox) can be moved between servers through dynamic provisioning. If an Exchange server fails, the software stack can be rebooted onto an exact replica including external network connectivity of the failed server. If an upgrade is needed, a new server with more resources can be provisioned with the same Exchange settings. For example, a CAS may be moved from a server with 72 GB of main memory to one with 384 GB of main memory with a simple reboot onto a just-in-time provisioned server having the same identity as the original.

For details about the Microsoft Exchange 2007 roles, refer to *Integrating Microsoft Exchange Server 2007 in a Cisco Multisite Data Center Design* at the following URL:

http://www.cisco.com/en/US/docs/solutions/Verticals/mstdcmsftex.html

NetApp offers options for Exchange 2007 resiliency and recovery caused by a disaster or hardware failure. SnapMirror provides site-to-site replication from one NetApp array to another with standard IP connectivity. In addition, SnapManager for Exchange allows seamless data consistency using SnapMirror to provide multiple recovery-point objective (RPO) and recovery-time objective (RTO) options.

Building Blocks for the Unified Data Center

Cisco and NetApp have a suite of products that, when combined, enable a fully virtualized data that offers investment protection for many years to come. The following sections outline a solution set consisting of compute, network, and storage that are all unified through the Cisco Unified Computing System platform.

Cisco Unified Computing System

The Cisco Unified Computing System unites network, compute, and virtualization resources into a seamless system that simplifies server setup, improves return on investment, and enables just-in-time, dynamic resource provisioning. The Cisco Unified Computing System represents a simplification of traditional architectures, dramatically reducing the number of devices that must be purchased, cabled, configured, powered, cooled, and secured. The solution delivers end-to-end optimization designed for virtualized environments while retaining the ability to support traditional operating system and application stacks in physical environments. The Cisco Unified Computing System provides all of these benefits in a scalable, investment-protecting design that meets today's demands while being ready to accommodate future technologies.

System Overview

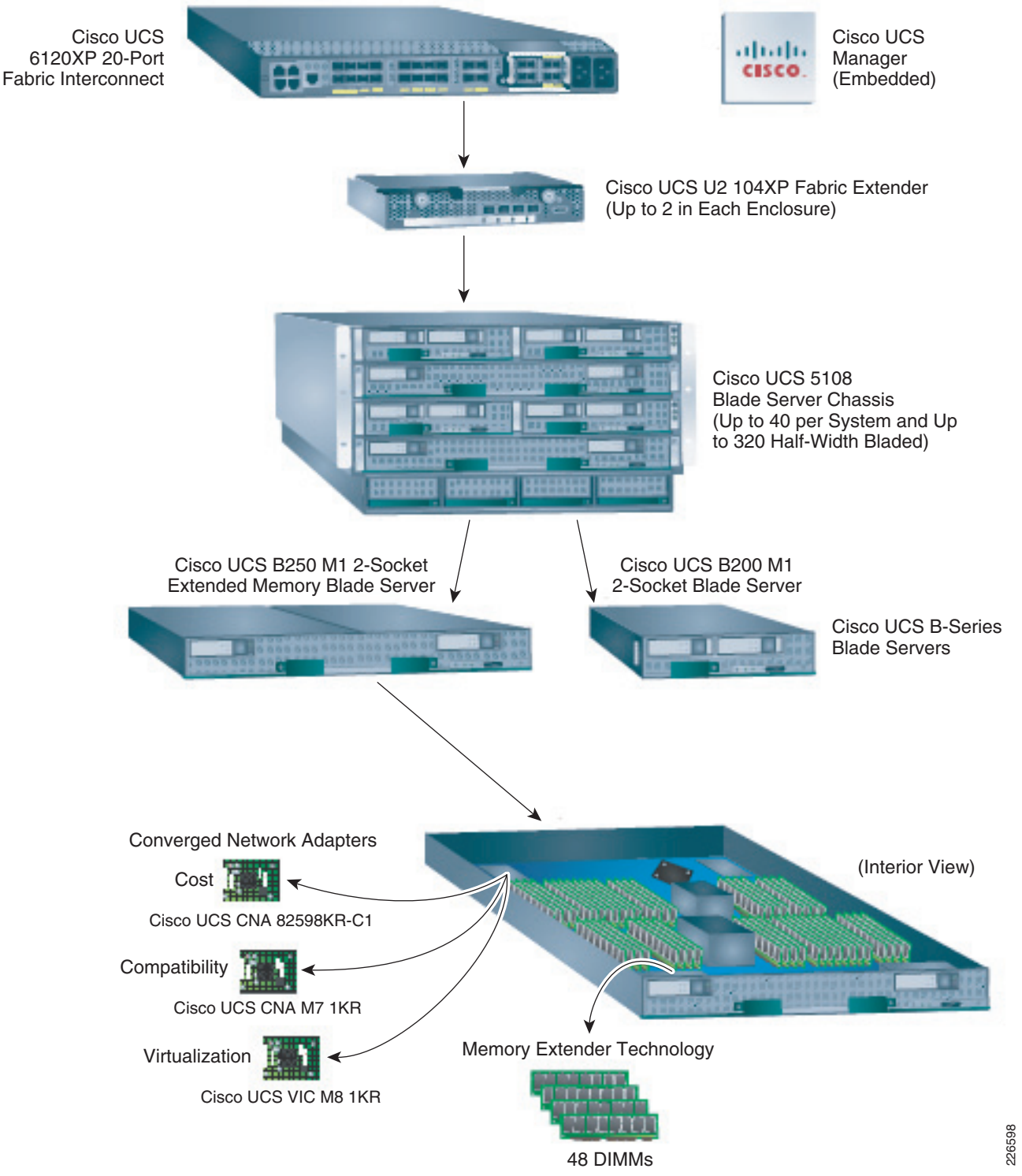
The Cisco Unified Computing System consists of one or two Cisco UCS 6100 Series Fabric Interconnects and one or more Cisco UCS 5100 Series Blade Server Chassis populated with Cisco UCS B-Series Blade Servers. Cisco UCS Manager is embedded in the fabric interconnects and it supports all server chassis as a single, redundant management domain.

Figure 4 shows the Cisco Unified Computing System components, which consist of the following:

- The unified fabric is supported by Cisco UCS6100 Series Fabric Interconnects. Figure 4 shows a Cisco UCS 6120XP Fabric Interconnect with 20 fixed ports and one expansion module slot.
- Cisco UCS Manager runs within the two Cisco UCS6100 Fabric Interconnects and manages the system as a single, unified, redundant management domain. The management software is deployed in a clustered active-passive configuration so that the management plane remains intact even if an interconnect fails.
- The unified fabric is extended to each of up to 40 blade chassis through up to two Cisco UCS 2100 Series Fabric Extenders per blade-chassis.
- Up to eight Cisco UCS B-Series Blade Servers can be installed in a Cisco UCS 5100 Series Blade Server Chassis. The chassis supports half-width and full-width blades. Cisco UCS B Series Blade Servers use Intel® Xeon® 5500 Series processors that deliver intelligent performance, automated energy efficiency, and flexible virtualization.
- Transparent access to the unified fabric is provided by one of three types of adapters in a mezzanine card form factor optimized for different purposes: low cost, compatibility with existing Fibre Channel drivers.

Cisco's memory expansion technology expands the memory footprint available to 384 GB of standard DDR-3 memory.

Figure 4 Cisco Unified Computing System Platform



For more information on Unified Computing System, refer to the following URL: http://www.cisco.com/go/unifiedcomputing.

Unified Fabric

The design goal is reasonably simple: design a single data center transport that can simultaneously transmit IP and Fibre Channel traffic over a single connection. The typical data center environment supports two to three parallel networks: one for data, one for storage, and possibly one for server clustering. In addition, servers often have dedicated interfaces for management, backup, or virtual machine live migration. Unified fabric consolidates these different types of traffic onto a single, general-purpose, high-performance, highly available network that greatly simplifies the network infrastructure and reduces costs. To do all this, a unified fabric must be intelligent enough to identify the different types of traffic, handle them appropriately and transmit them across a single link. The key components of the Unified Fabric include FCoE , lossless connectivity, and converged network adapters (CNAs).

Fibre Channel over Ethernet (FCoE)

FCoE shares both Fibre Channel and Ethernet traffic on the same physical cable over a CNA. For an enterprise that runs a data center, chances are that it uses Ethernet for TCP/IP networks and Fibre Channel for storage area networks (SANs), requiring maintenance of dual networks for separate purposes. SANs deliver well-understood value propositions, including storage consolidation, centralized storage management, high performance, reliability, and rapid reconfiguration. The advent of 10-Gigabit Ethernet lossless fabrics presents a new opportunity: being able to consolidate I/O, cables, and adapters while simultaneously increasing server utilization, reducing complexity, saving power and cooling all while maintaining management domains.

With FCoE, enterprise IT can transition to Ethernet over time, which enables the ability to capture the benefits of a converged network, including simplified management and reduced costs. NetApp supports the integration of traditional Fibre Channel storage with converged fabrics, as well as the industry's first native FCoE storage systems today. NetApp supports these two deployment models with the Unified Storage architecture, which includes multiprotocol support for Fibre Channel, iSCSI, NAS and now, FCoE on a single storage platform for a seamless transition to a fully converged fabric.

Quality of Service (QoS)

By default, Ethernet is designed to drop packets when a switch cannot sustain the pace of the incoming traffic. Packet drops make Ethernet highly flexible in managing random traffic patterns injected into the network, but they effectively make Ethernet unreliable. Fibre Channel uses buffer-to-buffer credits to manage storage traffic and provides for a lossless network. How can unreliable Ethernet be combined with reliable Fibre Channel?

Priority flow control introduced with the UCS 6100 and FCoE offers flow control of Ethernet traffic based on the industry standards. With a flow control mechanism in place, congestion does not result in drops, transforming Ethernet into a reliable lossless medium. For more detailed information on specifics QoS for FCoE, refer to the following URL:

http://www.fibrechannel.org/OVERVIEW/FCIA_SNW_FCoE_WP_Final.pdf

Converged Network Adapters (CNAs)

CNAs are at the core of providing a unified fabric across compute platforms. CNAs combine Ethernet NICs and Fibre Channel host bus adapters (HBAs), making the transition to a single, unified network fabric transparent and consistent with existing practices, management software, and operating system drivers. Both the Emulex and Qlogic CNAs are offered on theUnified Computing System platform to further facilitate the integration of FCoE into existing management procedures for HBAs.

NetApp Unified Storage

NetApp FAS6080 and FAS3170 storage platforms allow enterprises efficiently consolidate SAN, NAS, primary, and secondary storage on a single platform. These platforms have been designed from the ground up to be easy to install, configure, and manage. To help maximize staff productivity, all of NetApp's FAS systems share a unified storage architecture based on the Data ONTAP® operating system. With the FAS unified architecture, there is no longer a need to manage separate NAS, SAN, and iSCSI storage. Both can be managed in a single system with NetApp's concurrent support for block and file protocols using Ethernet and Fibre Channel interfaces.

System Overview

The NetApp FAS6080 consists of a single or dual controller enclosure attached to a maximum of 84 drive shelves. In those environments where the full power of a FAS6080 is not required, the NetApp FAS3170 allows for a maximum of 60 drive enclosures. Multiple FAS6080s or FAS3170s can be clustered for expansion and redundancy purposes.

- The FAS6080 allows the enterprise data capacity to grow as needed, offering a maximum of 1,176TB of available data storage
- Connectivity to the Cisco Unified Computing System is available through a maximum of ten 10-Gigabit Ethernet (GbE) ports, for over 100Gb of available bandwidth.
- For cases where Fibre Channel is needed, the FAS6080 supports up to eight 4-Gb Fibre Channel ports.
- The FAS6080, as in all of the NetApp FAS family, offers redundant, hot swappable components, and dual-parity RAID-DP. These combine to eliminate single point of failure.
- The FAS6080 also offers high availability features and clustering opportunities for designs that require the absolute highest level of performance and reliability.
- The FAS family offers a wide range of storage protocols, including FCoE, Fibre Channel, NFS, CIFS, and iSCSI.
- The NetApp FAS family offers many features including: Snapshot, SyncMirror, FlexVol, deduplication, and more.

If the enterprise’s data center storage needs do not require the highest level of performance, then the NetApp FAS3170 offers all of the same features that FAS6080 offers, but at a lower-price performance level. The major feature differences of the FAS3170 are as follows:

- The FAS3170 allows for up to 840TB of available data storage.
- The FAS3170 supports up to eight 10-GbE ports, and eight 4-Gb Fibre Channel ports.

Fibre Channel over Ethernet (FCoE)

To provide enterprises with increased flexibility for high-performance, data-availability, and data-management needs, NetApp offers native FCoE. This new connection technology allows the NetApp FAS to connect directly to the Cisco Unified Computing System without any additional hardware or complexity. FCoE is a logical progression of NetApp's Unified Storage approach of offering Fibre Channel, iSCSI, NFS, and CIFS in its enterprise systems.

DataONTAP

Manage enterprise's data, not hardware. Data ONTAP 7G software pools storage resources, using breakthrough thin-provisioning technology. Data ONTAP 7G provides a virtualized data environment with a simple interface that enables enterprise IT to create virtual storage volumes, make changes quickly, and achieve superior storage utilization. End-to-end NetApp deduplication is fully integrated, providing the ultimate efficiency for primary storage as well as backup and archival data.

Data ONTAP 7G includes industry-leading NetApp Snapshot™ technology as a standard feature. With Snapshot, the enterprise can protect its data and achieve rapid application recovery with minimal overhead and maximum scalability. Disk array protection is further enhanced by NetApp's innovative Double Parity RAID 6 implementation, RAID-DP™, which safeguards data from double disk failures while providing the performance that even the most demanding applications require.

Conclusion and Next Steps

The Cisco data center architecture along with NetApp storage solutions provides a holistic approach that allows the network and the applications it supports to work together in the most efficient way possible while fulfilling business needs that balance green and compute cycles. The primary goals of the Cisco Unified Computing System and NetApp partnership are to reduce TCO, improve business agility, and increase business resiliency within and between data centers.

The Cisco Unified Computing System and NetApp Unified Storage architecture simplifies the way servers, networks, storage, and applications are deployed. FCoE and Cisco Unified Computing System consolidate the compute resources, cabling, and I/O of the traditional server, network, and storage networking components. This simplification, coupled with NetApp’s consolidated data management and storage platforms offers enterprise IT the savings, flexibility, and modularity to meet any business challenge. This includes just-in-time deployment of new computing resources as well as simplified, reliable movement of traditional and virtual workloads. The Cisco and NetApp unified data center solution provides a scalable, investment-protecting system that meets future data center needs in terms of compute power, memory footprints, storage, and I/O bandwidth.

Additional References

For more information about the Cisco unified fabric and Unified Computing System, refer to the following URL: http://www.cisco.com/go/unifiedcomputing

For more information about the NetApp Unified Storage solution, refer to the following URL: http://www.netapp.com/us/products