White Paper

Cisco Unified Data Center: Redefining the Economics of Application Performance

What You Will Learn

Application performance is critical to successful business operations, employee productivity, and customer satisfaction. To attain and maintain the highest application performance, many IT departments designed their data centers using an application-centric approach, purchasing different server types with a wide range of networking capabilities to precisely match the needs of individual applications. This approach created infrastructure silos and led to costly complexities, inflexibility, and slow response to change.

This document examines how a homogeneous architecture based on the Cisco® Unified Data Center platform can help IT departments achieve the high performance they want, while simultaneously lowering their total cost of ownership (TCO) and improving their speed and agility.

High Application Performance No Longer Requires Economic Trade-Offs

In the past, the primary focus of application administrators was on delivering the best performance for a given application. They looked at an application as a single, isolated entity and, because some servers supported specific types of applications better, they often set up a dedicated server environment designed to match the requirements for that application.

This application-centric design approach had serious long-term drawbacks, however. The exclusive focus on application performance led to higher long-term data center costs and reduced IT productivity. By customizing the platform to the application, over time the typical IT data center acquired a range of different server types, each with a variety of I/O slots, operating environments, and software releases that it needed to maintain. This complexity invariably had two negative economic consequences.

First, it led to trade-offs in flexibility and responsiveness. Deployment of every application was a unique process, demanding in-depth planning, incurring the challenges and delays that come with first-time deployments, and requiring staff trained to implement different maintenance processes for each type of server. In addition, scaling the application was a challenge. Siloed server environments and management complexity create obstacles to resource sharing. Further, as the pace of change increased with the advent of virtualized data center and cloud environments, the tasks of deploying and maintaining the applications and servers took longer and introduced the second trade-off: it cost more.

For instance, challenges to resource sharing meant that administrators had to build their systems for overcapacity, incurring greater server, software licensing, and networking costs, as well as higher power, cooling, facility, and management costs. IT departments were burdened by low server utilization and a slower return on their IT investment (ROI). Server deployment and maintenance were time-consuming and error-prone processes, and virtualization of applications required significant manual integration.

The cost of this form of data center design has become prohibitive, and IT departments are seeking ways to redefine the economics of application performance. As they implement virtualized data centers and cloud computing environments and attempt to reallocate IT personnel to business-critical initiatives, the focus of

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application administrators has evolved: their goal is to find a solution that will simultaneously help ensure high application performance and lower TCO.

TERREMARK

- Improved customer application performance by 30%
- Increased availability for improved service-level agreement (SLA) performance even during maintenance tasks

The good news is that the prevalence of Intel processors across all server platforms means that IT departments now can choose from a broad range of servers offering almost identical raw CPU capability. This capability gives IT departments the freedom to standardize on a server platform and a supporting data center infrastructure that can also help ensure strong application performance for all their business critical applications.

The Cisco Unified Data Center provides organizations with the best of both worlds: a single, infrastructure that can be tailored to the needs of a specific application, and that can scale and adapt to change without creating complexity or the costs and inflexibility that are byproducts of that complexity.

One Flexible Data Center Platform for All Types of Applications

Designed specifically for virtualized and cloud environments, the Cisco Unified Data Center combines computing, storage, networking, and management in a dramatically simpler unified architecture that is optimized for virtualization and cloud computing. Using the latest Intel Xeon processor E7 family, the Cisco Unified Computing System™ (Cisco UCS®) combines servers with networking and storage access into a single converged system that delivers greater cost efficiency and agility with increased performance, visibility, and control.

Cisco UCS brings together tremendous computing power, memory, network, and I/O bandwidth in a given space while boosting performance of virtualized environments. Cisco virtual interface cards (VICs), in conjunction with Cisco Data Center Virtual Machine Fabric Extender (VM-FEX) technology, connect network interface cards (NICs) to virtual machines, maintaining network policies across virtual machine migration and improving performance by eliminating the overhead of software switching. As a result, Cisco VICs improve network throughput by up to 38 percent while freeing CPU cycles to deliver greater application performance. Each Cisco UCS blade server chassis can support up to 80 Gbps of I/O bandwidth for a half-width blade, 160 Gbps for a full-width blade, and an aggregate of 160 Gbps in a single eight-blade chassis—enough for even the most demanding applications.

Cisco Fabric Extender Technology (FEX Technology) allows IT departments to gain both the visibility and control of physical servers and the scalability of virtual environments. With fabric interconnect ports directly connected to both physical servers and virtual machines, virtual machine network traffic becomes completely transparent, secure, and under administrator control.

The integration of Cisco UCS and unified fabric allows the infrastructure to be easily tailored to the needs of a specific application, so the IT department can attain both higher application performance and a better ratio of price to performance.

For instance, the Cisco UCS high-density, high-performance design, including Cisco Extended Memory Technology, increases consolidation ratios for 2-socket servers while saving the capital, operating, real estate, and licensing costs of running virtualization software on larger, 4-socket servers. This technology optimizes the costs to deliver virtual machine computing capacity and is particularly effective at increasing ROI for virtual desktop environments and for servers that run just a single application instance but that require large memory footprints.

AVAGO

- Accelerated long-running batch processes by 30 to 40%
- Decreased operating costs by 40%

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In addition, Cisco Extended Memory Technology delivers up to 27 percent faster memory access speeds with high memory density that also saves up to 24 percent in memory costs. With support for up to 1 terabyte (TB) of memory in a 2-socket server, organizations can host applications using less-expensive servers without losing performance. Additionally, per-socket software licensing costs are reduced when a 2-socket server is used instead of a 4-socket server.

The Cisco Unified Data Center supports form-factor independence, so organizations can select the type of server—rack mount or blade—that is best for the application. Management is the same, however, for all Cisco UCS instances.

Cisco UCS can be configured to run any bare-metal or virtualized workload. Organizations can select the blade or rack servers they want and use Cisco UCS Manager to program the servers based on a specific application's requirements: for example, they can select a large-memory blade server for an application that requires a big memory database.

HAMILTON/CLERMONT COOPERATIVE ASSOCIATION

- Reduced time required for application performance enhancements from 10 minutes to 10 seconds

For proof of the Cisco Unified Data Center's ability to deliver exceptional application performance, IT departments can review more than 65 examples of world-record industry-standard benchmarks running mission-critical, enterprise-class applications on bare-metal servers, with workloads including Oracle E-Business Suite, Java application servers, and high-performance computing grids. This industry-leading performance also enables organizations to move from servers based on costly, proprietary RISC processors to Cisco UCS servers using industry-standard x86 architecture.

In addition to offering outstanding monolithic application performance, Cisco UCS is optimized for virtualized applications and cloud environments, as shown by years of performance records on the VMware VMmark 1.0 and 2.0 benchmarks that measure virtualization and cloud-computing performance. Cisco performance records include:

- Best CPU performance for 2- and 4-socket servers
- Best virtualization performance on a range of VMmark benchmarks
- Best cloud computing performance on a range of VMmark benchmarks
- Best enterprise application performance: on Oracle E-Business Suite (large, extra-large, and medium-size models), TPC-C, TPC-H, Microsoft SQL Server, and VectorWise
- Best enterprise middleware performance
- Best high-performance computing (HPC) performance

CONNECTEDU

- Accelerated application performance fivefold
- Reduced time spent provisioning new applications from 7 weeks to a few hours

Flexibility to Quickly and Cost-Effectively Respond to Changing Demands

Part of overall application performance is the capability to scale an application quickly to meet demand. In contrast to the complex, application-centric data center architecture that has been common in the past, the Cisco Unified Data Center architecture is designed to scale up, scale out, scale globally, and scale down computing and bandwidth easily and cost effectively.

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With the Cisco Unified Data Center, scaling is more graceful and efficient because the addition of the next Cisco UCS blade server chassis does not require installation of tens of thousands of dollars of new network and management infrastructure in the back of each chassis. Further, each increment of scale brings greater performance because of the proven performance of the system's core processing capability, powered by processors such as the Intel Xeon processor E7 family. The Cisco Unified Data Center creates an infrastructure that readily adapts to changes in demand, easily pooling resources when applications need more CPU power and just as easily scaling down resources when they are no longer required. The system is designed as a flexible pool of computing, networking, and storage access resources that can be allocated (and reallocated) to workloads on a just-in-time basis. This approach enhances an organization's agility and allows capacity to be managed on a strategic, organization-wide basis.

MOLINA HEALTHCARE

- 33% reduction in time to deploy new applications

With Cisco UCS, every detail of a server's configuration and its network connectivity are encapsulated in a Cisco service profile. Consequently, with Cisco UCS, rack-mount and blade servers can move from the loading dock and into production in a "plug-and-play" operation. IT departments can automatically configure blade servers using predefined policies simply by inserting the devices into an open blade chassis slot. They can integrate rack-mount servers by connecting them to top-of-rack Cisco Nexus® fabric extenders. Because policies make configuration automated and repeatable, configuration of 100 new servers is as straightforward as configuration of one server, delivering agile, cost-effective scaling.

Cisco service profiles also make migration of workloads between servers with different capacities straightforward. Spare capacity can be maintained in a pool shared by all applications and allocated on demand, reducing the cost of burst capacity and disaster-recovery resources. Consequently, this radically simplified architecture yields a massively scalable system whose complexity does not increase with size, helping contain administrative costs. All these factors together have allowed Cisco UCS customers to scale large configurations for up to 52 percent less cost.

> "We saw how we could achieve greater agility in our business applications to rapidly meet our internal customer business needs. And all of this was achievable through better utilization of our infrastructure assets without sacrificing performance, security or availability—a really big plus."
>
> —Tom Peck, Levi Strauss & Co.

Faster Time to Application Deployment

One often overlooked component of application performance is the speed at which an application can be deployed. A deployed application is delivering business value. Delays in application deployment result in slower return on IT investment and an opportunity cost to the business.

Cisco UCS automates IT in a way that no other product has accomplished, accelerating deployment, helping organizations achieve faster and greater ROI, and eliminating that opportunity cost. Cisco UCS is designed so that every aspect of server personality, configuration and connectivity can be managed through the Cisco UCS Manager software. This automation frees staff from tedious, repetitive, time-consuming chores that are often the source of errors that cause downtime, making the entire data center more cost effective. Service profiles help

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ensure IT policy consistency and compliance, allowing individual servers to be deployed effectively in fewer steps and often in half the time required in traditional environments.

Faster server deployment means faster application deployment. With computing resources grouped into pools, administrators know immediately which servers are available and best match application workload requirements. They can deploy these servers and applications easily in a safe, repeatable, agile, and cost-effective way.

> "By taking advantage of UCS' integrated fabric capabilities and unique service profiles, we've reduced power by 35 kilowatts, eliminated hundreds of LAN cables and SAN ports, and created a highly available and agile application environment to support virtualization and especially virtual machine, mobility."
>
> —Todd Eyrick, Monsanto

No Trade-Offs Required

The simplified, scalable Cisco Unified Data Center architecture allows IT departments to gain the economic benefits of a homogeneous computing environment without any sacrifice in application performance

Only the Cisco Unified Data Center provides IT with the capability to optimize both sides of the application performance equation: high performance and low TCO. The capability of the Cisco Unified Data Center to tailor server and networking resources to the needs of the application, apply innovative technology to achieve optimal CPU power and increased consolidation ratios, and easily pool resources to accommodate changes in demand provides IT departments with a highly efficient foundation for high application performance. The capability to scale up or down without complexity and to automate management lowers TCO while it accelerates delivery of business-critical applications to the users and customers who need access to them.

For More Information

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- http://www.cisco.com/go/unifiedmanagement

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