Infrastructure Matters: Cisco UCS Sets World-Record Cloud Computing Performance

Powered by the Cisco UCS B200 M3 Blade Server

Performance Brief
September 2012

Highlights

World-Record-Setting Results

- The Cisco UCS® B200 M3 Blade Server delivers a VMware® VMmark™ 2.1 score of 11.32@10 tiles, outperforming all other 2-socket blade servers.

Better Performance for Your Workloads

- Whether you are implementing a virtualized data center or a public or private cloud, these VMware VMmark 2.1 benchmark results indicate the degree to which the Cisco Unified Computing System™ (Cisco UCS) can accelerate your applications.

Blade Server Without Compromise

- Powered by the Intel® Xeon® processor E5 family
- Large (up to 768 GB) memory capacity
- Built-in programmable I/O in which the number and type of devices can be configured on demand to best support security, quality of service (QoS), and IT best practices

Violin Flash Memory Arrays

- Flash memory enhances performance and economics to support virtualized and cloud environments.
- Provides the reliability required for a strategic business resource.
- Cisco UCS interoperates with enterprise flash storage to increase the performance of virtualized applications

Infrastructure Matters More Than Ever

- The radically simplified design of Cisco UCS eliminates switching in blade servers, accelerating network traffic from virtual machines to a single point of management for all I/O traffic in a single multichassis system.

Better infrastructure yields better performance—one of the reasons why the Cisco Unified Computing System delivers the best cloud computing performance of any 2-socket server as measured by the VMware VMmark 2.1 benchmark. Better performance than HP. Better than Fujitsu.

Since the Cisco Unified Computing System™ (Cisco UCS®) was first introduced three years ago, it has captured more a dozen world-record performance titles on VMware® VMmark™ benchmarks. The Cisco UCS B200 M3 Blade Server's score of 11.32@10 tiles on the VMware VMmark 2.1 benchmark demonstrates virtualization performance and the infrastructure performance and agility for cloud computing environments, including how well a system's servers, network, and storage support virtual machine movement, storage migration, and virtual machine provisioning. The system used to achieve this performance included the Cisco UCS B200 M3 powered by Intel® Xeon® processors and a Violin flash memory array.

Simplicity Increases Performance

Cisco UCS is a truly unified system whose configuration is completely automated through unified, model-based management to simplify deployment of enterprise-class applications and servers running in bare-metal, virtualized, and cloud computing environments. Built to support blade and rack servers in the same management domain, Cisco UCS is designed for simplicity, an approach that delivers better performance at lower cost. The Cisco® fabric extender architecture connects the system's unified fabric from the system's pair of fabric interconnects directly to blade and rack servers and individual virtual machines. This radical simplicity increases network throughput and eliminates the multiple switching, I/O, and management modules that clutter traditional blade systems and increase infrastructure cost.

Without redundant network switches, management modules, and cables blocking the rear of its blade-server chassis, Cisco UCS has an elegant, efficient, straight-through airflow and lower infrastructure power budget. This design leaves more room to power and cool some of the most powerful Intel® Xeon® processors available, further accelerating cloud computing performance. Although not all customers will choose the highest-performing processors for their servers, the fact that the same chassis has already supported three generations of Intel Xeon

processors and three I/O and fabric upgrades testifies to the flexibility and investment protection that Cisco UCS offers.

VMware VMmark 2.1 Benchmark

The VMmark 2.1 benchmark uses a tiled design that incorporates six real-world workloads to determine a virtualization score. Then it factors VMware vMotion, Storage vMotion, and virtual machine provisioning times to determine an infrastructure score. The combination of these scores is the total benchmark score. Because Cisco UCS is a truly unified system, it delivers both virtualization and infrastructure performance.

Cisco UCS B200 M3 Blade Server Benchmark Results

Cisco achieved a VMmark 2.1 benchmark score of 11.32@10 tiles using two Cisco UCS B200 M3 Blade Servers (Figure 1), each powered by two 8-core Intel Xeon E5-2690 processors. Intel Turbo Boost Technology was enabled to raise the clock speed from 2.9 GHz to up to 3.8 GHz as conditions permit. Each system was configured with 128 GB of main memory and a built-in Cisco UCS Virtual Interface Card (VIC) 1240.

No-Compromise Blade Server

The Cisco UCS B200 M3 is a blade server without compromise. Powered by the Intel Xeon processor E5 family, the half-width blade server supports 24

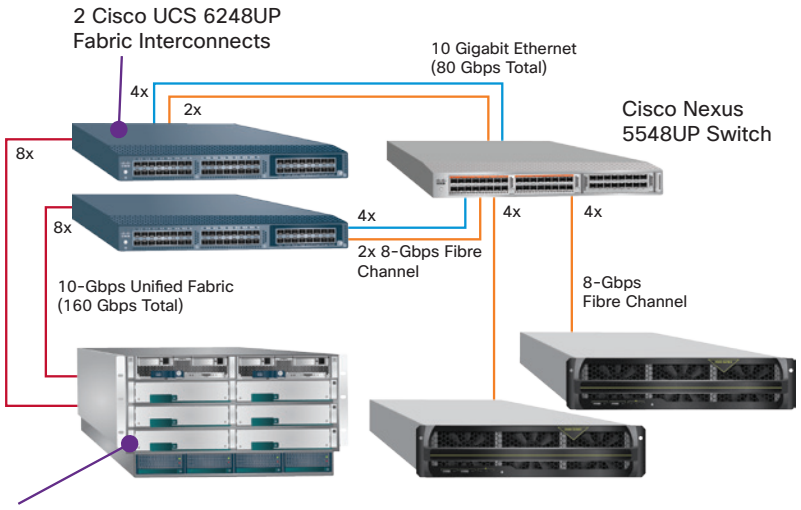

Figure 1. VMware VMmark 2.1 Benchmark Configuration

DIMM slots (up to 768 GB with 32-GB DIMMs) to support large virtual machine footprints. The server is designed to deliver the utmost in I/O bandwidth and flexibility. It is the first blade server anywhere to provide built-in programmable I/O connectivity in which the number and type of I/O devices can be configured on demand to support the needs of both VMware vSphere and the virtual machines running on the server, optimizing performance and security for cloud computing environments.

Cisco Virtual Interface Cards

The built-in Cisco UCS VIC 1240 is a modular LAN-on-motherboard (mLOM) I/O adapter that can be programmed on demand to match the needs of the hypervisor and the workload. The card can support up to 256 devices, in any combination of Ethernet network interface cards (NICs) and Fibre Channel host bus adapters (HBAs). The adapter accesses each of the system's two network fabrics for 40 Gbps of I/O connectivity. The Cisco UCS B200 M3 server's single mezzanine slot can be configured with an additional I/O adapter or a port expander card for the Cisco UCS VIC 1240 to bring the VIC's I/O connectivity to up to 80 Gbps. These options were not installed for the VMware VMmark benchmark.

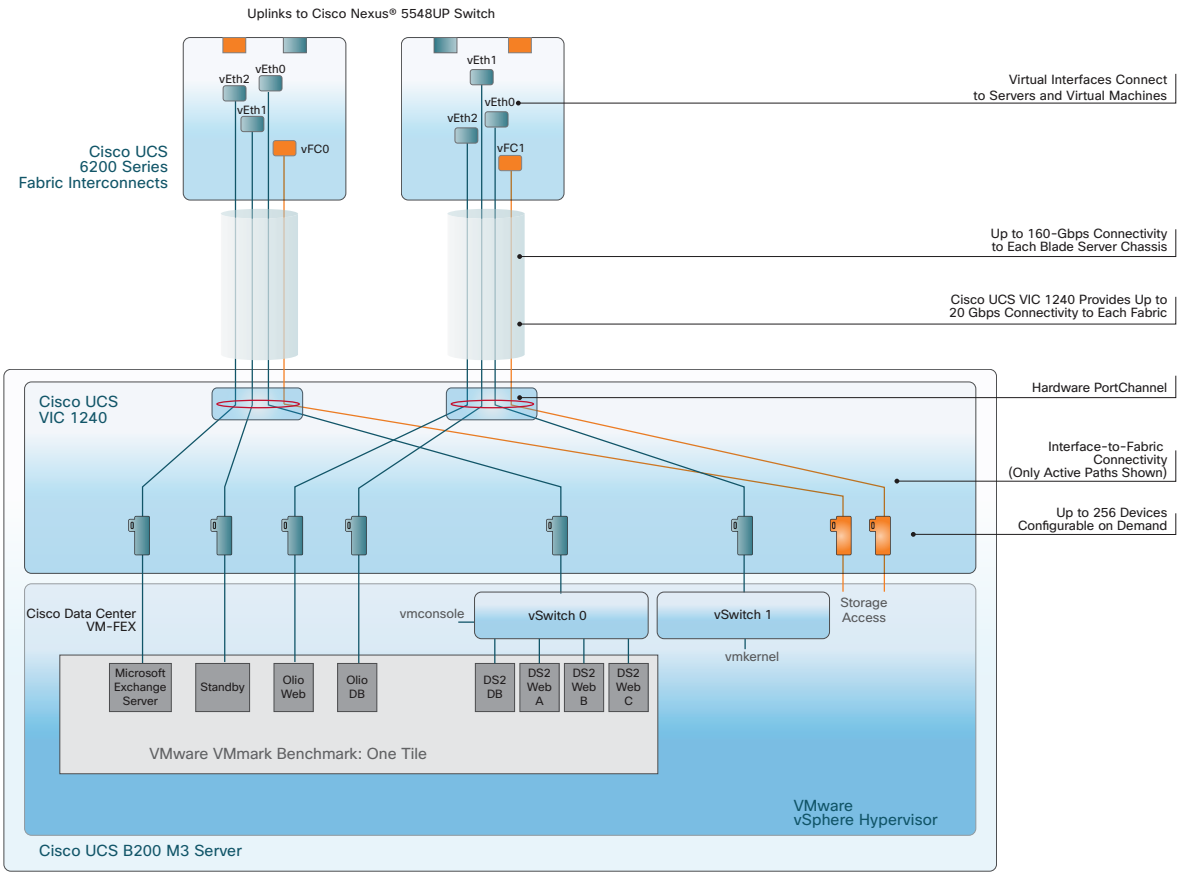

Figure 2. The Built-In Cisco UCS VIC 1240 Was Configured for Performance and Security Isolation

The benchmark did use the Cisco Data Center Virtual Machine Fabric Extender (VM-FEX), which connects NICs to individual virtual machines for greater network throughput. Using the Cisco Data Center VM-FEX, all network traffic is centrally managed by the system's fabric interconnects, eliminating software and blade-server switching. Coordination between Cisco UCS Manager and VMware vSphere maintains the association between NICs and virtual machines regardless of physical location.

For the benchmark, the Cisco UCS VIC 1240 was configured with eight devices (Figure 2). Two Fibre Channel HBAs were used to provide redundant access for virtual machine images and for booting the VMware vSphere hypervisor. One Ethernet NIC was used to connect and securely isolate the vmkernel interface through vSwitch 1. The vmconsole and DVD Store Version 2 (DS2) virtual machines were supported by a NIC connected to vSwitch 0. Four dynamic Ethernet NICs were configured using Cisco Data Center VM-FEX to support virtual machines in each benchmark tile for:

- Microsoft Exchange Server

- Olio web servers and database instances
- Standby server

Segregating traffic from different applications helps enable better management of quality of service (QoS) and provides enhanced security for client applications in real-world situations.

Intel Xeon Processor E5 Family

The Cisco UCS B200 M3 server is powered by the Intel Xeon processor E5 family (Figure 3). This versatile processor family forms the core of a flexible and efficient data center. Designed to deliver the right combination of performance and built-in capabilities at lower cost, the Intel Xeon processor E5 family delivers adaptive performance to a wide range of applications. In addition, Intel integrated I/O dramatically reduces I/O latency to help eliminate data bottlenecks and increase agility. Almost any environment–from virtualization and cloud computing platforms to design automation systems and real-time financial transaction processing systems–can take advantage of the Intel Xeon processor E5 family to boost computing and storage performance and streamline data center operations.

Violin 6000 Flash Memory Array

The benchmark's boot images and virtual machine storage were placed on two Violin 6000 Series Flash Memory Arrays. These storage arrays are all flash memory systems with the reliability, performance, and economics for deployment as mission-critical storage. A single system fits in three rack units (3RU) of space and can deliver up to one million I/O operations per second with 4 Gbps of bandwidth. The array is built with fully redundant components with no single point of failure, hot-swappable components, active-active Violin vRAID, spare memory to support a fail-in-place model, and systemwide wear leveling. Violin's flash-optimized vRAID stripes data across multiple memory modules for parallel access and nonblocking erase functions to deliver consistent latency.

Conclusion

Better infrastructure yields better performance, and Cisco's world-record-setting VMmark 2.1 benchmark results demonstrate how important infrastructure choices are for cloud computing environments.

With innovations including dual 10-Gbps unified fabrics, the Intel Xeon processor E5 family, built-in Cisco VICs, Cisco Data Center VM-FEX, large memory capacity, and Violin's all-solid-state memory, Cisco's results demonstrate the architectural advantages of a system built for virtualized environments, and they provide customers with a measure of what they can expect when deploying the Cisco Unified Computing System.

Figure 3. Cisco UCS B200 M3 Server

For More Information

For more information about Cisco Unified Computing System, visit http://www.cisco.com/go/ucs.

For more information about Violin flash memory systems, visit http://www.vmem.com.

Disclosure

VMware VMmark is a product of VMware, Inc. The comparative results cited in this document were available at http://www.vmmark.com and were valid as of September 18, 2012.

Americas Headquarters
Cisco Systems, Inc.
San Jose, CA

Asia Pacific Headquarters
Cisco Systems (USA) Pte. Ltd.
Singapore

Europe Headquarters
Cisco Systems International BV Amsterdam,
The Netherlands

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