



Where IT perceptions are reality

Application Report

Infrastructure Refresh Keeps Ticket Sales Flowing

Featuring

Ticket & Reservation Systems

HP ProLiant Gen8 Servers

HP Virtual Connect

Emulex 10GbE Server Adapters

Tickets & Reservation Apps

The Lifblood of Major Entertainment Venues

Despite continuing economic headwinds, attendance at America's top entertainment venues increased to 127 million in 2011, the latest year for which data is available. Daily average attendance of almost 350,000, higher during the peak holiday periods, places heavy burdens on e-commerce and on-site ticketing systems as well as on a venue's entertainment management applications. A seamless visit experience and flawless order execution are essential to driving customer satisfaction and repeat visits.

Data Center Infrastructure Keeps Business Flowing

Located in the United States, this entertainment venue operates two data centers to ensure business continuity and real-time disaster recovery. They support thousands of daily on-site ticket sales, a transaction-intensive eCommerce web presence for online ticketing and core entertainment operations applications for the venue.

The venue's total IT infrastructure consists of more than 100 physical servers, including 56 HP ProLiant server blades which host 340 virtual machines (VMs) and a total of almost 1 petabyte of Storage Area Network (SAN) and Network Attached Storage (NAS) based [storage](#) capacity at each data center. SAN storage capacity is about 560TB and NAS storage accounts for about 400TB. Prior to a recent upgrade, the storage networking backbone was comprised of 4Gb Fibre Channel for the SAN and 1Gb Ethernet for NAS.

The primary operating system deployed is Windows Server 2008, with Linux based servers hosting database systems. Hypervisor platforms for server virtualization include a mix of VMware ESXi 5.0 for higher resiliency and Microsoft Hyper-V for cost effectiveness.



Ticketing and reservations are examples of business-critical eCommerce applications used by major entertainment venues. [Watch this video](#) for an overview of data center infrastructure needed to support the applications.

Goals

Upgrade legacy servers and storage networks to increase throughput of transactions and reduce latency. Build in room to grow.

Key Technologies

The entertainment venue's data center involves many technologies, products, and processes. Currently, blade servers, server virtualization and converged Fibre Channel over Ethernet (FCoE) server connectivity stand out as technologies which are key to maintaining application performance and availability while reducing capital and operational expenses.

Blade Servers

The entertainment venue is deploying HP BladeSystem with ProLiant Gen8 servers using far less floor space, power, cooling, and cables. By sharing resources through a single enclosure, HP ProLiant server blades also eliminate a great deal of management complexity.



The IT team at this major entertainment venue had a vision for infrastructure which would last for several years. Their vision included blade servers, virtualization and 10GbE.



Server Virtualization

A typical application server utilizes only 1% to 5% of available CPU. VMware ESXi 5.0 based server virtualization allows the venue to fully utilize the compute power of each physical blade server by running multiple virtual machines (VMs) and applications. The result is another level of massive hardware consolidation and cost savings.

Advanced Connectivity and Network Virtualization

To accommodate the proliferation of virtual machines (VMs), the HP BladeSystem features FCoE connectivity with virtual networking capabilities which allow server admins to configure a unique virtual network for each VM. Dual-port HP Virtual Connect 10Gb FlexFabric Adapters are included in Gen8 servers used by the venue, which are based on Emulex Ethernet technology. A single HP Virtual Connect 10GbE FlexFabric Adapter port can be configured as four FlexNICs, with an option to configure one of the four as a FlexHBA, for either FCoE or iSCSI storage connectivity. Each FlexNIC or FlexHBA can be configured with its own set of network policies tailored to the needs of specific VMs and applications.

HP ProLiant BL460c Gen8 server blade



One or two dual-port 10Gb HP Virtual Connect FlexFabric mezzanine cards can be added.

The dual-port 10Gb HP Virtual Connect FlexLOM Adapter (not shown) is based on Emulex Ethernet technology. The FlexLOM adapter delivers FCoE connectivity and the two ports can be partitioned into as many as eight FlexNICs.

10GbE

High performance 10GbE ports are now available for blade servers in LAN-on-Motherboard (LOM) and mezzanine adapter form factors.

Aging I/O Infrastructure

Slowed Ticketing & Reservations

The data center infrastructure now in use to support eCommerce is the result of a recent data center refresh.

Before the refresh, high storage latency and low storage I/O operations per second (IOPS) performance degraded customer response time, prompting an assessment effort. Problems grew from minor issues such as read errors with certain databases, to delays in transaction processing and other host operations. Eventually, the system experienced an outage, an unacceptable scenario for a high-volume ticketing and reservation system.

In addition, a decrease in customer satisfaction was observed over a period of months. The two root causes of the problem were inadequate server capabilities resulting in system overload and bottlenecks between the host and storage devices. Upgrading the server and storage infrastructure was planned to resolve the performance issues.



Long waits lead to customer dissatisfaction and lost revenue. The IT team at this venue had a vision for infrastructure which would last for several years. Their vision included blade servers, virtualization and 10GbE.

FCoE

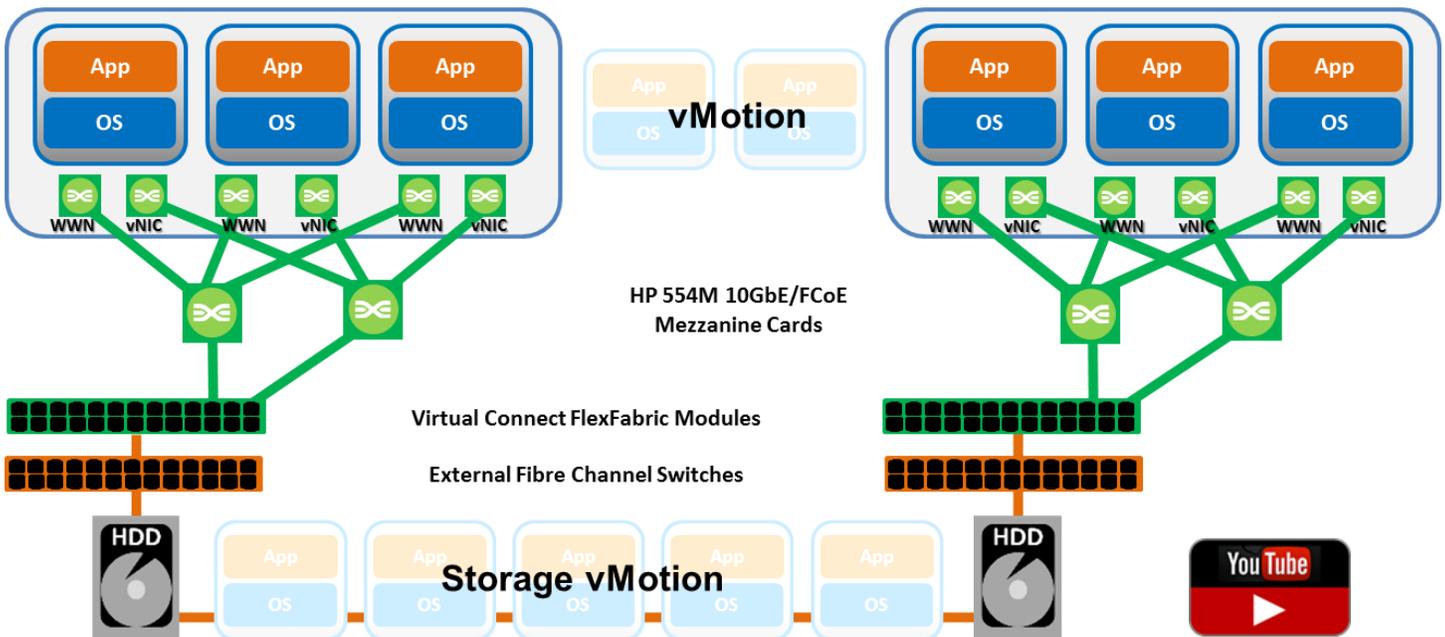
The FCoE protocol allows Fibre Channel SAN traffic to be carried over a 10Gb Data Center Ethernet (DCE) network.

Infrastructure Upgrade

HP BladeSystem with ProLiant Gen8 server blades & Virtual Connect

Assessment of current and future needs resulted in the selection of HP ProLiant Gen8 servers as the best choice; the most reliable and most able to scale and address the demand estimates of future growth. The venue deployed 16 ProLiant blade servers to host the virtualized workload for the critical eCommerce system as well as the most business-critical database applications.

This HP Gen8 environment utilizes Virtual Connect FlexFabric technologies for converged, high bandwidth 10GbE FCoE connectivity. Compared to traditional Ethernet and Fibre Channel SAN switches, HP Virtual Connect reduces upstream switch cable connections (with Dual hop FCoE topology), and simplifies management with more flexible LAN and SAN bandwidth allocation for traffic segregation and performance optimization. A total of 40Gb/s of bandwidth from two dual port 10GbE adapters was provisioned for the right mix of performance and high availability. One port on each adapter and 20GbE of bandwidth was dedicated to Storage vMotion and VMware Site Recovery (replication) traffic, while the second port was shared by various eCommerce applications. The second adapter provided failover for high availability.



One 10GbE port on each HP 554M mezzanine card is dedicated to Storage vMotion and Site Recovery Manager. The second 10GbE port on the adapter is used for eCommerce traffic. Each 10GbE data port is virtualized so it can be used as a virtual HBA (vHBA) and a virtual NIC (vNIC).

Storage vMotion

Perform live migration of VM disk files while maintaining service availability and transaction integrity.

Results & Lessons Learned

Virtualized eCommerce Emerges as the Killer App for 10GbE

The upgrade to HP ProLiant Gen8 server blades and 10Gb NAS delivered the higher throughput and lower latency needed today, and an architecture which can scale for years to come.

The new 10GbE infrastructure inside the ProLiant Gen8 servers allowed the entertainment venue to:

- Handle the growing traffic that had previously overloaded the 1GbE and 4Gb Fibre Channel networks.
- Consolidate its LAN and SAN connectivity with FCoE.
- Deploy a tier-1 eCommerce application as a VMware virtualized workload to automate availability features (vMotions, Storage vMotions and site-to-site replication).

Lessons Learned

The following are some lessons the entertainment venue staff want to share with their peers:

- ⇒ **Find a technology that will scale**—The decision to upgrade the infrastructure was driven by a vision that the technology deployed must meet current needs and future growth for a period of about 10 years. The goal was to ensure that the infrastructure did not become antiquated in a matter of a few years. This led to a choice of deploying HP BladeSystem with ProLiant Gen8 server blades featuring FCoE connectivity on a 10GbE Converged Network Adapter (CNA).
- ⇒ **Simplified manageability with FCoE**—A unified Ethernet based networking infrastructure was easier to manage than separate Ethernet LAN and Fibre Channel SAN infrastructures and also scales more effectively to manage long term growth.



Results

Before upgrade—Transaction latencies and user dissatisfaction.

After upgrade—Ticket sales flowing with unified 10GbE FCoE SAN, NAS & LAN, and a virtualized blade computing infrastructure.

Resources

Related Links

To learn more about the companies, technologies, and products mentioned in this report, visit the following web pages:

[HP FlexFabric Adapters Provided by Emulex](#)

[HP BladeSystem](#)

[HP VirtualConnect Technology](#)

[IT Brand Pulse](#)

[VMware ESXi 5.0](#)

[VMware vSphere Distributed Resource Manager](#)

About the Author



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Rahul Shah has over 20 years of experience in senior product management and marketing positions with semiconductor, storage networking and IP networking manufacturers including QLogic and Lantronix. At IT Brand Pulse, Rahul is responsible for managing the delivery of technical services ranging from hands-on testing to product launch collateral. You can contact Rahul at rahul.shah@itbrandpulse.com.

