Virtualization Increases Storage Networking Complexity

Virtualization enables a more efficient use of computing infrastructure and capital resources. It makes access to computing resources more affordable, which in turn fosters application innovation. However, virtualization creates new challenges for storage administrators. Virtualized servers typically use shared storage to maximize all the features and capabilities of this technology. The costs of a storage area network (SAN) are significant, so it is critical to manage I/O infrastructure to provide the highest degree of use while, at the same time, guaranteeing performance and service level agreements (SLAs).

Virtualization enables the sharing of a common set of physical resources among many virtual machines (VMs). This consolidation of many virtual servers on just a few storage devices can create bottlenecks as virtual machines compete for storage resources. Virtualized infrastructures undergo frequent changes in load patterns because they are shared by many applications, raising the likelihood of transient or intermittent problems which are only detectable by analyzing I/O load patterns.

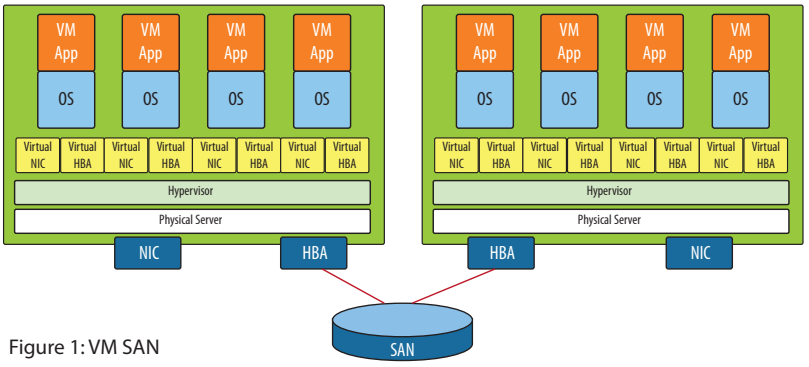

Figure 1: VM SAN

Server virtualization has evolved to provide features which provide high availability and workload balancing across a virtualization cluster. Features such as the VMware® vMotion™ and Storage vMotion products can move running VMs from host to host, as well as from one storage device to another. While these capabilities are especially valuable, they increase the complexity of storage networks as the relationships among virtual machines, physical hosts, and the storage device are highly fluid and dynamic. The resulting complexity makes it imperative that data center operators have the solutions necessary to view and troubleshoot performance problems that can often impact business productivity. Without visibility into the storage network virtualization and storage, administrators can end up in conflict over the sources of performance degradation.

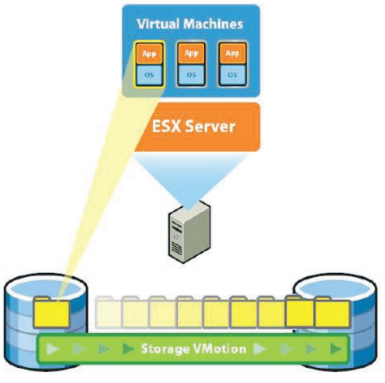

Figure 2: VMWare

The Need for I/O Performance Analysis

Storage I/O performance is often overlooked as a key aspect of overall application performance and availability. As a result, there is an increasing need for tools to proactively address potential performance problems. For example, operators need to troubleshoot and isolate whether performance issues originate on the local area network (LAN), the server, or in the storage network. Server virtualization abstracts the application and operating system from the physical server, allowing more applications to be loaded on a single hardware platform and increasing the type, and level, of I/O workloads supported through a single HBA/CNA and switch port. VMs may create periods of very high disk I/O, which can create high resource contention that impacts the performance of VMs and the applications which they host. Virtualized infrastructure has multiple tiers, with several layers of virtualization, all of which manage I/O. As the number of VMs multiply, the result is an "I/O blender" effect where traditional and predictable IO patterns become randomized, creating the potential for dynamic points of congestion.

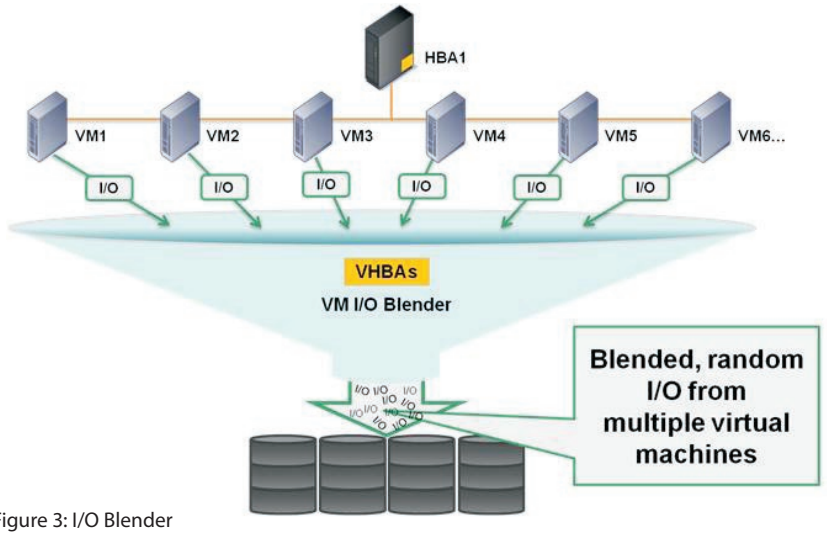

Figure 3: I/O Blender

For that reason, virtualization has led to a greater number of application performance problems originating in the storage infrastructure. Insight into I/O workloads being generated by virtualized environments is critical when troubleshooting performance issues or preventing downtime associated with storage latency. Diagnosing and correcting these issues requires the ability to capture, in real time, the storage traffic being generated at different locations on the infrastructure.

Basic I/O counters are helpful. However, only an advanced analysis solution can resolve complex performance issues affecting application and VM performance. For instance, using the right tools and techniques for I/O analysis can identify which servers are delivering the highest I/O load, the greatest throughput, or experiencing the longest latency for reads and writes. The ongoing analysis of storage environments can help optimize infrastructure costs and better manage virtual server environments, ultimately leading to better application performance.

Capturing and trending I/O response times can be a proactive technique to isolate the root cause of performance issues and maximize the efficiency of I/O infrastructure. I/O latency is one of the key indicators for SAN performance and application performance. Similarly, understanding I/O utilization is important when troubleshooting performance problems, particularly in virtualized environments with frequently changing workloads. Additional key performance indicators may include response time, queue depth, average disk queue length, average I/O size in kilobytes, I/O per second (IOPS), throughput in megabytes per second, and write/read percentage completions.

JDSU Storage Analysis Solutions

The JDSU Xgig® is a powerful storage analysis tool for Fibre Channel, Gigabit Ethernet, Fibre Channel over Ethernet and FICON. Xgig provides a comprehensive set of debugging and analysis tools for analyzing traces and provides simple access to performance metrics such as:

- IOPS by logical unit number (LUN)
- Min/max/avg exchange completion time
- Read and write MB/sec by LUN
- Frames-per-second by LUN
- Errors by LUN
- Packet-level visibility including all errors and primitives

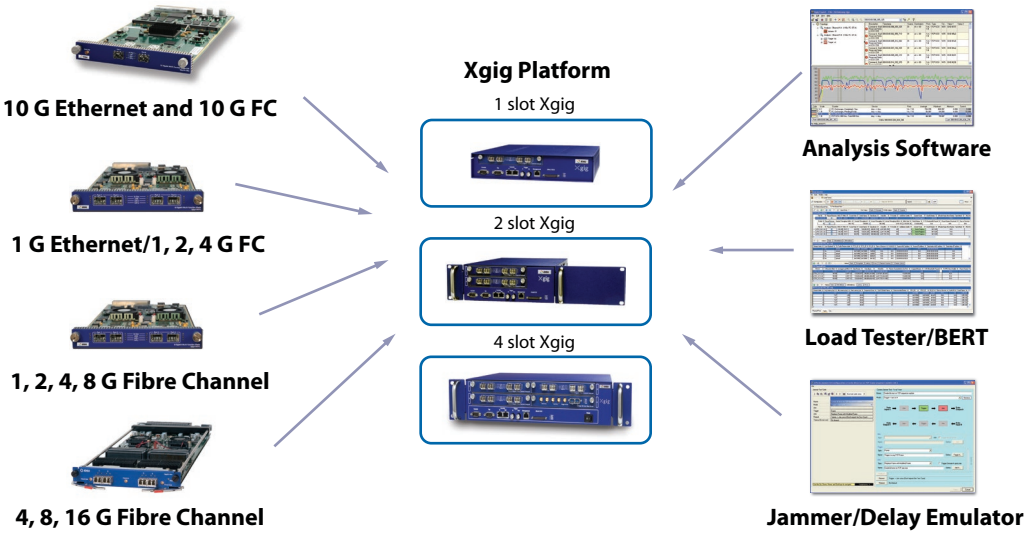

Figure 4: Xgig Analyzer Options

When implemented with a JDSU passive optical tap, the Xgig can be perpetually wired into virtualized data center environments to provide real-time access to key protocol-level information for on-demand troubleshooting and ongoing performance benchmarking.

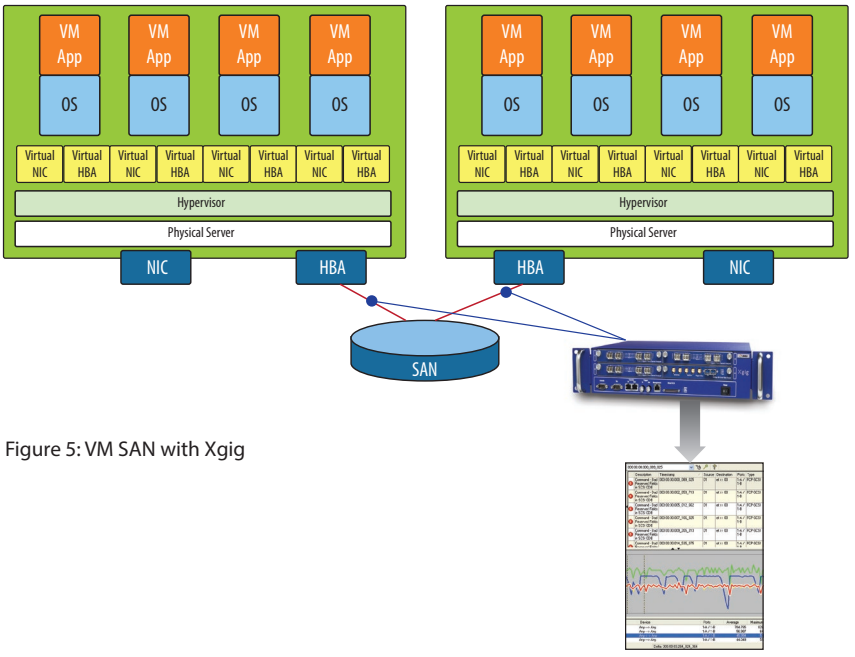

Figure 5: VM SAN with Xgig

SAN Performance is Critical

Today's data center environments are growing in size, complexity, and business criticality. Optimal performance of each piece of the data center infrastructure is critical to deliver an optimal end-user experience as well as new cloud-computing service revenues. SANs play a vital component in data center architectures. Rapidly isolating and addressing performance impacting issues is vital. Often, understanding I/O performance and contention lets storage administrators optimize existing infrastructure investments, proactively manage system performance, and accelerate the isolation and remediation of performance-affecting issues when they do arise. Protocol analysis, commonplace in Ethernet/IP environments, will now become increasingly vital in storage networks. This need is increasingly critical as greater layers of virtualization are deployed, including server virtualization, storage virtualization, and I/O virtualization.

Test & Measurement Regional Sales

NORTH AMERICA
TOLL FREE: 1 855 ASK-JDSU
1 855 275-5378

LATIN AMERICA
TEL: +1 954 688 5660
FAX: +1 954 345 4668

ASIA PACIFIC
TEL: +852 2892 0990
FAX: +852 2892 0770

EMEA
TEL: +49 7121 86 2222
FAX: +49 7121 86 1222

www.jdsu.com/test

