ESG Lab Validation Summary

Virtualization with Violin Memory 6000 Series Flash Memory Arrays

High Performance, Reliability, and Economics in an All-Silicon Storage System

This ESG Lab Validation report documents the results of hands-on testing of the Violin Memory 6000 Series flash Memory Storage array, with a focus on the performance, efficiency, and flexible scalability of these storage systems in highly virtualized, mixed workload environments. Testing was designed to stress the performance scalability of Violin arrays in a highly virtualized environment. Ease of use, availability, and manageability were also examined.

Learn more at
http://www.violin-memory.com

The Violin Memory 6000 series is one of the very few custom-built all-flash memory storage arrays designed as a sharable, tier-1 storage resource. These arrays are built using Violin Intelligent Memory Modules (VIMMs)—that are uniquely optimized to provide high performance without sacrificing availability. A switched memory architecture provides a non-blocking read/write environment that enables the 6000 series to deliver sustained high performance and low latency. With full redundancy, hot-swappable components and non-disruptive software and firmware upgrades, the system also offers high levels of serviceability and uptime.

In this report, ESG Lab validated that Violin was able to support a 10,000 seat virtual desktop environment, sustain high write performance over time, predictably scale a mixed business application workload, and support nearly 1.4 million IOPS, all at array response times measured in microseconds.
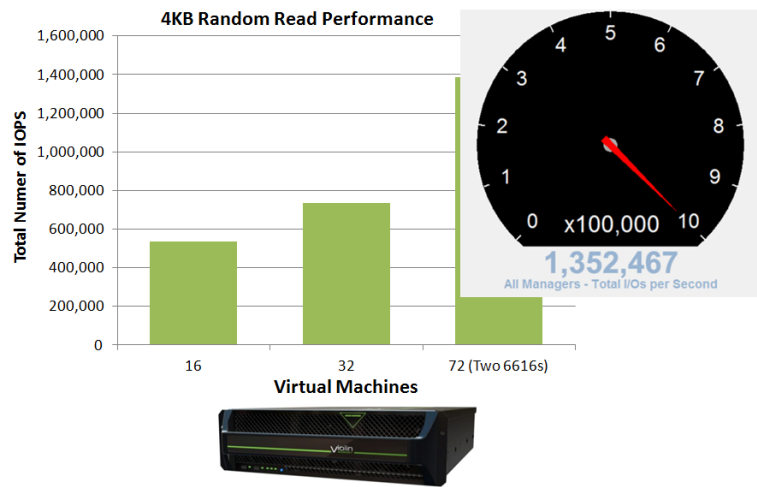
Why This Matters

ESG research indicates that performance scalability is a top concern with IT managers surveyed. When multiple users running diverse applications share a storage system, ensuring that service levels are met can be a difficult challenge. A burst of I/O activity in one application (e.g., a user first logging on) can lead to poor response times and lost productivity for other users. A desktop virtualization environment potentially presents one of the most diverse and challenging mixes of I/O. Boot storms in the morning, or AV scans throughout the day can bring the infrastructure to a halt, making it impossible to sustain a predictable end user experience.

Violin flash Memory Arrays offer predictable and scalable performance with extremely low response times, making a scalable virtual desktop environment a reality. ESG Lab testing has validated that the efficiency and performance of the Violin architecture–custom-built for flash–can be used to confidently meet the performance needs of a real-world deployment of a 10,000 seat virtual desktop environment, from proof of concept to production.
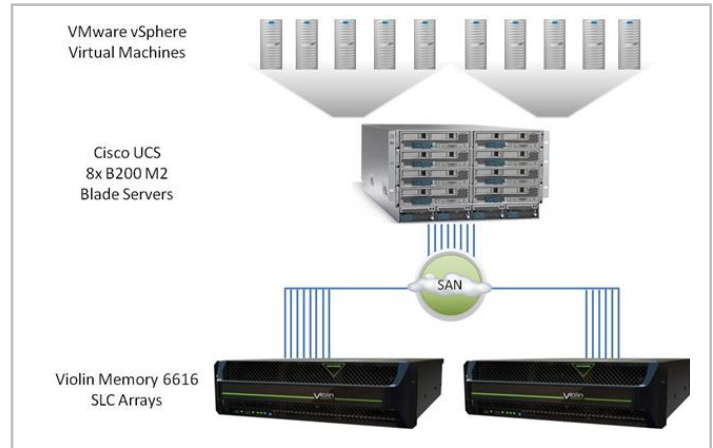
Performance has also been one of the most important reasons organizations have been reluctant to virtualize business critical applications. The randomization of I/O in a virtual environment has a significant impact on performance. ESG Lab has confirmed that Violin can meet and exceed the demanding performance requirements of large-scale consolidation, supporting nearly 1.4 million IOPS in two 3U flash Memory Arrays, enabling consolidation through virtualization.

ESG Lab Validation Highlights

ESG Lab performed hands-on testing of Violin Memory 6000 Series arrays at a Violin facility in Mountain View, California using Cisco UCS servers and VMware vSphere 5. The following is a summary of the results:

- ☑ Allocating Violin capacity was easy. Within minutes of sitting down at the console, an ESX cluster had recognized freshly configured Violin capacity as a standard block device that was usable as a datastore for installing virtual machines and applications.
- ☑ The user interface of the Violin GUI made it easy to monitor storage performance as well as system and component health.
- ☑ Testing with industry standard workload generators and multi-threaded test scenarios confirmed that Violin flash memory arrays can be used to provide predictably scalable storage performance in highly demanding, large scale VDI environments from POC to production.
- ☑ Testing with a variety of business-critical, performance-sensitive application workloads yielded high levels of performance and throughput that scaled predictably as virtualized workloads were added. Testing with a mixed workload methodology scaled linearly as VMs were added, while response times measured at the hosts stayed in the single digits. Testing with volumes striped over flash devices in two storage arrays yielded nearly 1,400,000 IOPS with extremely fast response times of under a millisecond—that's orders of magnitude faster than a power-hungry disk array with thousands of spinning hard drives and many gigabytes of cache.
- ☑ Violin arrays demonstrated very high performance sustained over more than 11 hours, thanks to an architecture optimized for flash.

Issues to Consider

- ☑ The redundant architecture and tightly integrated system software of Violin Flash Memory Arrays deliver enterprise-class levels of performance and availability, but do not yet support extended functions that are supported by legacy enterprise-class disk arrays (e.g., volume snapshots, clones, and policy-based quality of service). Violin has advised ESG Lab that development of a number of enterprise-class extended functions is under way. Implementation is planned for upcoming releases.

The Bigger Truth

The rise of flash-based storage arrays stems from the dramatic improvements in performance and efficiency that they offer. However, despite these potential improvements, it has been difficult for some organizations to justify the extra cost of flash, driving limited deployments with flash used as cache or as a storage tier. While this tactic can keep costs down, difficulty predicting where and when to move data has often restricted the benefit. Some customers have been waiting for an enterprise-class, flash-based array that delivers not just high performance, but high availability, reliability, and ease of use in a cost-efficient package—the Violin Memory 6000 Series fits the bill.

While this all-flash array can serve a variety of needs, ESG Lab focused on virtualized business critical application workloads and virtual desktop infrastructure (VDI). A key reason for this focus is that the aggregated workloads that virtualization creates can severely stress HDD storage systems by significantly increasing the random nature of the IO; ESG Lab refers to this phenomenon as the "IO blender." Because HDD environments support a limited number of IOPS per spindle, this IO blender can sink storage performance. With server virtualization still at the top of the IT priority list for most organizations, Violin's solution to this problem is welcome.

One test that ESG Lab conducted with the Violin Memory array used 4K random reads with 72 virtual machines. This test generated extremely high performance: 750,000 IOPS from a single Violin 6616 and nearly 1.4 million IOPS from two systems. With Violin's all-flash array, users can be sure that scaling their deployments will be free of storage bottlenecks.

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