

Flash storage addresses emerging storage dynamics and sparks a shift to primary storage alternatives

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Introduction

Virtualization permeates enterprise networks. It is the stepping-stone to cloud computing environments and a key enabler of data center consolidation. Virtualization enables IT organizations to consolidate server infrastructure as well as legacy business applications such as databases, unified communication and collaboration, and file sharing onto virtual machines. Similarly, IT organizations can consolidate emerging applications driven by mobile, social, cloud computing and big data.

Consolidation of these mixed workloads introduced challenges for IT organizations that impacted their storage infrastructures, including demands for increased performance; consistent, sustained lower latency; quicker response times; and multiple-characteristic workloads in new mixed workload environments. To address these new challenges, IT organizations increase their storage footprint and add HDD storage arrays that address the performance issue by enabling more IOPS to handle the potential bottleneck between the application and the storage network. With the additional storage hardware in the storage infrastructure, administrators need the requisite additional floor space and power and cooling in their data centers. Another challenge storage administrators face is the creation of management complexities from storage silos, which result from storage that is focused on serving a single application being added to the network. Additionally, application servers deal with delayed or longer response times from legacy storage architectures. To address latency issues, IT organizations tried increasing the number of CPUs, thus potentially increasing the number of servers as well, increasing capex and opex costs — which runs counter to an overall strategy of reducing spending and increasing consolidation.

Increasingly, IT organizations search for cost-effective, easy-to-manage storage solutions that can improve business outcomes and deliver increased efficiencies and higher performance. Flash storage has become an economical alternative to traditional HDD storage architectures that not only outperforms traditional architectures in speed and efficiency, but can also provide a better overall TCO that drives down an organization's capex and opex. Typically, flash storage arrays require less rack space compared to similar scenarios for legacy HDD- or hybrid-based storage, thus reducing the floor space and power and cooling costs that will ultimately justify the capital outlay for the hardware and reduce operating costs. Flash storage can be delivered in two design options. The first option leverages commercial off-the-shelf solid-state disks (SSDs) with NAND flash. The second design option is to build custom modules using NAND Flash memory chips, which results in a closer alignment to the performance, reliability and latency requirements of today's critical business applications. However, there still can be performance, reliability and latency limitations with SSD-based flash, as it is based on a disk design. As flash storage becomes more flexible and efficient, and its price point continues to decline, it will be vital to understand the key differences between these two design architectures as IT organizations explore options to replace or migrate away from legacy HDD-based storage. TBR expects the flash storage market to outgrow all other storage markets, rising at a 22.9% CAGR between 2014 and 2018. Violin Memory provides a unique, all-flash architecture and innovative strategy that aligns with the increased demands of transforming IT environments, offering IT organizations an alternative to legacy storage solutions.

Violin Memory's Flash Storage Platform leverages a unique and innovative architecture

Violin Memory aims to help IT organizations transform their storage infrastructures, data centers and overall business as data centers move to all silicon with a flash-based storage solution. Violin's strategy is to provide a leading-edge, intelligent and cost-effective storage alternative to traditional HDD- or hybrid-based primary storage offerings. Violin's Flash Storage Platform™ (FSP) is an all-flash storage array delivering the high performance, sustained low latency, greater efficiencies and enterprise-class data services required for critical business applications that predominately reside on primary storage. A key differentiator to Violin's FSP is the custom all-flash modules that Violin spent a significant amount of resources designing and developing. By architecting a solution that can control down to the flash-die level instead of the disk level that is typical of SSD-based flash designs, Violin addresses the inherent issues with disk-based architectures that limit the performance potential of NAND flash. The FSP delivers optimal flash capabilities via a vertically integrated design of software, firmware and

hardware leveraging Violin's Flash Fabric Architecture™ (FFA), Concerto OS 7 and Symphony Management to provide a seamless, scalable platform with granular data controls.

At the heart of the FSP platform is Violin's Flash Fabric Architecture, which offers a multilayer design made up of three key components — Violin Intelligent Memory Modules (VIMMs), Violin Switched Fabric (vXF) and Violin virtual RAID (vRAID) — that collectively deliver higher IOPS performance and greater reliability on a more efficient, next-generation all-flash platform. The VIMMs compose the first layer of Violin's FFA and connect to an optimized mesh design delivering intelligent flash management that masks chip-level issues typically associated with NAND flash. This layer delivers reliable, sustained low latency and high performance, as it avoids the hotspot and high latency issues typically attributed to HDD-based storage or All-flash Arrays architectures using traditional SSD. The second layer of Violin's FFA has the unique capability to mesh VIMMs together into an array that enables FSP to deliver unmatched scalability, performance, fault tolerance and power savings. The third layer of Violin's FFA is vRAID, which performs RAID functions in hardware, rather than software, ultimately reducing latency compared with HDD-based and SSD-based storage. The FSP FFA architecture allows large consolidation of mixed and multiple workloads due to its large performance envelope and sustained low latency.

Another key component to Violin's FSP is Concerto OS 7, a comprehensive suite of data services that deliver enterprise-class capabilities required to support primary data in consolidated mixed workload environments in enterprises. Concerto OS 7 Data Services focuses on four areas: business continuity, data scaling, data protection and data efficiency.

- To ensure applications are always available, Concerto Business Continuity provides features such as asynchronous replication, synchronous mirroring, Continuous Data Protection (CDP), and zero Recovery Point Objective (RPO) and zero Recovery Time Objective (RTO) stretch cluster capabilities. This ensures users do not have to compromise on business continuity as they transition to flash and are able to consolidate from multiple products to one.
- To ensure mixed workloads are protected and FSP is fully integrated into the data center ecosystem, Concerto OS 7 provides application and crash consistent snapshots and granular control on protection policies. Further enabling the transition to FSP, Concerto OS 7 supports inbuilt data migration capabilities with existing LUN imports and transparent LUN mirroring.
- To address increased amounts of data as well as the impact on the storage infrastructure, Concerto OS 7 allows unparalleled scaling of capacity and performance through online expansion of storage capacity and LUNs under a single name space up to 1.4PB with 2.2M IOPS.
- To ensure maximum economic efficiency is achieved, Concerto OS 7 offers thin provisioning and thin clones that guard against the need to over-provision storage, typical with HDD-based storage designs. This is enhanced with Violin's proprietary and inline data reduction and compression. Violin's FSP provides granular control of data reduction, support of mixed data reduced LUNs and thick/thin LUNs on the same platform, and the ability to enable and disable data reduction nondisruptively.

Violin, recognizing the importance of providing seamless and tight integration with infrastructures, provides key integration through Concerto OS 7 with ecosystem partners including Microsoft, VMware (VAAI, SRM, vMSC, VADP, vCenter, VASA), and Symantec that deliver greater value to consolidated mixed workload environments.

Managing Violin's FSP components is Symphony, a single-pane-of-glass flash management UI that helps storage administrators manage their consolidated mixed workload environments easily on Violin FSPs or All Flash Arrays. Symphony enables the management of large-scale FSP and all-flash array deployments from one management console, providing high-level and low-level views and diagnostics of the FSP and Violin all-flash array environment. Utilizing Symphony, storage administrators can take advantage of the health and diagnostic tools that recognize any potential faults to FSP and minimize downtime proactively. For greater and customizable controls, Symphony enables storage administrators to customize monitoring environments utilizing Smart Groups that enable the

creation of specific groups of LUNs and arrays. With Symphony, storage administrators will have granular control of data protection via snapshot scheduling and mirroring and replication services. To assist with proactive planning, storage administrators can utilize the performance and capacity reporting capabilities of Symphony.

Collectively, Violin's FSP and vertically integrated design of software, firmware and hardware deliver a next-generation all-flash storage platform that meets the requirements of the consolidated mixed workloads in primary storage environments that enterprise IT organizations are challenged to support. Violin's FSP helps IT organizations combat challenges in a more cost-effective and economical manner than the HDD-, hybrid- or SSD-based storage architectures they have deployed.

Flash storage must provide innovation around consistent performance, enterprise data services, security and seamless scaling

Flash storage will gain market traction as organizations continue to virtualize their data centers on the path toward cloud computing. Storage infrastructures are stressed with the increased demand to support legacy and new emerging applications (workloads) taking advantage of all virtualization has to offer. Storage costs and complexities continue to weigh on IT organizations as they struggle to meet the demands of consolidated mixed workload environments and the requirements of higher performance, lower latency and overall greater efficiencies. As such, IT organizations will not only focus on price points for storage, but more importantly, they will also focus on overall TCO, as they must focus their attention on the CAPEX and OPEX aspects of their operations. Compounding the challenges IT organizations face are the continued migration of data centers to fully virtualized environments and the increasing number of legacy applications and new applications that will enter the data center through mobile, social, cloud and big data initiatives that continue to be strategic for businesses as they aim to be more competitive in a global economy.

TBR believes Violin Memory's Flash Storage Platform takes a different approach to flash storage by eschewing the use of commodity SSDs while still leveraging NAND in an internally developed custom flash module and Violin Memory's intellectual property, increasing the number of unique capabilities the FSP possesses over legacy or SSD-based storage architectures. Violin Memory takes a holistic approach to addressing IT organizations' key pain points surrounding existing and SSD-based storage infrastructures. The company's platform addresses the performance concerns associated with legacy approaches and provides a more cost-efficient design with fewer hardware and software components than traditional storage. It also delivers enterprise-class data management, and data protection capabilities comparable to the legacy HDD-based storage arrays supporting primary data.

By leveraging a vertically integrated design that utilizes the tight integration between Violin's hardware, firmware, software and intellectual property, organizations can support the same workloads and storage capacity with fewer Violin FSPs than traditional HDD-based primary storage arrays. FSPs require less data center floor space and thus less power and cooling, reducing costs. The potential labor savings from managing a smaller and less complex storage infrastructure is an overall benefit IT organizations need to be aware of as they look at the TCO and weigh the overall value an all-flash platform like Violin's FSP can bring to their infrastructure.

TBR research indicates IT organizations will continue to face the challenge of balancing the demands legacy and emerging applications place on the storage infrastructure with budget constraints, requiring a more cost-effective strategy and approach. Organizations will seek all-flash platforms that can not only provide the enterprise-class capabilities they are accustomed to with legacy primary storage, but also provide the overall TCO required to transform their data center to meet the demands of consolidated mixed workload environments.

Conclusion

TBR believes Violin Memory provides an innovative Flash Storage Platform with its unique flash fabric architecture and enterprise data services that can meet the challenges and requirements IT organizations face as they

consolidate mixed workloads of legacy and emerging business applications. Violin's FSP delivers optimal flash storage capabilities via a vertically integrated design of software, firmware, and hardware that leverages Violin's Flash Fabric Architecture, Concerto OS 7 and Symphony Management to provide a seamless, scalable enterprise storage platform with granular data controls. Violin Memory provides an all-flash storage platform that meets IT organizations' requirements and lays the foundation for organizations seeking to deploy a next-generation architecture that can seamlessly address requirements that will materialize as enterprises continue to transform their IT infrastructures to meet the demands of the changing global economy.

About Violin Memory

Violin Memory transforms the speed of business with high-performance, always-available, low-cost management of critical business information and applications.

Violin's All-flash optimized solutions accelerate breakthrough capex and opex savings for building the next-generation data center. Violin's Flash Fabric Architecture (FFA) speeds data delivery with chip-to-chassis performance optimization that achieves lower consistent latency and cost per transaction for cloud, enterprise and virtualized mission-critical applications. Violin's All-flash Arrays and Appliances and enterprise data management software solutions enhance agility and mobility while revolutionizing data center economics.

Founded in 2005, Violin Memory is headquartered in Santa Clara, Calif.

About TBR

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Serving a global clientele, TBR provides timely and actionable market research and business intelligence in formats that are tailored to clients' needs. Our analysts are available to further address client-specific issues or information needs on an inquiry or proprietary consulting basis.

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