

**Datacenter virtualization ushers in a new era of high-end enterprise 'virtual' storage**

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The rapid emergence of server virtualization over the past few years has helped deliver significant cost savings for IT organizations, as the benefits of large-scale server consolidation and dynamic resource allocation have helped bring down both capital expenditure and operational overhead for a large part of the IT infrastructure.

Until relatively recently, most datacenter virtualization projects have focused on non-mission-critical workloads and applications, as IT organizations have been reluctant to risk moving their IT crown jewels into such a new environment on a broad scale. This is quickly starting to change as tangential areas of IT relative to the server are optimized to handle the new challenges and opportunities that server virtualization presents.

The storage infrastructure is one such area that is increasingly 'ready,' with a large number of storage vendors coming to market recently with offerings that they claim are optimized for virtualization. One popular hotspot here is the small and mid-sized business (SMB) market, where a growing cadre of providers offers systems that leverage the iSCSI protocol to provide SMBs with an IP-based platform for consolidated storage behind their virtual server farms. Many of these offerings provide 'good enough' levels of performance, reliability and availability for these types of environments.

However, it's often overlooked that aside from the legion of SMBs that have embraced server virtualization with gusto in recent years, many of the biggest and most aggressive adopters of server virtualization are some of the very largest IT datacenters – Fortune 500 enterprises and large public bodies whose IT infrastructure includes mission-critical database applications that support online transaction processing and other mission-critical applications like financial trading, airline reservations and messaging applications such as email.

Although such applications have not typically been in the crosshairs of server virtualization vendors, this is starting to change. For example, VMware is driving the notion of the fully virtualized datacenter, where it believes that substantially all of an organization's IT processes – from the relatively trivial to the mission-critical – will in the near future run on virtual infrastructure. Its pending release of vSphere – dubbed the 'virtual datacenter operating system' – represents a major push by VMware to encourage large enterprises in particular to virtualize their tier-one applications, in the process gaining all of the flexibility and consolidation benefits of virtualization, as well as maintaining the required levels of performance.

## **A new era of high-end enterprise storage?**

If the promise of the 'virtual datacenter operating system' is to become a reality, the industry will have to collectively invest in the storage layer to support growing performance, availability, protection and continuity requirements. Why? Because storage is a critical link in the infrastructure chain, especially for tier-one applications. The fully virtualized datacenter potentially places even greater demands on the storage layer, but there are also potentially significant benefits to be realized through storage optimization here.

High-end, block-oriented fiber channel storage systems have long been the industry standard for large enterprises running tier-one applications. Such systems have historically been in a league of their own when it comes to delivering not only the required IOPS and capacity, but also the attendant redundancy, high-availability, disaster-recovery and rich software functionality to meet the most stringent recovery time and recovery point objectives.

However, we believe that massively consolidated virtual server and application environments will usher in a new era of high-end storage, purpose-built for the particular demands of the virtual datacenter. If such systems must be capable of scaling to potentially millions of IOPS and petabytes of capacity across potentially tens of thousands of drives and host ports, then we think 'scale out' architectures are increasingly going to be considered as effective and cost-efficient alternatives to more traditional 'scale up' approaches to dealing with these workload challenges, much as they have been in the server world for a number of years.

In addition to helping deliver more linear performance and capacity capabilities, a scale-out approach could drive other benefits. IT and datacenter managers will have the flexibility to install systems in the most appropriate part of the datacenter, even distributing various 'nodes' across it if necessary – a scenario that was beyond the realm of possibility just a few years ago. In such a massively consolidated environment, it perhaps goes without saying that downtime is simply not an option, but achieving this in a cost-effective manner has historically been tough to realize.

Although all of the above characteristics of performance, availability and reliability are critically important in encouraging large organizations to move to the virtual datacenter, perhaps a greater incentive for IT managers is the prospect of managing IT infrastructure – including storage – as a service, rather than purely as a technology. Up to this point, policy-based management has been more of an aspiration than a reality for most storage managers, since size and complexity have often made it safer – if not easier and less time-consuming – to manage resources and devices at a physical level. But if the storage layer has the intelligence to dynamically share and move resources so that the right data is sitting on the right tier of storage at the right time, then it becomes possible to provision storage services more cost-effectively, in a more automated, policy-based fashion, and in a way that doesn't negatively impact or disrupt any current operations.

## **Using tiered storage to reduce costs and boost performance**

In the current economic environment, any opportunity to deliver hard cost savings is going to be welcomed with open arms; in fact, we'd go so far as to suggest that vendors that don't offer hard evidence of cost savings simply won't be considered by potential customers. We

think the move to the virtualized datacenter will help here, too, both in terms of capital expenditure and, perhaps most importantly, from an operational overhead perspective.

The move to tiered storage, for example, can increasingly help deliver savings on both fronts. Tiered storage for large organizations used to be a choice between putting data on high-cost disk or low-cost tape. More recently, those disk options have expanded so that performance-oriented data can reside on faster fiber channel drives, with less-critical data residing on slower but higher-capacity drives such as Serial ATA. Meanwhile, the emergence of solid-state disk (SSD) drive technology is enabling a new tier of storage, offering superfast performance for the most demanding applications – something that is again high in the mind of large enterprises in particular.

Although these SSD technologies are more expensive to acquire per-gigabyte than traditional disk storage, prices of flash storage are falling fast, and proponents note that a layer of 'tier zero' SSD storage can actually reduce overall costs, since a small amount of SSD storage can deliver the same performance as a large number of 'short stroked' fiber channel drives. Choosing a more performance-appropriate tier of storage can also raise overall storage utilization, since short-stroked fiber channel drives are often badly underutilized from a capacity perspective. Indeed, many vendors claim it should be possible to reduce overall drive costs, deliver more drive IOPS, reduce power and cooling costs, and use fewer overall drives by using a mixture of SSDs, FC disks and SATA disks, versus just using standard FC disks.

### **High-end storage vendors focus on the virtual datacenter**

As we alluded to above, we have recently seen many emerging and established storage vendors in the midrange focus their development and messaging on virtualization. Additionally, we are now starting to see high-end enterprise storage vendors focus more specifically on how their products help users optimize their storage infrastructure for the virtualized datacenter.

The most recent, and perhaps strongest to date, evidence of this is EMC's new Symmetrix V-Max storage system, the latest revision of the storage giant's flagship array. The V-Max uses a radically different architecture that delivers scale-out storage, and it includes a range of features designed to appeal to large customers looking to virtualize their entire datacenter. Aside from the new architecture, EMC is hoping to differentiate itself by helping customers simplify management in virtual environments. Many of these efforts have focused on management abstraction and automation that can help speed up and simplify the complex, repetitive and time-consuming tasks in storage management, many of which can be rendered more complex when dealing with virtualized servers.

To highlight these features, EMC is drawing comparisons with some of the automation capabilities offered by VMware. Just as VMware Infrastructure allows server resources to be quickly provisioned on demand, EMC claims its new Auto- and Virtual-Provisioning allows the same to be done for Symmetrix V-Max storage. It says its enhanced Virtual LUN feature is analogous to VMware's Distributed Resource Scheduler for nondisruptively moving data, while its well-established PowerPath load-balancing tool complements VMware's HA vStorage option.

EMC is also integrating V-Max management with VMware: a new plug-in for VMware's vCenter management console allows EMC ControlCenter 6.1 to auto-discover virtual servers, improving visibility for monitoring, provisioning and reporting. Additionally, integration between VMware's Site Recovery Manager and EMC's Replication Manager promises advanced protection via SRDF (Symmetrix Remote Data Facility) replication for virtual environments.

Meanwhile, we expect to see the other players in high-end storage increasingly focus their messaging and attention on the virtualized datacenter. Hitachi Data Systems, with its enterprise-grade USP-V platform, can virtualize external third-party arrays into one pool, providing what it claims is unrivaled consolidation capabilities, as well as other optimization features such as thin provisioning and dynamic volume expansion. The company has highlighted server virtualization as a key focus area for this year right across its portfolio, including the high-end USP-V.

While IBM has been less forthcoming so far about its plans around datacenter virtualization specifically, there's no doubt this is also a strategic focus area for its high-end storage business. IBM's flagship enterprise storage platform is its DS8000 series. A recent update saw Big Blue add SSD support to the DS8000, as well as support for 1TB SATA drives and full-disk encryption, although it still lacks support for thin provisioning. IBM is also aggressively pushing its new XIV storage system for the virtualized datacenter, although the DS8000 remains IBM's primary play for high-end, performance-oriented storage.

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