CHANGING THE RULES OF THE GAME:
TOP 5 REASONS TO ADOPT APPLICATION-AWARE STORAGE

Virtualization has been on such an impressive growth curve over the past decade that it no longer seems like the "next new thing." But it's important to keep virtualization's formidable footprint in context: Most large and midsize organizations already have virtualized at least some percentage of their data center infrastructure (compute, storage or networking), and most x86 server workloads have been virtualized for the past few years.[1]

As virtualization has transformed from an exciting new technology to a mainstream infrastructure blueprint, many IT organizations have reaped the benefits of reduced capital expenditures, easier scalability and improved IT agility and flexibility. But many hurdles can also accompany virtualization, including the management challenges associated with virtual machine (VM) sprawl. Not the least of these challenges is the increasing disconnect between data center managers pushing their virtualization programs to the max and storage administrators who often remain bound to legacy storage infrastructure best suited for traditional physical environments.

As a result, IT departments are looking for new ways to deploy, provision and manage storage in an increasingly virtualized environment so they can make business outcomes—embodied in their key applications—their focal point. This has a significant impact on storage decisions in many areas, including performance analysis, capacity planning, storage management, availability, data protection and storage economics. Making the transition from physical to virtual has been far from painless for IT departments. Virtualization-savvy data center managers talk about applications and workloads, while their storage counterparts still speak in terms of data volumes, logical unit numbers (LUNs) and spindles.

To bridge that gap and help organizations adapt their storage infrastructure for the current and future realities of virtualized infrastructure, many organizations are evaluating and implementing a new infrastructure model: **application-aware storage**. In this model, IT organizations deploy storage solutions that put the spotlight on virtualizing applications and services instead of requiring considerable attention in managing physical storage devices and arrays. This focus on applications aligns with how more and more organizations view the role of IT—to support improved business outcomes through smarter and more efficient utilization of applications. This has prompted IT departments and infrastructure teams to focus on system performance, quality of service (QoS), streamlined deployment and being able to scale applications—and the storage that supports those apps—in an increasingly virtualized environment.

Application-aware storage simplifies troubleshooting and ongoing management by providing VM-level visibility, as well as control, insight and agility. As a result, storage provisioning becomes more efficient, deployment becomes faster and easier, and budgets previously spent on more devices and physical storage solutions are freed up for application-centric projects.

1 "Survey: 51% of x86 Servers Now Virtualized," ServerWatch, Jan. 17, 2013

Here are five reasons why IT organizations are moving to, and succeeding with, application-aware storage:

1. **Application-aware storage provides VM-level visibility and control across the entire infrastructure.** VM sprawl has significantly increased storage management complexity, while negatively affecting storage capacity utilization rates. As a result, storage performance—measured in such metrics as latency and I/O rates—has suffered, creating frustration among business users and support headaches for storage administrators. Moving to an application-aware storage model helps address these challenges by locating and surfacing information on VM behavior, infrastructure performance and usage rates. It also helps by providing per-VM snapshots, cloning and efficient wide-area networking replication in order to improve performance, while dramatically reducing the need to overprovision storage to ensure proper response and capacity availability. As a result, storage costs and management complexity are reduced.

2. **Intelligence and automation improves deployment and management.** Today's application-aware storage solutions are "self-learning," in that they bring higher levels of intelligence and automation to systems deployment and ongoing storage management. These highly automated storage solutions eliminate multiple levels of data mapping that results in more complex management often seen in traditional physical storage infrastructure. As a result, the already-stretched in-house IT staff can manage more storage with less effort, and automation-centric management philosophies of application-aware storage enable a more logical and customizable policy development and management process. Another key element is the "hypervisor-agnostic" nature of application-aware storage, reflecting today's reality of heterogeneous hypervisor usage throughout organizations.

3. **Application-aware storage is based on agile services that scale to the demands and requirements of the applications.** One of the hallmarks of agility in today's IT environment is the ability to run virtual infrastructure—servers, storage and desktops—simultaneously without tuning. This ability to run mixed workloads on a single system, across applications, is essential to delivering very low latency. The agility of application-aware storage results in enterprise-class scalability for even relatively small organizations without having to resort to overprovisioning of storage, resulting in improved QoS by providing each VM with its own I/O "lane." Finally, the resulting performance gains are typically delivered in a considerably smaller physical footprint because it doesn't rely on overbuying storage infrastructure to deliver the capacity and responsiveness necessary for today's business-critical applications.

4. **Use application-aware storage to take advantage of flash's benefits while avoiding its hassles.** Yes, flash storage is extremely fast, is great on power consumption and takes up less physical space than traditional hard disk drives. But simply deploying all-flash storage arrays based on traditional storage architecture can actually add complexity to storage management. The so-called "shelf of flash" often requires major upgrades in storage management software and in storage infrastructure itself, which may eat into capacity utilization rates. Many IT departments are discovering that moving from hard disk-based solutions to all-flash solutions doesn't really address long-term issues of scalability and utilization rates. In fact, all-flash arrays aren't any more optimized for VMs than traditional disk-based storage has been. Application-aware storage leverages awareness of the applications, VMs and vDisks in your virtual environment to intelligently store and manage those images down to the lowest layers of the storage array. With application-aware storage, organizations can experience the performance benefits of flash and automatic alignment of virtual disks with the economics of a hybrid (flash plus hard disk) solution.

5. **Application-aware storage delivers superior economic benefits to traditional storage infrastructure solutions.** From an operating expenses perspective, there are several financial benefits to application-aware storage. It's typically easier to install and manage than traditional storage, because it's based on a single data store rather than on numerous RAID groups, LUNs and volumes. As a result, there's less IT management overhead, and the highly automated architecture helps eliminate per-VM tuning and significantly improve service-level agreement compliance. Capital expenses also are lower, since organizations can eliminate the purchase of unused capacity as an overhead buffer to avoid performance issues that traditional storage experiences when LUNs approach 80% full or more. Application-aware storage allows organizations to use all the storage capacity they purchase. Instead of thinking about low cost per raw gigabyte, IT organizations will get improved economic benefit by evaluating storage based on cost per "usable" gigabyte or, eventually, storage costs per VM.

Application-Aware Solutions from Tintri

One company that has made application-aware storage its bread and butter is Tintri. With "smart" storage that sees, learns and adapts to an increasingly virtualized infrastructure, Tintri's storage solutions help IT organizations focus on applications instead of on managing storage infrastructure.

Tintri's application-aware storage solutions provide VM-level visibility, control, insight and agility, which helps to eliminate planning and complex troubleshooting by often-overworked IT departments.

The company's VMstore product line uses its unique FlashFirst™ architecture to natively understand and integrate with virtual infrastructure. By using flash efficiently and selectively, the VMstore line enables key features such as deduplication, compression and automatic data placement to achieve 99% of the I/O delivered by flash. Storage management functionality such as performance and capacity monitoring, snapshots, QoS management and VM-level replication helps to simplify storage management and keep storage provisioning costs low.

Among the major, performance-intensive customers that utilize Tintri's application-aware storage are Advanced Micro Devices, F5 Networks, TIBCO, SonicWALL and Northwestern University.

Summary

As virtualization becomes the norm throughout organizations of nearly all sizes, and as more organizations look to private cloud solutions, IT decision makers are increasingly in need of ways to keep storage costs and complexity under control in the face of often-runaway VM sprawl. Application-aware storage is designed to help achieve those goals by giving IT leaders and storage administrators VM-level visibility into application performance and availability, and by properly provisioning storage resources to meet those requirements in a virtualized environment.

To learn more about how Tintri is using application-aware storage solutions for VM-level insight and intelligence, go to **www.tintri.com/products/tintri-vmstore**.