TINTRI VMSTORE
Zero Management Storage

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Storage challenges in the virtual infrastructure are tremendous. Virtualization consolidates more IO than ever before, and then obscures the sources of that IO so that end-to-end visibility and understanding become next to impossible. As the storage practitioner labors on with business-as-usual, deploying yet more storage and fighting fires attempting to keep up with demands, the business is losing the battle around trying to do more with less.

The problem is that inserting the virtual infrastructure in the middle of the application-to-storage connection, and then massively expanding the virtual infrastructure, introduces a tremendous amount of complexity. A seemingly endless stream of storage vendors are circling this problem today with an apparent answer – storage systems that deliver more performance. But more "bang for the buck" is too often just an attempt to cover up the lack of an answer for complexity-induced management inefficiency – ranging across activities like provisioning, peering into utilization, troubleshooting performance problems, and planning for the future.

With an answer to this problem, one vendor has been sailing to wide spread adoption, and leaving a number of fundamentally changed enterprises in their wake. That vendor is Tintri, and they've focused on changing the way in which storage is integrated and used, instead of just tweaking storage performance. Tintri integrates more deeply with the virtual infrastructure than any other product we've seen, and creates distinct advantages in both storage capabilities and on-going management.

Taneja Group recently had the opportunity to put Tintri's VMstore array through a hands-on exercise, to see for ourselves whether there's mileage to be had from a virtualization-specific storage solution. With no doubt, there is clear merit to Tintri's approach. A virtualization specific storage system can reinvent a broad range of storage management interactions – by being more VM-aware – and fundamentally alter the complexity of the virtual infrastructure for the better. In our view, these changes stand to have massive impact on the TCO of virtualization initiatives (some of which are identified in the table of highlights below) but the story doesn't end there. At the same time they've fundamentally changed management, Tintri has also innovated around storage *technology* that enables Tintri VMstore to serve up storage beneath even the most extreme virtual infrastructures.

On the technology front, Tintri sports a flash-first architecture that deduplicates solid-state storage to make it go further, alongside a sophisticated QoS approach that couples intelligent insight into per-VM IO patterns with algorithms that guarantee fair-service even among a multitude of machines and the most contentious IO. Meanwhile, Tintri is uniquely VM-aware, and can apply these technologies in the right time and place by understanding things like where metadata should be stored for maximum performance and capacity efficiency.

But Tintri is more than just either one of these single management or technology dimensions of innovation. The innovations in these two areas are inseparably intertwined with Tintri, and that's what makes the difference. In essence, with an architecture that guarantees VM performance, Tintri reduces storage interaction to the point that it almost disappears, and every storage operation suddenly becomes just a VM operation – you no longer manage a data store, just VMs. And those VMs

are now wrapped with serious storage capability. Sure, you may be able to execute a snapshot with vSphere's tools, or use VMware's Linked Clone features. But the real power is in using those same features and having Tintri generate instant near-zero-space snaps or clones, or similarly provision near-zero-space clones of desktops that enable greater flexibility than Linked Clones.

Arguably, this is the way it should be. In a VM-centric world, storage provisioning automatically happens, and the VM becomes the building block. Since the storage system is no longer a distinct entity that must be managed, this allows Tintri to function as a virtual infrastructure building block with almost no overhead, no matter how many Tintri VMstore arrays are involved. On top of this, emerging technologies like Tintri's Global Center are poised to reshape Tintri management at scale into an even greater advantage. While we did not specifically review it here, Global Center is Tintri's new solution and architecture for managing many Tintri systems (up to 32 VMstores per Global Center) while preserving all of the insight and analytics that were responsible for the clearly differentiated Tintri management capabilities in this exercise.

The Tintri VMstore is as close to truly zero management storage as we have ever seen. More importantly, as we'll discuss in this report, the impacts are significant enough that we think every business should be considering what Tintri and virtualization-specific storage can do for TCO.

Highlights from Validating Tintri VMstore		
Performance: Observed mixed R/W Performance per VMstore	**6X** better than typical mid-range storage systems *with* SSD.	*Delivering 60,000 to 75,000 IOPs per 3U building block, Tintri's flash-first architecture delivers superior performance density over typical performance-accelerated traditional storage systems, even when they sport mixed SSD/HDD configurations.*
Capacity Advantage	**6X** or better capacity than typical mid-range storage of similar performance	*At 4.5TB usable storage per rack unit, Tintri sets a high bar for storage density behind the virtual infrastructure. (And a new T650 increases this to 8.4TB usable per U)*
Routine Management Time and Effort at Scale – hypothetical estimation of 8,000 VMs	**52X** advantage	*Tintri, even at scale, can reduce annual time spent on deployment and provisioning to minutes, versus weeks for storage made up of traditional arrays.*
Estimated time to troubleshoot typical virtual infrastructure performance problems	Minutes versus days	*VM IO intelligence and end-to-end path insight allows administrators to drill down into individual workload demands and utilization, and immediately pinpoint problems, even if they are in the hypervisor or network.*
Our estimated annual management time and effort impact from Tintri storage	**60X** reduction	*In-depth, end-to-end virtual infrastructure visibility and consistent ease of use vastly simplify virtual storage administration, yielding a distinctly different management approach versus traditional storage*

Table 1 : Highlights from our hands-on testing of Tintri's VMstore touching on both core storage capabilities in the virtual infrastructure, and management efficiencies.