



# Faster, More Cost-Effective VDI Deployments with All-Flash HyperConverged Infrastructure

## 10x higher price-performance benefit over Nutanix

**AT A GLANCE** The cost and performance of infrastructure has long plagued virtual desktop infrastructure (VDI) adoption. Fortunately, the latest hyper-converged infrastructure (HCI) solutions address these issues. This performance benchmark study compares the third-party testing results of the Gridstore all-flash HyperConverged Appliance 3.2 (HCA)<sup>1</sup> with Nutanix published testing results on their NX-3450 series product. With all-flash storage, Gridstore delivers 6.6X faster performance, with support for 30% more virtual desktops, for a 10X increase in the price performance of each virtual desktop over the Nutanix local replica architecture.

### Benefits

- **Higher performance:** With an architecture more suited to VDI deployments, Gridstore performs 6.6X faster than Nutanix
- **Lower performance variance:** Compared to Gridstore, Nutanix has 13X larger performance variances
- **Higher ROI:** Gridstore supports up to 30% more desktops and they're 6.6X faster

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### The State of VDI

VDI offers CIOs the opportunity to reduce total cost of ownership (TCO) through lower desktop infrastructure acquisition cost with the use of thin clients and bring-your-own-resource/device (BYOR/BYOD) programs. With lower provisioning and support cost and support for new computing form factors, such as tablet-based computing, VDI gives a workforce more flexibility, while moving IT into new territory as they extend beyond desktop PCs. Successful criteria of VDI are price and performance:

- Cost per desktop determines the return on investment (ROI) and whether VDI is worth pursuing from a financial perspective
- Performance of the desktop determines whether the user experience is at least as good as the physical desktop—slow performance will cause end users to reject VDI

A common obstacle to VDI projects is access to shared infrastructure resources (i.e., servers with SAN storage) used to run core business systems. Storage administrators frequently are not comfortable putting

desktops on the same infrastructure as critical business systems. And if they are, access is often granted in such a way that critical business applications get priority, but at the expense of VDI performance and/or scaling limitations, which can lead to VDI rejection by end users. It is estimated that 50% of enterprises adopt this approach of leveraging existing infrastructure and hit these political as well as scaling obstacles later in the deployments, resulting in higher costs that erode VDI ROI.

End-user acceptance is primarily driven by virtual desktop performance as well as performance variances of the virtual desktop. If the average performance is perceived to be slower than a physical desktop, adoption can be impacted. If there are large performance variances (i.e., it works well, but then there are periods of very slow response), user adoption can be impacted. It's important to note that the VDI I/O profile is practically the exact opposite to traditional enterprise workloads. Speaking at the BriForum VDI conference in London, Ruben Spruijt, CTO of PQR (an ICT infrastructure specialist) said, "In my experience a user's PC spends 20-40% of the time doing reads, and 60-80% on disk writes."<sup>2</sup>

<sup>1</sup> HCI version 3.5 is now available and is 30% faster

<sup>2</sup> [www.computerweekly.com/feature/How-will-storage-infrastructure-change-with-VDI-deployments](http://www.computerweekly.com/feature/How-will-storage-infrastructure-change-with-VDI-deployments)



## Evaluating VDI Performance and Cost per Desktop on HCI: Nutanix vs. Gridstore

The following section looks at two different HCI architectures. Taking into consideration the unique I/O requirements of VDI, the two architectures are outlined and evaluated using Login VSI, a common VDI benchmarking tool with publically available results.

Nutanix provides an HCI VDI solution in clustered “nodes.” As shown in Figure 1, each node runs virtual machines (VMs), just like a standard VM host, and a special Controller VM (cVM) that controls access to the distributed storage system. Data is written to the local cVM (local storage) and is also replicated between cluster nodes for protection from one or two node failures.

With Nutanix’s architecture, for read processing, if data is located in the local flash tier, the system provides low-latency reads of local data by not having to cross the network to other nodes for the data. However, if the data is in the HDD tier, performance can be several orders of magnitude slower. Similarly for write processing, all writes must traverse the network and are replicated to the other nodes. For every write I/O, the data is effectively written three times to three nodes—resulting in 200% data being transferred across the network and 300% total storage load being placed across the three nodes. The Nutanix architecture adds latency to every I/O by having to traverse three virtualization stacks for every write and consumes resources from other guest VMs to handle the replicated I/Os.

The impact of Nutanix’s architecture on VDI read/write processing is shown in Table 1, where Login VSI performance testing by Nutanix<sup>3</sup> and Gridstore shows that Gridstore is faster and supports more desktops than Nutanix for a much higher price-performance advantage.

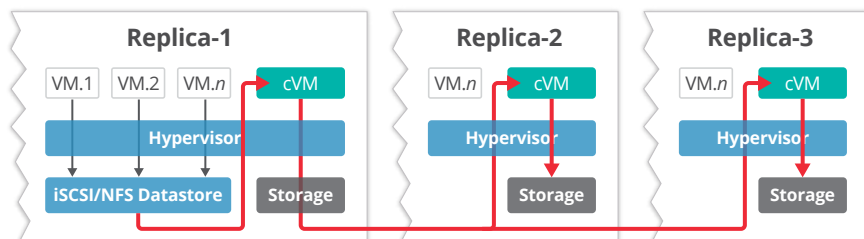


Figure 1. Nutanix architecture

Equipment	Nutanix NX-3450 Series	Gridstore GS-3000-90
Processor	Dual Intel Xeon E5-2670	Dual Intel Xeon E5-2690
RAM	256GB	256GB
Storage	Hybrid	All-flash
Number of Nodes	Four	Four
Number of Desktops	100 desktops per node	143 per desktops per node
Baseline Performance	5,280 ms	798 ms
Performance Variance	3000-5000 ms	300 ms
VSI Index (Performance)	5742 ms	1384 ms

Table 1. Login VSI benchmark results for Nutanix and Gridstore HCI solutions

3 Nutanix Citrix XenDesktop on Hyper-V Reference Architecture, v 1.1, Jan 2014



## Gridstore Parallel All-Flash Architecture Advantage

Gridstore leverages a parallel all-flash architecture that drives higher density, higher performance and lower costs compared to HCI platforms that use a replication architecture like Nutanix. Through a combination of hyperconvergence and high performance inline erasure encoding, Gridstore significantly reduces the total cost to make all-flash VDI affordable.

Gridstore All-Flash HyperConverged Infrastructure creates a shared infrastructure that does not impact existing core business applications. Gridstore consolidates infrastructure layers (compute, SAN, storage) into a single tier, thus radically reducing the TCO, while all-flash VDI drives the highest performance desktops with the minimum performance variances. With write-intensive VDI I/O workloads, local replica caching has no impact on 80% of the I/O (the writes). In fact, since 80% of I/O is

replicated, this actually doubles the system load on a Nutanix HCI solution.

Contrast this with Gridstore, which runs bare metal and relies on inline erasure encoding and a parallel all-flash architecture. As shown in Figure 2, Gridstore eliminates replicas and the additional replication workload placed on other nodes in the cluster, providing efficient system load distribution across all nodes.

The benefits of parallel all-flash and inline erasure encoding technology include:

- Higher performance with fractional parallel writes across nodes with all flash
- 50% lower resource utilization by eliminating the replication load placed on other cluster nodes and the network, allowing more VDI desktops
- Increased desktop density through better resource utilization which drives down both acquisition and operating costs
- Consistent low latency performance for all I/O—not just cached data—which eliminates variable performance differences between flash and spinning disks

### High Performance Erasure Encoding, No Replicas

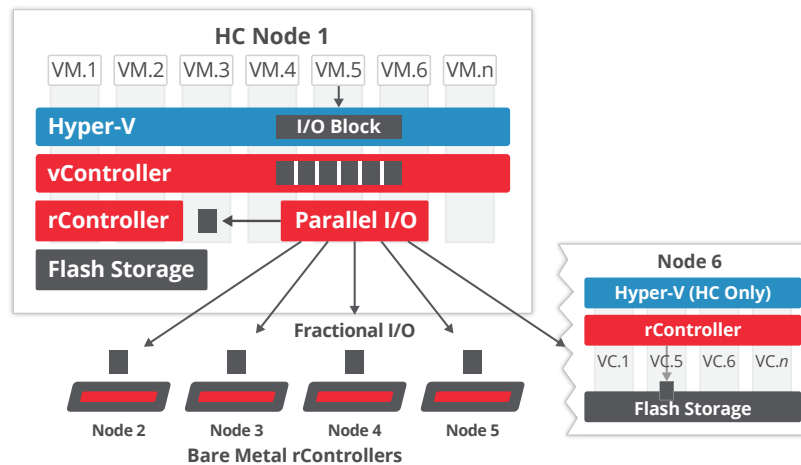


Figure 2. Gridstore parallel all-flash HCI architecture



“AN ORGANIZATION LOOKING TO DEPLOY VDI TODAY HAS ALL-FLASH ARRAY OPTIONS, DE-DUPLICATION OFFERINGS, HYPER-CONVERGED (SCALE-OUT) SYSTEMS, AND EVEN LOCAL STORAGE AGGREGATION PRODUCTS AVAILABLE – ALL OF WHICH CAN NOT ONLY INCREASE PERFORMANCE OF VDI, BUT LOWER THE COST AS WELL”

– Gartner Blog Network  
*The Secret Bottleneck of VDI*  
by Mark Lockwood  
October 10, 2014

## Conclusion

Cost per desktop and performance per desktop are key criteria for determining the success of VDI deployments. The results of the Login VSI benchmark testing show that Gridstore better enables successful VDI deployments than Nutanix, as summarized below.

### Performance (VSI Index)

VDI projects rely on a virtual desktop user experience that is equivalent to or better than a standard desktop experience. With an architecture more suited to VDI deployments, Gridstore performs 6.6X faster than Nutanix.

### Performance Variance

Large performance variances result in disgruntled end users and lost productivity. Compared to Gridstore, Nutanix has 13X larger performance variances.

### Cost

Due to better resource utilization by eliminating the replication processing, Gridstore supports up to 30% more desktops than Nutanix and runs these desktops 6.6X faster with significantly lower performance variance for an overall greater ROI.

With all-flash storage now cost-effectively available from Gridstore, it doesn't make sense to deploy VDI with a hybrid storage solution with slower performance and higher performance variances that lead to poor end user adoption. When considering which infrastructure option to use for VDI, Gridstore offers a cost-effective all-flash HCI solution with a scale-as-you-grow model and centralized single-pane-of-glass management. IT managers can maximize their VDI benefits with the Gridstore HCA that is purpose-built for Microsoft Hyper-V VDI projects.



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