DELL EMC SCALEIO PERFORMANCE VALIDATION
Virtualization Using VMware Tools

SOFTWARE-DEFINED STORAGE & DELL EMC SCALEIO

Dell® EMC® ScaleIO® is designed to address today’s block storage challenges in the data center. As a software-defined block storage solution, it offers the ability to modernize the data center with an agile and resilient platform running on industry-standard servers. ScaleIO provides the scalability, performance, flexibility, elasticity, and TCO required for enterprise & modern apps, including VMware environments.

STORAGEREVIEW TAKES ON EMC SCALEIO WITH VMWARE VMMARK & VSAN HCI BENCH PERFORMANCE TOOLS

StorageReview.com (StorageReview), a well-known, independent storage review body, validated EMC ScaleIO running on ScaleIO Ready Nodes (formerly VxRack Nodes) for virtualized workloads. The tools used for testing these workloads were VMware VMmark and VMware VSAN’s HCIbench. StorageReview states:

“The VMmark Virtualization Benchmark is a comprehensive multi-host datacenter virtualization benchmark designed to mimic the behavior of complex consolidation environments. Legacy benchmarking methodologies designed for single-workload performance and scalability are insufficient for server consolidation, which gathers a collection of workloads onto a virtualization platform consisting of a set of physical servers with access to shared storage and network infrastructure.

The ability to virtualize irregular workloads while effortlessly load-balancing and automating workload provisioning combined with a wider range of administrative tasks has revolutionized server usage. As such, VMmark benchmarking focuses on user-centric application performance and accounts for the effects of this infrastructure activity (that can impact CPU, network, storage or other performance) on overall platform performance.”

“VMware’s VSAN group recently announced a free storage performance testing tool for Hyperconverged Infrastructure (HCI), the HCI benchmark or HCIbench. While stressing traditional arrays with I/O or bandwidth tests is fairly well understood, applying synthetic tests to HCI gear requires a careful approach and a steep learning curve.

With traditional storage infrastructure you setup your I/O generator of choice with a given workload profile, point it to some LUNs and let it rip. Hyperconverged testing requires a large-scale approach where many VMs (often 10-64) simultaneously apply that workload across multiple vDisks, at the same time… not to mention collecting all of that data when the task finishes.

This type of approach is needed to adequately stress the platform and move closer, although not equal to, a real-world production setting. As you might imagine this is hard for experienced reviewers to accomplish and can be impossible for many end-users to complete in a reasonable time frame. VMware’s HCIbench helps make this testing process much easier and lets anyone who can deploy a pre-built VM test as well as an independent reviewer test HCI better.”

CONFIGURATION
- VxRack Node (All-Flash PF100)
- Dell PowerEdge R730 Servers
- VMware vSphere 5.5 / 6.0

DEPLOYMENT CHOICES
- Storage-Only / 2-Layer
- Hyper-Converged Infrastructure

WORKLOADS TESTED
- Virtualization

BENCHMARK TOOLS
- VMmark
- HCIbench

EMC SCALEIO PROS
- Simple deployment and management
- Ultimate flexibility in deployment
- Incredible high-performance

http://www.storagereview.com
**VMMARK PERFORMANCE REVIEW (STORAGE-ONLY / 2-LAYER)**

The first set of virtualization performance testing uses VMmark to emulate virtualized workloads on a storage-only ScaleIO cluster. The objective is to benchmark the All-Flash Nodes' performance using a VMware benchmark tool that emphasizes system performance for virtualized workloads as well as stresses the entire system.

It’s not surprising that the ScaleIO storage-only cluster holds up very well during this testing, maxing out at 26 tiles while showing even gains from start to finish. At the max point, there is still some capacity left, but the compute front-end is maxed out. These impressive results continue to highlight the fact that, despite all the flexibility within ScaleIO, there is no compromise in performance.

**VMMARK SCORING (STORAGE-ONLY / 2-LAYER)**

![VMware VMmark 2.5.2 Virtualization Benchmark](image)

26 Tiles = 35.1 VMmark Application Score

StorageReview summarizes:

“The [ScaleIO Ready Node] has been showing record setting performance as we run it through our benchmarks.”

“The [ScaleIO Ready Node] continues to impress on its capabilities overall.”

More info: [http://www.storagereview.com/emc_vxrack_node_powered_by_scaleio_vmmark_performance_review_2layer](http://www.storagereview.com/emc_vxrack_node_powered_by_scaleio_vmmark_performance_review_2layer)

**VMMARK PERFORMANCE REVIEW (HYPER-CONVERGED)**

The second set of virtualization performance testing uses VMmark to emulate virtualized workloads on a hyper-converged (HCI) ScaleIO cluster. The objective is to benchmark the All-Flash Nodes' performance using a VMware benchmark tool that emphasizes system performance for virtualized workloads as well as compare the HCI results to the storage-only ScaleIO test results.

It’s hard to not be repetitive, but once again the test results are extremely astounding. The ScaleIO HCI cluster maxes out at an incredible 28 tiles (compared to 26 tiles for the ScaleIO storage-only cluster) while barely breaking a sweat – only 14% of the CPU is consumed at the full 28-tile load. Adding to this, latency was around 0.6ms for reads and 0.5ms for writes – leaving plenty of performance available for workloads in case any VM migrations are required due to a drive failure. Clearly ScaleIO has a very low overhead impact.
VMMARK SCORING (STORAGE-ONLY VS. HCI)

StorageReview summarizes:

“...ScaleIO hardware still wasn’t pushed to the brink.”

“It’s rare in the enterprise storage market that claims such as incredible performance and very-low overhead play out as well as we’ve seen with EMC’s [ScaleIO Ready Node]…”


HCIBENCH PERFORMANCE REVIEW (STORAGE-ONLY / 2-LAYER)

The third set of virtualization performance testing uses HCibench to gather synthetic performance statistics on a storage-only ScaleIO cluster. The objective is not to show peak performance capabilities, but rather to benchmark the All-Flash Nodes’ performance in order to make comparisons between ScaleIO in a storage-only deployment versus ScaleIO in a hyper-converged deployment. It’s not a true apples-to-apples comparison, but does provide a good representation as to how the two deployment types will perform. Additionally, what is important here in regard to other products is how performance goes down with capacity used – and how it did not decrease significantly with ScaleIO.

Small-block random transfers and large-block sequential workloads were tested, with strong results. It’s important to note (which StorageReview does) that the All-Flash ScaleIO Ready Node is capable of reaching higher synthetic numbers with other benchmarking tools such as FIO. So, while not measuring peak performance, the tests do provide a strong baseline for comparing to a hyper-converged ScaleIO deployment.
**HCIBENCH BANDWIDTH (STORAGE-ONLY / 2-LAYER)**

![HCIBENCH Bandwidth Graph](image)

32K Block Size Sequential Read Bandwidth = 9 GB/s | Sequential Write Bandwidth = 4.7 GB/s

StorageReview summarizes:

“The EMC VxRack Node continues on its path of being **high-performance** storage array to be reckoned with.”

“Bandwidth in this scenario was also **very strong**…”


**HCIBENCH PERFORMANCE REVIEW (HCI)**

The fourth set of virtualization performance testing uses HCIbench to gather synthetic performance statistics. The objective of the HCIbench testing for a HCI ScaleIO cluster is to compare the performance results from the HCIbench testing of the storage-only ScaleIO cluster. It is important to note that it is NOT to show maximum performance capabilities. The remarkable outcome is that most of the ScaleIO HCI test results are comparable with the storage-only results, while only a few tests show a minor performance hit. The primary benefit, however, is that a ScaleIO HCI cluster saves considerable rack space compared to a ScaleIO storage-only cluster (2U vs. 10U). This impacts costs, both CAPEX and OPEX, as the need to purchase / power / cool / administer less hardware results in lower TCO for customers deploying ScaleIO HCI clusters.

**HCIBENCH BANDWIDTH (STORAGE-ONLY VS. HCI)**

![HCIBENCH Bandwidth Graph](image)

32K Block Size Sequential Read Bandwidth = 8.24 GB/s | Sequential Write Bandwidth = 4.16 GB/s

StorageReview summarizes:
“Similar to the EMC [ScaleIO Ready Node] Two-Layer configuration, the HCI platform offers tremendous large-block transfer performance.”

“Being generally agnostic makes ScaleIO all that much more flexible when being put to work in large environments that may have to support a wider range of software.”


KEY TAKEAWAYS

1. EMC ScaleIO, software-defined block storage, is a flexible and highly-performant solution for customers running virtualized workloads.

2. In relation to storage-only configurations, hyper-converged configurations deliver impressive results with less compute power.

3. Not one, but four reports prove that EMC ScaleIO is an optimal solution for virtualized workloads, especially VMware.

CONCLUSION

There is no question that EMC ScaleIO is a highly scalable, highly performant block storage platform for VMware workloads. By delivering software-defined storage via Server SAN, its massively parallel and distributed architecture enables shared storage without the bottleneck of a cache. The performance results from StorageReview further confirm this, with outstanding results regardless of the whether a customer chooses a storage-only or hyper-converged deployment. Based on the results from StorageReview, it is clear that ScaleIO is a cornerstone of the modern data center, and the optimal software-defined, hyper-converged platform for VMware environments.