

CGH Medical Center uses Virtana Storage Load Testing to assure new storage deployment will meet future performance needs



ABOUT

Industry
Healthcare

Headquarters
Sterling, Illinois, USA



OBJECTIVE

Perform comprehensive storage workload performance validation and testing to analyze and model production storage workloads, determine optimal storage systems and configurations, identify performance limits, and contain CAPEX costs



RESULTS

- Validated the arrays and configurations proposed by the new storage vendor and mitigated the risks of deploying the new arrays into the production data center
- Gained full confidence that storage system being selected can support the workloads in the production data center today and beyond

ABOUT CGH Medical Center

CGH Medical Center is a progressive acute care facility located in the heart of the Sauk Valley, in Northern Illinois. Since opening in 1909, CGH has consistently received high ratings for delivering quality care to its community, positive public awareness, safety, and high patient satisfaction. CGH is committed to the health and wellness of the community, and to providing leadership in the healthcare field.



THE CHALLENGE:

CGH relies on a diverse application portfolio that includes electronic medical records, billing, lab, radiology and several other mission-critical systems. These interdependent systems must operate together without fail for CGH to deliver on its mission to provide excellent patient care through outstanding skill and heartfelt passion. IT supports these mission-critical applications with an active/active campus-style data center infrastructure. To optimize utilization, CGH makes use of both server and storage virtualization technologies from VMware and their storage vendor. For many years, CGH has used Virtana Infrastructure Performance Management (IPM) to ensure optimal performance and availability in its highly virtualized environment. The IT team informed the Virtana team that their existing fibre channel storage, supported by Cisco switches, was getting expensive to maintain and needed to be upgraded.

Healthcare storage infrastructure at centers like CGH must keep up with bandwidth-demanding applications, a growing user community, and access to information from remote sites. Doctors, patients, and hospital administrators all assume that medical



and insurance records will be online and available with good response times. Downtime or poor performance of the storage infrastructure can delay or compromise care.

To keep pace, the IT professionals at CGH looked at the adoption of new, more cost-efficient storage technologies, but there were many unknowns. This is why storage performance validation is becoming a key component to cost-effective and responsive storage system rollouts.

The primary goals were to reduce the risk of organizational interruption (slowdowns or outages) and to ensure the right product and product configuration is acquired. More specifically, CGH deemed that the evaluation of storage infrastructure should include modeling of the production application workload environment as accurately as possible. They needed to pre-determine the performance limits of the proposed storage system so that the upgrade would be as flawless as possible and support their anticipated worst-case growth needs. "Budget decisions of this size are reviewed by the board of directors and no one in IT wanted to report a bad decision," said Michael Fritz, Network and Data Center Supervisor. A validation test was called for, but CGH's capable staff doesn't employ a full-time test or performance lab.

THE SOLUTION:

When Fritz and Greg Beck, CGH Systems Administrator, learned from their local Virtana Solution Engineer that Virtana offered a storage performance and validation service using Virtana Storage Load Testing, the industry's leading storage workload performance validation platform, they engaged with Virtana immediately to quantify the performance of the proposed storage arrays. As a long-time Virtana IPM customer, CIO and Vice President of Support Services Randy Davis was very comfortable with his experience with Virtana, so it was a natural fit.

The new storage vendor offered a 30-day performance guarantee, so CGH could have put the new system straight into production, but that still carries a risk as they cannot do "what if" testing to guarantee future performance as needs grow. Though CGH did have the proposed system at their disposal for testing, they had to complete the tests within 30 days. Anyone who's done an infrastructure POC can appreciate how challenging this can be.

So, on January 26, the Virtana and CGH teams extracted a representative workload from the production systems using Virtana IPM. They then ran those workloads with Virtana Storage Load Testing from Jan 28 to Feb 1, at three scaled levels—baseline 1X, 2X, and 3X—to model and account for significant growth. The final test and validation report was presented on February 6. The entire process of profiling the existing workload, testing on the proposed array, analysis, and results took a little more than one week.



RESULTS:

To everyone’s delight, the CGH workload test performed very well on the proposed new storage platform. The 1X baseline load (as corresponding to current production levels) resulted in the almost identical behavior of the throughput and IOPS but much lower and steadier latency compared to the older production system. See graph 1 below for latency results.

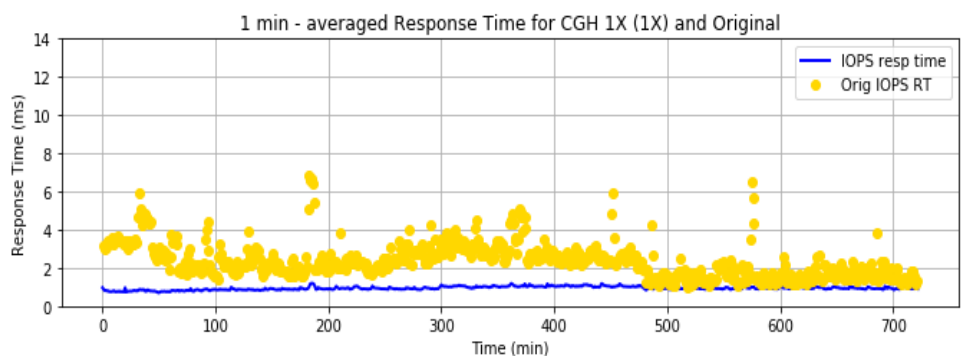
As the CGH workload was scaled to 2X, the proposed storage platform produced double the throughput and IOPS with only slightly increased average latency as compared to 1X. The latency at 2X did exhibit slightly more volatility with slightly higher maximum latency peaks, but were well within expected parameters.

As the CGH workload was scaled further to 3X, the proposed storage platform produced triple the throughput and IOPS with another slight increase in average latency over 2X results. However, the latency at 3X did exhibit even more volatility with larger maximum latency peaks. This demonstrated that the storage platform might be nearing a limiting point in further workload increases even though the 3X throughput and IOPS levels were attained

Table 1: Select key performance indicators

Load	IOPS		Throughput (MB/s)		Latency (ms)	
	Avg.	Max.	Avg.	Max.	Avg.	Max.
Original	7,072.75	23,722	217.48	708.91	2.58	6.86
1X	7,078.71	23,726	216.08	738.19	0.91	12.84
2X	14,157.62	47,442	432.08	1,457.62	1.17	13.66
3X	21,234.44	71,168	648.07	2,176.32	1.37	329.64

Graph 1: Baseline Latency



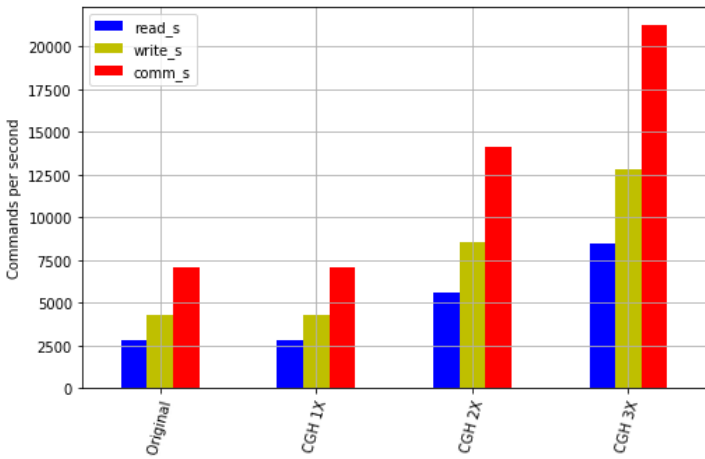
The graph on the right is an example of the test results. Graphs were generated for IOPS, throughput, and latency for 1X, 2X and 3X workloads, as well as for sub-workload clusters, for analyzing LUNS with similar behavior.



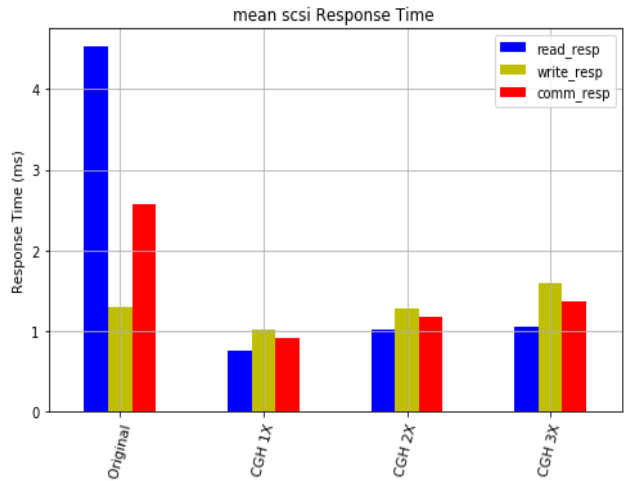
The IO performance was achieved with significantly lower Latency (blue line) than the current production environment (yellow) as the average Response Time was measured at 0.91 ms as compared to 2.58 ms for the original data. Another way to visualize results is shown with the following Key Performance Indicator (KPI) bar charts.

The average IOPS bar chart above and the average latency bar chart below shows how well IOPS scale from 1x to 3x, and how insignificantly latency changes while the load scales from 1x to 3x. Latency, even at 3x, is still overall lower than the original results.

Graph 2: IOPS Comparison



Graph 3: Response Time Comparison



The cost of Virtana’s Storage Load Testing service compared with the budget for the whole storage upgrade project was money well spent,” said Fritz. “With this testing, we now know that the new storage arrays will be able to support our workload growth for many years.”

“We absolutely recommend Virtana’s Storage Load Testing service,” added Beck.

