

Benefits

- The WorkloadWisdom tests validated the arrays and configurations proposed by the new storage vendor, ensuring the purchase was “right-sized”
- Tests mitigated the risks of deploying the new arrays into the production datacenter
- The CGH team gained full confidence that the storage system being selected can support the workloads in their production datacenter into the future

“The cost of the VI performance testing service compared with the budget for the whole storage upgrade project was money well spent.”

“With this testing, we now know that the new storage arrays will be able to support our workload growth for many years.”

Michael Fritz

Network and DC supervisor CGH Medical Center

“We absolutely recommend VI’s workload testing service.”

Greg Beck

Systems Administrator CGH Medical Center

Storage Performance and Validation Service uses WorkloadWisdom to provide assurance that new storage deployment will meet future performance needs



Medical Center Background

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.

Environment Overview

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 datacenter 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 the Virtana VirtualWisdom Infrastructure Management Platform to ensure optimal performance and availability in its highly virtualized environment.

Recently, the IT team informed the local Virtana team their existing fibre channel storage, supported by Cisco switches, was getting expensive to maintain and needed to be upgraded.

Challenges

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 cause delayed or compromised critical healthcare.

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

The primary goals are 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", according to 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 Evaluation and Implementation

When Michael Fritz and Greg Beck, CGH Systems Administrator, learned from local Virtana Solution Engineer Mark Samuelson, that Virtana offered a Storage Performance and Validation Service, using WorkloadWisdom, the industry's leading Storage Workload Performance Validation platform, they engaged with the local Virtana service team immediately. They wished to quantify the performance of the proposed storage arrays. As a long-time VirtualWisdom 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 the VirtualWisdom product. They then ran those workloads with WorkloadWisdom from Jan 28 to Feb 1, at three scaled levels, baseline 1X, 2X, and 3X, to model for 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

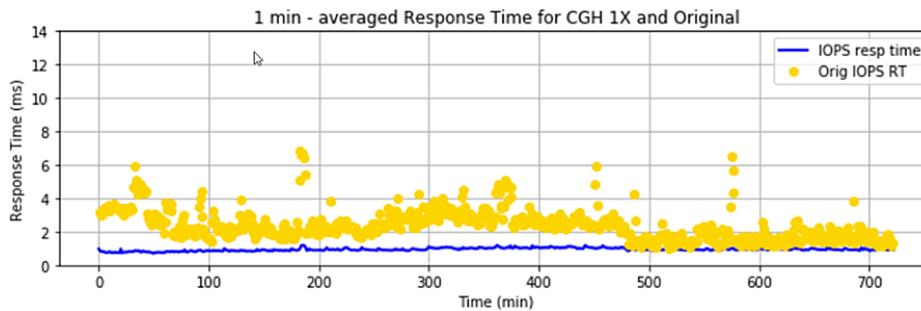
To everyone's delight, the CGH Workload test performed very well on the proposed new storage platform.

- 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 storage platform might be nearing a limiting point in further workload increases even though the 3X throughput and IOPS levels were attained.

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

Table 1: Select Key Performance Indicators

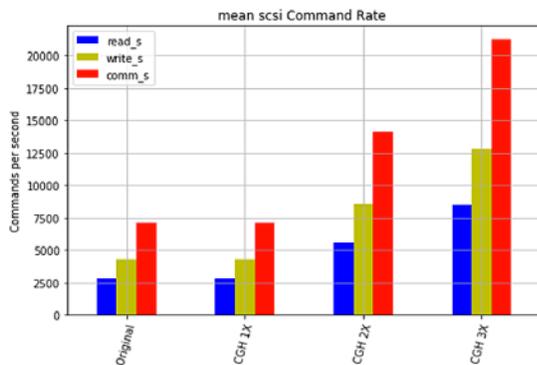
The graph below is an example of the test results. Graphs were generated for IOPS, throughput, and latency for 1X, 2X and 3X workloads, as well as for sub-workload clusters, for analyzing LUNS with similar behavior.



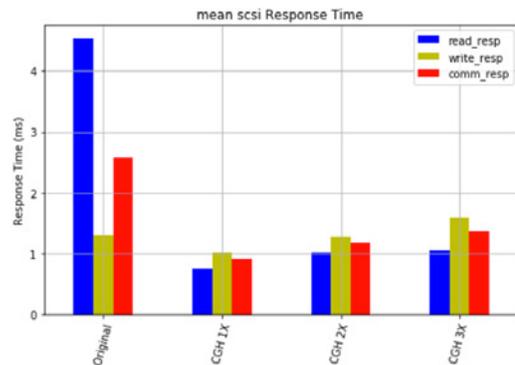
Graph 1: Baseline Latency

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

Benefits of the Storage Performance Validation Service using WorkloadWisdom (and VirtualWisdom)

- The WorkloadWisdom tests validated the arrays and configurations proposed by the new storage vendor, and mitigated the risks of deploying the new arrays into the production datacenter.
- The CGH team gained full confidence that the storage system being selected can support the workloads in their production datacenter today and into the future.
- Comprehensive storage workload performance validation and testing:
 - Analyze and model production storage workloads
 - Determine optimal storage systems and configurations
 - Identify performance limitis
 - Cotain CAPEX costs



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