

Microsoft Storage Spaces Erasing a Slow SAN's Impact on a Managed Service Provider



Customer Background

"Employee Owned, Client Focused" isn't just a tag line at Acropolis Technology Group, a managed service provider (MSP) and hosting company in St. Louis, Missouri. Rather, it is the statement of their core mission, and embodies the Acropolis sentiment that if their clients succeed, they succeed. Acropolis has consistently delivered highly responsive, first-class services to some of St. Louis's best companies since 1996.

Challenge – Increase Storage Performance, While Decreasing the Storage Footprint and OpEx Costs

Acropolis was operating an aging NetApp storage area network (SAN) consisting of a NetApp FAS2050 Network Attached Storage (NAS) head, and six (6) storage shelves. The storage was used as part of their hosting platform and organized into four tiers of storage, with the 12.6TB of raw capacity primary storage from forty-two 300GB/15K RPM fibre channel drives. The remaining shelves were filled with lower-speed hard disk drives. Performance of NetApp SAN (sequential reads of 171MB/s, and maximum sequential writes of 33MB/s) were well below Acropolis needs. To paraphrase one of the data center managers at Acropolis, the NetApp storage was "slow, slower, painfully slow and 'I might as well handwrite this data' slow". The performance of the NetApp SAN is shown in Figure 1. Being part of the ever growing hosting platform, this storage was quickly reaching its limits and needed to be supplemented or replaced before it impacted production workloads.

To supplement performance, Acropolis added a Compellent storage array with twelve (12) 450GB 10K RPM SAS drives and a compellent cache card. While this arrangement increased most of the performance metrics by at least 2X, the cost of the configuration limited the scalability of the solution. The physical footprint of this particular storage set (including switches) had grown to 46U of rack space. Finally, Acropolis was paying nearly \$20K/year for maintenance on the two aging SAN's. These metrics really didn't represent a long-term solution to the issues of growing storage capacity and the need for higher performance that Acropolis were feeling – it was time for a new solution.

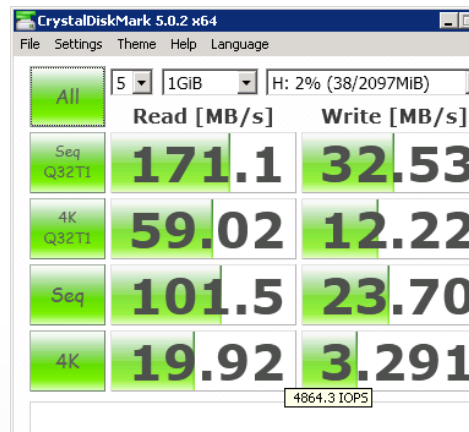


Figure 1: Performance of Original SAN

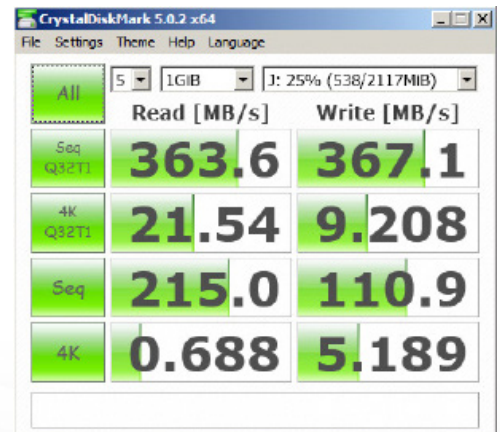


Figure 2: Performance of Original SAN + Compellent Array

The Challenge



Improve performance, capacity, and reliability of Acropolis storage system, while reducing system footprint, cost, and complexity.

The Solution



Acropolis deployed a DataON storage system in two phases. The first phase involved 3 DataON DNS-2640 JBODs, which replaced the existing NetApp/Compellent SAN, tripling performance and capacity. The second phase provided more capacity for bulk data, while implementing a cluster-level disaster recover solution. The result was improved storage capacity, reliability, and performance, while eliminating licensing costs associated with Acropolis's old SAN.

The Result



- 3X-5X increase in system performance
- Ability to survive drive, enclosure, and cluster failures without data loss
- Elimination of high monthly service and support costs associated with the NetApp SAN
- Prepared for transition to Microsoft Windows Server 2016



Quote:



"The increased performance of the DataON solution allowed us to double VM density, while reducing the physical footprint of our SAN from 65RU to 36RU,"
said John Yarborough of Acropolis Technology Group.
"What was more impressive is that we were able to go from dual-processor servers with a total of 16 cores to single-processor servers with 8 cores, and still see a performance increase of 3x-5x. The net result was significantly better performance, smaller physical, power, and cooling footprint, and an availability improvement that was significant."

The Goals for Acropolis Technology's New Storage Solution

As Acropolis looked at new solutions for their issue, the data center team there developed the following set of goals that the new solution needed to achieve:

- Better performance – preferably approaching 1Gb/s for sequential reads and writes. This was driven primarily by the needs of customers and their applications.
- Ability to survive failures at the drive, controller (head), and shelf (enclosure) level. This would provide additional redundancy that would be valuable for clients running critical workloads.
- Significantly reduced footprint, and with it reduced power consumption and cooling needs.
- Reduce ongoing maintenance costs.
- Scalable growth - this next generation of storage would serve as the base for future growth and as the replacement to other aging data silos.

Given Acropolis experiences with "big company" storage providers (NetApp and Compellent), the data center team at Acropolis expanded their search to include new entrants into the enterprise storage space. One option that came up from a variety of industry blogs was Microsoft's Scale-Out File System (SoFS), a component of Microsoft Windows Server 2012 R2. Acropolis also looked for a competent hardware vendor that was dedicated to Microsoft storage solutions. Acropolis is an organization that is dedicated to providing hardware and software solutions for the Microsoft Windows Server environment. After some initial evaluations of Microsoft Windows SoFS, Acropolis moved on to the next step with Microsoft and DataON.

Deployment of The DataON Solution by Acropolis Technology

DataON's technical team worked with Acropolis to put together a solution that would best meet their needs and serve as a good starting point for evaluating Storage Spaces and SOFS as a viable platform for the future. They settled on a configuration with three DataON DNS-2640 JBODs connected to two HP servers configured for clustered Windows Storage Spaces. The three JBODs contained twenty-four 400GB SSDs configured in a 3-way mirror with 3.2TB of usable capacity, and forty-eight 1.2TB 10K RPM HDDs for the secondary storage tier. The entire configuration is shown in Figure 4. This configuration allowed Acropolis to utilize the built-in data migration capabilities of Windows Storage Spaces to automatically migrate hot and warm data to the right storage media. The "enclosure awareness" capability of Microsoft Storage Spaces also improved overall reliability by allowing for an entire storage enclosure failure to occur with ZERO data loss. Finally, utilizing Microsoft Windows meant zero "learning down-time" for Acropolis's IT team – they already knew Windows, and didn't require any new or unique training to start being productive immediately. The performance of the DataON/Microsoft Windows SoFS storage system more than met the goals Acropolis initially set out for their new storage system, as shown by the data in Figure 5. Note that both sequential read and write performance metrics were well over 1GB/sec. When compared to Figure 1 (or even Figure 2), every metric improved by at least 3x, and some improved by 10x or even nearly 20x. One of the other surprise "bonuses" that Acropolis realized with the Storage Spaces/ DataON configuration was with "enclosure awareness", which was not possible on the previous platforms.

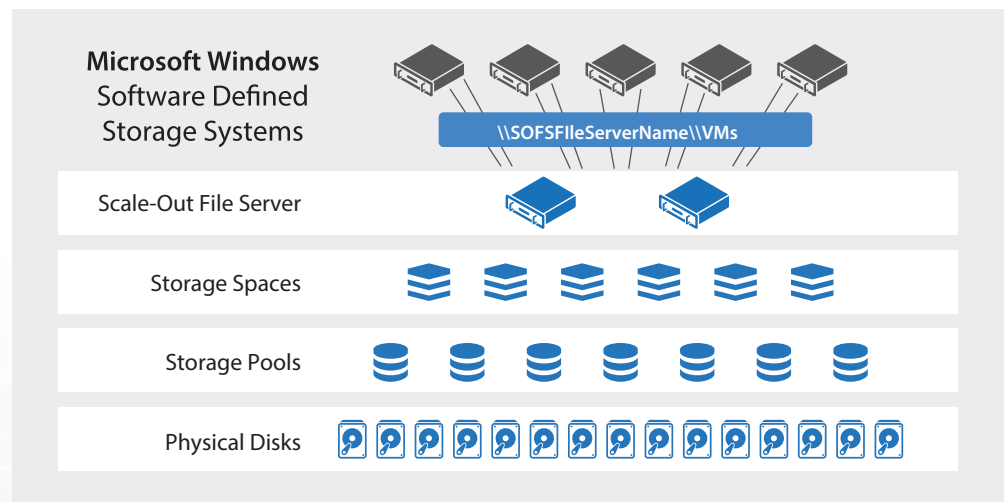


Figure 3: Microsoft Windows Software Defined Storage Systems

While standard RAID configurations within an array protect against the loss of one disk drive (or two if RAID 6 or RAID 10 is utilized), Storage Spaces duplicates data so that an entire enclosure can be lost without a loss of data. To put this in concrete terms, Acropolis could lose one of the three DataON DNS-2640 JBODs shown in Figure 4 without losing any data. This capability provided an additional level of high reliability for Acropolis data center that is very attractive to Acropolis's customer base. As the performance of the new DataON solution freed Acropolis from their initial performance issues, they began to look for additional opportunities to optimize customer application performance. Acropolis stores a lot of bulk data for their customers, and they wanted to improve their DR capabilities.

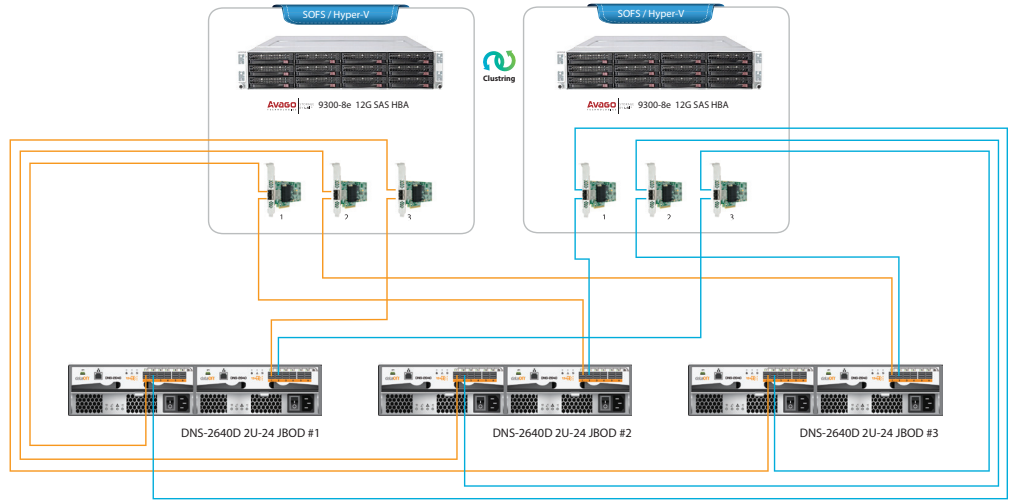


Figure 4: Acropolis/DataON/Microsoft Phase 1

To do so, they expanded their new storage system by adding four more DataON JBODs and storage controllers to form a "cold" storage tier, and to provide cluster-level failover. The result was a significant increase in capacity and system reliability. This configuration is shown in Figure 6.

Deployment Benefits: ✓

- ✓ 3x more sequential read performance
- ✓ 60x more sequential write performance
- ✓ 2x the compute capacity, 45% reduction in physical footprint
- ✓ Elimination of \$18K/year in VMWare recurring license fees
- ✓ Elimination of \$12K/year in NetApp recurring maintenance fees

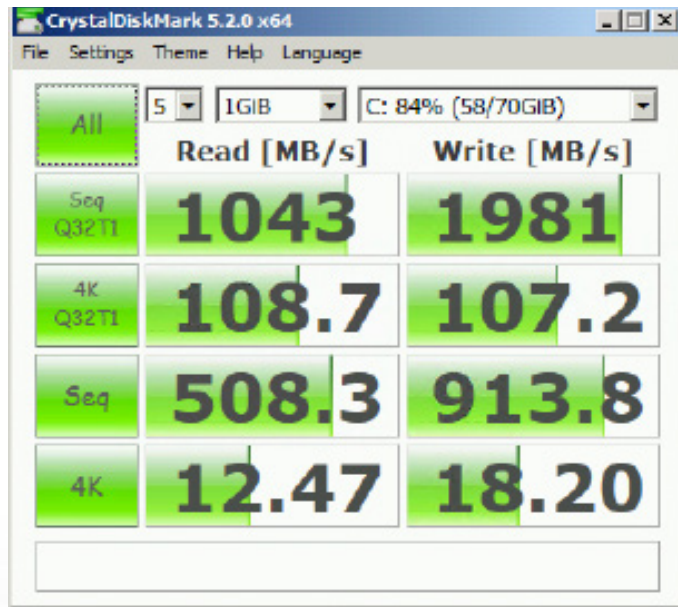


Figure 5: Phase 1 Performance

Benefits of the DataON Solution: Faster with Less Hardware

One of the immediate benefits of this change was that Acropolis can easily run 30-40 VM's on each host, compared to the 15-20 VMs that they were constrained to under VMware and the old storage. The VMs under Hyper-V also consumed less CPU and RAM because they are no longer bound by disk. The physical footprint with the DataON solution is also significantly reduced.

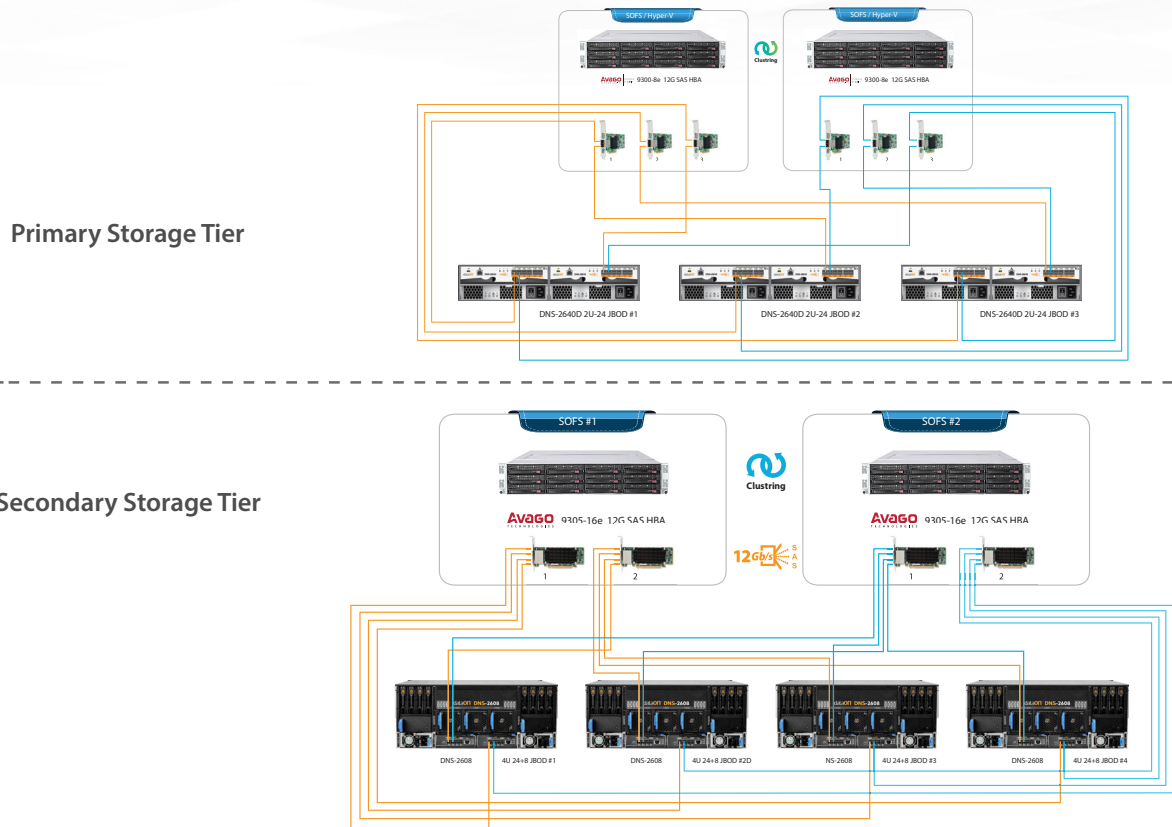


Figure 6: Acropolis/DataON/Microsoft SoFS Phase 2 Deployment

Acropolis was able to replace one of their hosting pods consisting of 65 rack units worth of VMware hosts, SAN storage, switching and backups. The new environment provides 2X the compute capacity, 5X the storage capacity, and 3X the backup storage capacity, all while taking up only 36U of rack space (6U for hosts, and 30U for storage). Acropolis was able to reduce their VMware licensing fees by \$18,000/year, eliminate the \$20,000/year in maintenance costs for the old SAN's, and provide a better overall experience for their clients.



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