

University of Illinois Doubles SQL and Oracle Performance on Flash Arrays with DymaxIO I/O Transformation Software



Even though the University of Illinois Facilities and Services was running their most I/O-intensive MS-SQL and Oracle applications on an all-flash storage array to get the most performance possible, the growth of databases and users meant they were no longer seeing the same levels of performance.

THE CUSTOMER

Since its founding in 1867, the University of Illinois at Urbana-Champaign has earned a reputation as a world-class leader in research, teaching, and public engagement. With their land-grant heritage as a foundation, they pioneer innovative research that tackles global problems and expands the human experience.

THE CHALLENGE

For Facilities and Services, their largest, most mission-critical MS-SQL and Oracle databases are supported by an all-flash storage array to get the most performance possible. However, the growth of databases and users meant they were no longer getting the same Quality of Service (QoS) to their users under peak load.

“As we learned through this exercise with ConduSIV’s DymaxIO™ I/O transformation software, we were getting hit really hard by thousands of excessively small, tiny writes and reads that dampened performance significantly,” said Greg Landes, Manager of Systems Services.

“It wasn’t necessarily ‘death by a thousand cuts,’ because our all-flash array didn’t ‘die’ from it, but it was more like ‘drag by a thousand cuts.’ Everything was just slower due to Windows Server write inefficiencies that break writes down to be much smaller than they need to be and forces the all-flash SAN to process far more I/O operations than necessary for any given workload.”

Landes continued, “When you have a dump truck but are only filling it a shovelful at a time before sending it on, you’re not getting near the payload you should get with each trip. That’s the exact effect we were getting with a surplus of unnecessarily small, fractured writes and subsequent reads, and it was really hurting our storage performance, even though we had a really fast ‘dump truck.’ We had no idea how much this was hurting us until we tried DymaxIO to address the root-cause problem to get more payload with every write. When you no longer have to process three small, fractured writes for something that only needs one write and a single I/O operation, everything is just faster.”

CHALLENGES

- Performance degradation of MS-SQL applications on Windows servers
- Performance degradation of Oracle applications on Windows servers

DYMAXIO BENEFITS

- 50% or greater application performance improvement, with no additional hardware
- Latency and throughput dramatically improved
- True “set and forget” management
- Compatible with all SAN/NAS systems
- Easily deploy to largest virtual, physical or cloud environments
- Before-and-after performance reporting to validate performance gains
- Enterprise-wide visibility into I/O performance, from VM to storage

“By solving the issue of small, fractured, random I/O, we’ve been able to increase the efficiency of our infrastructure and, ultimately, our people.”

GREG LANDES

MANAGER OF SYSTEMS SERVICES

ENVIRONMENT

- Key applications: Integrated Workplace Management System on Oracle Database, along with other Oracle Database and Microsoft SQL Server supported applications
- Operating Systems: Microsoft Windows Server 2008 R2 / 2012 R2 / 2016 / 2019
- Hypervisor: VMware vSphere 6.0 / 6.7
- Storage Devices: Dell EMC SC Series Hybrid Storage Arrays
- Storage Networks: 8 Gb Fibre Channel / 10 Gb iSCSI

DYMAXIO FEATURES

IntelliWrite[®] automatically prevents split I/Os from being generated when a file is typically broken into pieces before write and sequentializes otherwise random I/O generated by the “I/O blender” effect.

IntelliMemory[®] intelligent caching technology caches active data from read requests using only idle, available server memory.

“Time Saved” Benefits Dashboard shows ongoing benefit of the software by revealing the amount of I/O offloaded from storage and how much time that saves.

Benefit Analyzer[™] embedded benchmark provides before/after performance comparisons prior to installing DymaxIO and after.

[Download a 30-day evaluation »](#)

ConduSiv Technologies

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THE SOLUTION

Landes heard about how ConduSiv’s DymaxIO I/O transformation software had helped other virtualized customers solve their performance issues, so he felt he had nothing to lose by trying it.

No DymaxIO is “set and forget” software that runs transparently in the background on Windows servers and automatically offloads I/O from underlying storage, then streamlines the I/O traffic that remains. All of this is done with near-zero overhead to the CPU. First, DymaxIO eliminates excessively small, fractured writes and reads, and displaces them with large, clean contiguous writes so more payload is carried with every I/O operation. Second, DymaxIO establishes a tier-0 caching strategy by using idle, available DRAM to serve hot reads. Nothing has to be allocated for cache since DymaxIO dynamically adjusts to only what is otherwise unused. With as little as 2GB of available memory, many customers serve as much as 50% of their read traffic. As a result, most DymaxIO customers experience at least 50% faster application performance. For the University of Illinois, some of their applications saw much more than a 50% boost.

THE RESULT

“Not only did DymaxIO dramatically help our write-heavy MS-SQL and Oracle Servers by increasing performance 50–100% on several workloads, it also helped our Veeam backup. But we saw even bigger gains on our read-heavy applications that could take advantage of DymaxIO’s patented DRAM caching engine, that put our idle, unused memory to good use. Since we had provisioned adequate memory for these I/O-intensive systems, we were well positioned to get the most from DymaxIO.”

“AssetWorks AiM is our operations and facilities management software that runs on Oracle. It is one of our hardest-hitting applications, so we have it supported by an all-flash array. As it turns out, most of our hot reads during any given 24-hour period of time is common data. Before DymaxIO, all this common data was traversing the full stack of our infrastructure to be served from underlying flash storage; but after DymaxIO, most of this read data was served right out of our server-side DRAM that wasn’t being fully utilized. For us, that meant getting the data in inches instead of miles, and getting it from DRAM, which is 15X faster than SSD,” said Landes.

When testing the before-and-after effect on their production system, Greg and his team first measured without DymaxIO. It took 4 hours and 3 minutes to process 1.57TB of data, requiring 13,910,568 I/O operations from storage. After DymaxIO, the same system processed 2.1TB of data in 1 hour and 6 minutes, while only needing to process 2,702,479 I/O operations from underlying storage. “We processed half a terabyte more in a quarter of the time,” said Landes.

By solving windows write inefficiencies so more payload is carried with every I/O operation and by establishing a tier-0 caching strategy, far more I/O was offloaded from storage than they had any idea.

Landes continued, “We thought we were getting the most performance possible from our systems, but it wasn’t until we used DymaxIO that we realized how inefficient these systems really are if you’re not addressing the root cause performance issues related to the I/O profile from Windows servers. By solving the issue of small, fractured, random I/O, we’ve been able to increase the efficiency of our infrastructure and, ultimately, our people.”