



# SIMPLIFIED STORAGE

City streamlines IT by moving from a traditional SAN environment to Dell EMC Microsoft Storage Spaces Direct Ready Nodes.

City of Oklahoma City | Local Government | United States

## Business needs

The City of Oklahoma City needed a highly reliable next-generation IT solution to replace its aging storage area network infrastructure.

## Solutions at a glance

Dell EMC Microsoft Storage Spaces Direct Ready Nodes with:

- Microsoft® Storage Spaces Direct software
- Dell EMC PowerEdge™ servers with Intel® Xeon® Scalable processors
- Integrated storage and network I/O controllers
- Dell EMC OpenManage software

Management with Microsoft System Center Virtual Machine Manager and Dell EMC OpenManage

## Business results

- High availability for mission-critical systems
- Improved performance for end users
- Savings on software licenses and data center floor space

The IT Department migrated about 600 VMs to Storage Spaces Direct in just

**2 weeks**



The IT Department cut the time required for initial backups by about

**33%**



# Around-the-clock operations

In today's municipalities, IT is everything. At one level or another, the work of all city departments now revolves around backend and frontend IT systems.

That's the way it is at the City of Oklahoma City, the capital of the state of Oklahoma. The work of police officers, fire fighters, utilities personnel, building inspectors and other staff revolves around IT systems operated by the City's Information Technology Department. The department is also charged with keeping the City's e-commerce applications, such as bill-payment systems, up and running around the clock, seven days a week.

## The IT environment

To meet its service mandates, the IT Department operates three data centers, including a new data center built for lights-out operation. In round numbers, the department manages about 1,000 servers, three-fourths of which are virtualized, and around 2.5 petabytes of data spread over file systems, backup applications and storage area networks.

"We have a mixed workload," says Shamra Gibson, Enterprise Server Infrastructure Manager, City of Oklahoma City. "It's really hard for us to manage the virtual server workloads by putting servers that need a certain amount of performance on a certain cluster. So we've created a private cloud, and all of our host clusters have the same performance specs. For us it is easy to manage on the backend by being able to create a VM when needed and not having to make sure it's on a certain cluster."

In addition, with the private cloud, resource provisioning is much faster. "We keep the compute space on the backend at a maximum of 60 percent utilized, so when someone comes to us and says, 'I need a VM and it's going to need 20 terabytes of storage and 64GB of RAM,' we don't have to wait three or four months to provide the resources," Gibson says. "We can build the VM and get it to them within a few hours, and then expand the infrastructure on the backend. The infrastructure model that we have built is easy for us to manage, as well as being able to provide customers the resources they need within a very quick turnaround."

# Moving to Storage Spaces Direct

When the IT Department built its new data center, it made the decision to move forward to Microsoft Storage Spaces Direct technology in Dell EMC Ready Nodes. That decision was driven in part by the need to replace an aging infrastructure that included servers that were coming out of warranty and a SAN that was at the end of its life, according to Gibson.

"Here at the City, we like to stay on the cusp of the new technologies," Gibson says. "In 2012, Microsoft released Storage Spaces. We looked at that, and at the time I wasn't comfortable with JBODs (just a bunch of disks). Microsoft later did some work on performance and reliability, so when Windows Server 2016 came out, I thought, OK, now that it's more mature technology, it's time to move to S2D. Then we're partners with Dell, and so I started looking at what it would look like if we implemented this with Dell EMC."

To get a clear sense of what the department needed, Gibson took advantage of Live Optics from Dell EMC, an application formerly called DPAK. IT organizations use this free, online software to collect, visualize and share data about an IT environment and its workloads.

"Anytime I need to replace current hardware with new hardware, I take DPAK, or Live Optics, and run it on the servers to get the performance metrics," Gibson says. "In this case, I ran it during a peak usage time in our environment on the hosts I wanted to replace. I uploaded that information to Dell and that's how we spec'd our Storage Spaces environment."

## A software-defined storage solution

Microsoft Storage Spaces Direct, known informally as S2D, changes the ground rules for conventional IT architectures built around SAN or NAS disk arrays. Storage Spaces Direct eliminates the need for separate storage arrays. It uses industry-standard servers with local-attached drives to create highly available, highly scalable software-defined storage (SDS) at a fraction of the cost of traditional SAN or NAS arrays. Its converged or hyper-converged architecture simplifies procurement and deployment, while features such as caching, storage tiers and erasure coding, together with hardware innovations such as RDMA networking and NVMe drives, deliver unrivaled efficiency and performance.



*“My Dell Reps work hard to understand our environment. They are not just here to sell. They are here to help.”*

**Shamra Gibson**

Enterprise Server Infrastructure Manager,  
City of Oklahoma City

Dell EMC Microsoft Storage Spaces Direct Ready Nodes simplify and accelerate the deployment of S2D. The Ready Nodes are optimally configured with the required amount of CPU, memory, network, I/O controllers and storage (SSDs, HDDs or flash devices). The Ready Nodes model gives the IT team at the City of Oklahoma City the confidence and convenience that comes with preconfigured, tested and certified configurations designed for Storage Spaces Direct and fully supported by Dell EMC. Dell EMC serves as a single point of contact for the entire Ready Solution.

Storage Spaces Direct Ready Nodes are built on Dell EMC PowerEdge™ servers with Intel® Xeon® Scalable processors. These servers provide the compute power and the storage density the IT Department needs to take full advantage of the benefits of Storage Spaces Direct and the advanced features in Windows Server 2016. The solution in place at the City of Oklahoma City uses PowerEdge R740xd servers for regular Hyper-V hosts and PowerEdge R640 servers for a four-node SQL host cluster dedicated to virtual SQL servers.

## Live migration to S2D

In moving to Storage Spaces Direct, the IT Department took advantage of the live migration Hyper-V feature in Windows Server 2016. This feature allows IT administrators to move running virtual machines from one Hyper-V host to another without noticeable downtime. Using live migration, Gibson and her IT team migrated approximately 600 VMs from the legacy environment to Storage Spaces Direct in just two weeks.

“The live migrate feature is agnostic to hardware or data center,” Gibson says. “Previously, to be able to live migrate you had to have the same servers and the same storage,

but because of the features Microsoft has implemented in the server operating system we were able to live migrate VMs at an OS level.”

## Performance and reliability

Today, the Storage Spaces Direct Ready Nodes are delivering the performance and the reliability needed for an organization that operates around the clock, according to Gibson. While she doesn't have direct one-to-one comparisons to share, Gibson says the new system is delivering noticeably better performance than that of the legacy SAN.

“We did some performance testing before we started moving our production loads to Storage Spaces Direct,” she says. “We had eight VMs running per host moving a 10GB file to storage. We tested with a 25-percent-write and 75-percent-read ratio with an 8k block, and eight threads for each VM, and we were seeing close to 460,000–500,000 IOPS.”

That I/O is helping to cut the time for backup runs. “For initial backups, we cut the time down by a third compared to the time it was taking before,” Gibson says.

The best reports of all come anecdotally from end users who are enjoying faster performance. “The customers are noticing that when they have to remote in to a server, it's quicker to respond,” she says. “We have some large virtual file servers that are on these clusters, and when people get into their shares they are reporting that it is a lot faster to search for a file.”

# Simplified storage and support

In another important benefit, the Storage Spaces Direct Ready Nodes model simplifies storage management and support. While the legacy Compellent-based SAN was working fine, it required more attention from the department's small (seven-person) IT team than would a hyper-converged solution with Storage Spaces Direct.

"It's not that Compellent wasn't working fine or a great product," Gibson says. "Here at the City, I don't have as many people on my team to support an environment of our size, as probably a private company would. With Storage Spaces Direct, I'm just dealing with actual physical servers, not with the SAN. It reduces the hardware footprint we have to support."

In addition, Gibson and her team are capitalizing on the capabilities of Dell EMC OpenManage software for hardware monitoring and support — "OME calls home and reports a hardware issue and if a replacement is needed it automatically ships the replacement hardware," Gibson says.

"I'm using OME as a resource to help supplement our small team, because it's always watching our hardware environment and will alert us if we need to update firmware or a piece of hardware needs to be replaced," Gibson says.

# Working with Dell EMC

"Dell has been a great partner with the City of Oklahoma City for years," Gibson says. "I've been in this role for 10 years now and I have worked with the engineers at Dell for storage, for servers, whatever. My Dell Reps work hard to understand our environment. They are not just here to sell. They are here to help. I can say I'm having an issue with a server and I probably need to replace it, and we work together to come up with a solution that fits my environment."

Gibson says she has learned a lot from the engineers at Dell EMC. "They've helped architect solutions that just worked. A lot of shops will do VMware. They know we're not VMware. So we architect solutions around what works better with Hyper-V."

The bottom line? "Dell has been a great partner for us," Gibson says. "Everybody I've worked with works to understand the environment. We're able to get the resources we need when we need them, to help us either replace hardware or figure out an issue. Every Dell Rep I have had has tried to understand my needs and helped me build an Enterprise Infrastructure that is stable and reliable."



Learn more about the solution at  
[DellEMC.com/wssd](https://DellEMC.com/wssd)



View all customer stories at  
[DellEMC.com/softwaredefined](https://DellEMC.com/softwaredefined)



Share this story

Copyright © 2018 Dell Inc. or its subsidiaries. All Rights Reserved. Dell, EMC, and other trademarks are trademarks of Dell Inc. or its subsidiaries. Intel, Xeon and the Intel logo are trademarks of Intel Corporation in the U.S. and/or other countries. Other trademarks may be trademarks of their respective owners. This case study is for informational purposes only. The contents and positions of staff mentioned in this case study were accurate at the point of the interview conducted in September 2018. Dell and EMC make no warranties — express or implied — in this case study.

