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STORAGE SUCCESS

University capitalizes on Dell EMC Microsoft Storage Spaces Direct Ready Nodes

UNIVERSITÀ DI PISA

University of Pisa | Higher Education | Italy

Business needs

The University of Pisa needed a robust storage environment to meet the needs of students, faculty members and industrial users.

Solutions at a glance

- Dell EMC Microsoft® Storage Spaces Direct Ready Nodes
- Dell EMC™ PowerEdge™ servers with Intel® Xeon® processors

Business results

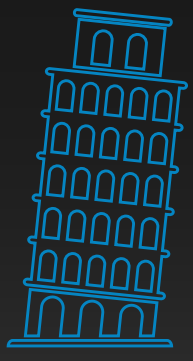
- Accelerated solution deployment
- Achieved expected performance
- Gained storage resiliency

The storage solution is

HIGHLY SCALABLE

The Ready Nodes are

VERY RESILIENT



Meeting the needs of users

The University of Pisa was officially established in 1343, although a number of scholars claim its origin dates back to the 11th century. Today, the University of Pisa is a public institution that comprises 20 departments, with high-level research centers devoted to agriculture, astrophysics, computer science, engineering, medicine and veterinary medicine.

To support its students and faculty in their research and development work, the university has a dedicated IT Center with a wide range of computational resources, including high-performance computing (HPC) clusters. This center also offers assistance to the Italian automotive and manufacturing industry, providing facilities for the design and testing of innovative solutions.

Many of the users who leverage the resources of the IT Center require high-performance, low-latency data storage that scales easily to accommodate ever-growing volumes of data. To meet this need, the IT Center deployed a hyper-converged storage solution based on Dell EMC Microsoft® Storage Spaces Direct Ready Nodes.

The solution

Microsoft Storage Spaces Direct, known informally as S2D, 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.

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). They give IT leaders the confidence and convenience that comes with preconfigured, tested and certified configurations designed for Storage Spaces Direct and backed by world-class support delivered by Dell EMC, which serves as the 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 University of Pisa needs to take full advantage of the benefits of Storage Spaces Direct and the advanced features in Windows Server 2016.

Simple, fast scalability

For the University of Pisa, the Ready Nodes approach simplifies and accelerates the ordering and deployment of software-defined storage building blocks, according to Antonio Cisternino, the university's chief information officer and a computer science researcher.

"One of the dreams of hyper-convergence is the idea of easily adding new nodes so you can grow as you need," Cisternino says. "Every time you add a node, you add a little bit of CPU, a little bit of memory, a little bit of storage and network. That simplifies it. You have fewer questions."

And that's the way it is with the Ready Nodes approach. When the IT Center needs more storage for a cluster that runs various university services or for its web servers, its R&D lab or its Microsoft SQL Server database, it simply needs to add more Dell EMC Storage Spaces Direct Ready Nodes. The IT Center started with eight nodes and has plans to add eight more nodes this year, and will likely add additional nodes next year.

"If I do it on my own, I have to keep track of how I stood the nodes up so that I have homogeneous nodes that are simpler to manage," Cisternino says. "If I go for the Ready Nodes, I can reduce the operations time. That's my goal. The Ready Node model is really handy. I can deploy Ready Nodes and spend less time on configuration and those sorts of things. And I don't have to go through the validation testing because I know that they're already validated for the aggregated throughput."

Optimizing the environment

As many IT leaders have discovered, the network is the new storage bottleneck. Drives are getting faster, but the speed at which data moves is limited by the bandwidth of the network. With this understanding, the IT team at the University of Pisa is working to optimize its network architecture to improve the performance of Storage Spaces Direct, especially as it deploys lightning-fast NVMe drives.

Fueling innovation

IT leaders at the University of Pisa partnered with Dell EMC and Intel to build an IT infrastructure that delivers the compute power, storage capacity and performance required to do advanced and innovative research in highly competitive fields. A focal point of this effort is the Dell EMC | Intel Competence Center for Cloud and High Performance Computing at the University of Pisa. The center was created to respond to the rapidly growing need for leading-edge infrastructure solutions. It allows university researchers to share and power their work, and visitors to get insights into the latest and most efficient infrastructure technology.

"The network has become again the bottleneck of a system, mostly because of NVMe drives," Cisternino says. "Four NVMe drives, aggregated, are capable of generating around 11 gigabits per second of bandwidth, which tops a 100-gigabit connection. They may saturate and block I/O with just four drives, so we are looking to 25 gigabit, which becomes 50 gigabit because we're using a spine-leaf approach. Every server has two lanes, so aggregate bandwidth is 50 gigabits per second. This helps us ensure that the network will not be too much of a storage bottleneck."

In addition, the IT Center is leveraging the built-in storage tiering features in Storage Spaces Direct. These features allow IT administrators to take advantage of different types of drives, using the fastest drives for caching and other drives to provide capacity.

"We use tiering, which we really appreciate," Cisternino says. We have a number of mechanical drives — typical 2.5-inch SAS drives — and we have SSDs for the flash tier. So it's a hybrid configuration. On the R&D side, we are starting to deploy and test full-flash NVMe drives."

Meeting expectations

Ultimately, the Dell EMC Microsoft® Storage Spaces Direct Ready Nodes have met the high expectations that Cisternino had when his team deployed the hyper-converged solution.

"On the performance side, I got what I was expecting," he says. "Better storage performance than I had before, comparable to other technologies I'm running. On the latency side, it's even better."

In addition, the Storage Spaces Direct Ready Nodes have proven to be both reliable and resilient, according to Cisternino.

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