DELL Technologies

Capitalizing on virtualization

The University of Pisa gains greater flexibility and value from its IT infrastructure with Dell EMC hardware and VMware virtualization software.

UNIVERSITÀ DI PISA

Research and Education | Italy

Business needs

The University of Pisa needs an flexible IT infrastructure to meet the teaching and research needs of a diverse academic community.

Solutions at a glance

- Dell EMC PowerEdge servers with Intel® Xeon® processors
- Dell EMC PowerSwitch networking
- VMware vSphere virtualization software
- VMware vSAN hyperconverged storage
- Dell EMC PowerVault and Isilon storage arrays
- Dell EMC Data Domain storage with Veeam Backup

Business results

- Improving utilization of valuable IT resources
- Enabling flexible approaches to IT provisioning
- Simplifying the migration of workloads
- Meeting the diverse needs of faculty researchers

Virtualization with VMware

INCREASED UTILIZATION

IT administrator can respond faster with

FLEXIBLE RESOURCES

FUELING INNOVATION

IT leaders at the University of Pisa partnered with Dell Technologies 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.

A legacy of excellence

Established in 1343 by an edict of Pope Clement VI, the University of Pisa has a centuries-old legacy of excellence in scientific research. Its distinguished alumni include the likes of Galileo Galilei, who many consider to be the father of modern science, and Enrico Fermi, the Nobel Prize winning physicist who created the world's first nuclear reactor.

Today's, the University of Pisa continues to build on its long history of scientific leadership across 20 academic departments, with high-level research centers focused on agriculture, astrophysics, computer science, engineering, medicine and veterinary medicine. The university is ranked among the world's Top 300 universities based on academic research and reputation.

Virtualizing infrastructure with VMware

As a Dell Technologies HPC & AI Center of Excellence with a focus on VMware, the University of Pisa is always breaking new ground in its use of leading-edge hardware and software technologies. That's the case with the University's focus on virtualizing IT resources to improve asset utilization and make infrastructure easier to deploy, manage and change, for both IT administrators and end users.

The University has two virtualization systems, one based on VMware software and one based on Microsoft software. Lately, the VMware environment is gaining a lot of traction as the University expands its use of its VMware vSAN™ hyperconverged storage environment and its VMware Horizon® virtual desktop infrastructure (VDI) environment.

"VMware is gaining traction because of a couple of reasons," says Maurizio Davini, chief technology officer for the University of Pisa. "The first one is VDI. We have deployed quite a significant Horizon infrastructure, and people have started to use it heavily. And the other reason is the flexibility of using the infrastructure not only for the typical virtualization work like virtual machines but also using the infrastructure in a flexible way for regular computing and high performance computing."

A look under the hood

The University of Pisa has several VMware clusters, all based on VMware vSphere. These include a data center installation, a stretched cluster installation spanning multiple sites and a disaster recovery installation.

These resources include:

- Clusters built with Dell EMC PowerEdge R730xd servers connected to Dell EMC PowerSwitch S4048-ON switches (dual 10-Gb/s Ethernet) and vSAN storage (local and stretched between two data centers with a direct 8-km fiber optic link)
- A cluster built with Dell EMC PowerEdge R740xd servers connected to Dell EMC PowerSwitch S5048-ON switches (dual 25-Gb/s Ethernet) and Dell EMC PowerVault ME4084 storage arrays
- A cluster built with Dell EMC PowerEdge R730xd servers connected to a Dell EMC PowerSwitch Z9100-ON switch (100-Gb/s Ethernet), vSAN storage (Intel® Optane™ disk and NVMe disk) and Dell EMC Isilon scale-out NAS for NFS storage
- A cluster built with Dell EMC PowerEdge R7425 servers connected to a Juniper Networks QFX5200 Switch (dual 100-Gb/s Ethernet), vSAN storage and Dell EMC Isilon scale-out NAS for NFS storage
- The VDI environment includes PowerEdge servers with NVIDIA T4 tensor core GPUs. Machine and deep learning workloads leverage PowerEdge C4130/C4140 servers with NVIDIA P100 and V100. HPC workloads also utilize DSS 8440 servers with NVIDIA V100 and T4 tensor core GPUs.

Infrastructure backup is provided by the Dell EMC Data Domain DD6300 with Veeam Backup, and the servers are managed via the Dell EMC OpenManage Enterprise console.

“All the infrastructure is from Dell Technologies — networking cards, networking switches, several generations of PowerEdge servers, typically with disk inside and vSAN,” Davini says. “It’s all Dell.”

The benefits of virtualization

Virtualization of the infrastructure is one of the keys to gaining the greatest value from the University’s investments, Davini notes. With vSAN, for example, the University can gain the benefits of hyperconverged storage stretched across several data centers. That enables the easy migration of workloads from one data center to another, while simplifying management and disaster recovery.

“That was our first approach,” he says. “And then we introduced VMware Horizon for VDI.”

VMware Horizon is a solution designed to simplify the management and delivery of virtual desktops and apps to end users via a single platform. It helps the University’s IT administrators control, manage and protect all of the Windows resources end users want, at the speed they expect.

Davini and his colleagues initially used Horizon to meet the computing needs of laboratories, administrative offices and other university units. They then expanded the focus to the use of virtual machines for high performance computing.

Today, about half of the University’s researchers run their workloads on virtualized infrastructure and about half run on bare metal servers.

“If a researcher needs to have access to the machine, to install their software, to do development and so on, they typically prefer VMs because they are more flexible,” Davini notes.

Flexibility is the key here. While acknowledging that performance might be higher for some jobs on bare-metal servers, Davini says that he and his team put greater emphasis on the flexibility they get with virtualization infrastructure.

Working with Dell Technologies

In Dell Technologies and VMware, the University of Pisa found an ideal combination of hardware and software for its virtualized environments.

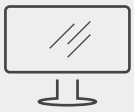
“We choose Dell because it’s the best in quality and the best in support,” Davini says. “I am not joking. We now have around 600 servers in our data center, including different generations from Dell, and we have statistics that show us that Dell is the best in quality and support.”

Davini describes VMware software in similar best-in-class terms.

“From a software quality point of view, the VMware virtualization environment is the best on the market,” he says. “The quality of software is unbelievable. We have done comparisons. If you can afford it, it is the best.”

Another advantage of a VMware virtualization environment is its versatility.

“VMware gives us the possibility to be flexible and to use the infrastructure for a lot of things — enterprise workloads, VDI, remote workstations, support for smart working, scientific computing, HPC — all in the same infrastructure in a very flexible way,” Davini says. “And this is the problem that VMware and Dell have helped us to solve.”



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