The University of Milan uses a Syneto Extreme Series storage, reaching 250,000 IOPS, to deploy hundreds of virtual machines with instant provisioning and scalability.

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**THE HIGHLIGHTS**

**Industry**

Public teaching and research university

**The Problem**

The University of Milan was searching for a storage solution could support a complex virtual desktop infrastructure without over-provisioning and with a reduced TCO. The infrastructure also needed to be easily managed, highly scalable and built to handle the write-intensive nature of VDI. VDI data also requires protection against common silent data corruption at the data block level.

**The Solution**

The University of Milan opted for a Syneto Extreme Series, pure SSD array, that goes up to 250,000 IOPS. The storage can instantly provision new space as requirements grow and it can create VM clones without additional space requirements. In-line Deduplication, Compression and Thin Provisioning ensure a low TCO while end-to-end data integrity guards against silent data corruptions.

The Syneto Extreme series behaved very well, as expected. In a load test with data pool creation and preparation for 100 virtual machines, it reached over 250,000 IOPS, nearly saturating the gigabit interface.

Laura Colombo - Information Systems, University of Milan
The University of Milan is a public teaching and research university, which - with 31 departments and a teaching staff of 2000 professors - is distinguished by its wide variety of disciplinary fields. A leading institute in Italy and Europe for scientific productivity, the University of Milan is the largest university in the region, with approximately 64,000 students.

Milan, the capital of Lombardy, is one of the most dynamic and international regions in the European Union. It is a leader in the national economy and stands at the forefront of Italian research and development investments and commitment to technological innovation.

The University of Milan’s Informations System division is charged with maintaining the universities’ information systems. The division is also tasked with the design and development of new applications. They also provide all the necessary hardware and software to support the universities’ users.

**CUSTOMER PROFILE**

VDI complexity and ROI
VDI deployment projects usually require a lot of time which is dedicated to management and huge budgets to solve the common scenario of over-provisioning. Usually a VDI project creates a large storage footprint, increased management, space, power and cooling expenses.

With VDI, IT departments often have to continuously manage more and more virtual desktops as they come online. Further time is then spent on configuring, monitoring and troubleshooting the infrastructure. The University of Milan was searching for a way to avoid all these TCO-increasing pitfalls by finding a solution that can be configured in minutes rather than days.

Virtual Desktop density
The single most important aspect of any VDI deployment is VM density. If a storage array cannot handle a large number of virtual desktops, the costs become impractical. VM density changes the economics of VDI storage because the more VMs a storage can handle the lower the price/desktop becomes.

To avoid the risk of deploying a system that proves ineffective in the long run, The University of Milan needed to make sure any choice featured Thin Provisioning for smart space usage and could control space allocation the VM level.

**Random I/O bursts**
VDI produces a very large number of IOPS. Small, random write-intensive IOs in a steady state and big bursts of IOs during peak workloads for short periods. This kind of very random IO patterns are not handled well by legacy storage arrays.

For a true VDI deployment, hybrid storage with SSDs acting as a read-cache is not sufficient. This is why The University of Milan’s Information Systems Division was searching for an affordable pure SSD storage array.

**Scalability and integrity**
With VDI, it’s hard to predict scalability needs. A project that starts with 50 VMs will not be able to handle a 500-seat production environment. A VDI storage solution must be capable of expanding virtual disks nearly instantly and create fast clones of existing VMs to ensure fast provisioning.

Data integrity is also a major consideration for VDI deployments. An end-to-end data integrity approach the protects against all to common silent data corruption, coupled with automated processes are essential.

The University of Milan needed a solution that could provide both growth and security in an efficient package.
**THE SOLUTION**

**Dedicated VDI storage**

The University of Milan adopts a Syneto Extreme series, all-SSD storage array, which performs 250,000 IOPS and can host 1000s of virtual desktops based on Red Hat Enterprise Virtualization for servers and desktops (RHEV). The Extreme Series is specifically built to handle VDI projects with high throughput and very low latency. It handles I/O burst during workloads without slowing down the entire system.

The pure SSD Extreme Series array is designed to handle the write-intensive nature of VDI deployments without the performance lag of disk-based storage.

**Instant provisioning**

Syneto Storage OS, the OS used to manage the Extreme Series, instantly provisions new space by transparently growing the size of virtual disks with no downtime.

The VXClone technology on the Extreme series can also nearly instantly create VDI clones. This feature allows The University of Milan to deploy hundreds of persistent virtual desktops in seconds.

**Efficient deployment**

The OS on the Extreme Series, Syneto Storage OS, uses data reduction technology to achieve a much lower space consumption when deploying a VDI solution. Both Deduplication and Compression are applied in-line to VDI data writes to ensure no duplicate data blocks are stored.

The University of Milan also benefits from easy management features and friendly management layer which leverages a scalable multicomponent architecture to automate processes. The Extreme Series chosen by The University also calls on Thin Provisioning to ensure space between VMs is efficiently distributed.

**VDI data integrity**

Syneto Storage OS running the Universities’ Extreme Series array uses and end-to-end data integrity approach to guard against silent data corruption dangers like bit rot, phantom writes or DMA parity errors. This practice protects VDI data on block level in a unique way.

Each block written on the Extreme Series is checksummed and this checksum is kept in a pointer to that block. Data is then checksummed all the way up the filesystem hierarchy. When a Virtual Desktops’ data is read its checksum is calculated and in case of mismatches a self-healing mechanisms is applied, repairing it.

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**THE SYSTEM**

![Syneto Extreme Series with Virtual Desktops](image)

- **Virtual Desktops**
- **In-line data reduction**
- **Pure SSD storage**

**SYNETO EXTREME SERIES**