The Singapore Institute of Technology Uses Virtualization Tools to Create Virtual Campus

“Virtualization is the backbone that allows our educational model to run seamlessly; it enables us to be more agile, responsive, and to scale in accordance to our vision.”

— Ee Choon Huang, Director, Communications and Information Technology, Singapore Institute of Technology

The Singapore Institute of Technology (SIT) provides industry-focused degree programs to graduates of the country’s five polytechnics. Established in 2009, SIT enables diploma graduates from Singapore’s local polytechnics to obtain degrees in engineering and applied sciences, health science, design, interactive digital media, education and hospitality through reputable university partners from around the world.

This education model offers students significantly greater choices in terms of upgrading to degrees within their chosen field of study.

Virtual Infrastructure is the Backbone of the School

SIT currently operates using interim facilities at Singapore’s polytechnics and other locations. With its network of distributed campuses, planning and implementing a supporting IT infrastructure was challenging.

“We are offering many different degree programs across different locations in Singapore, and with partners from around the world. Therefore, we needed our infrastructure to be as flexible as possible,” said Ee Choon Huang, Director, Communications and Information Technology, SIT. “Our IT budget needs to support a wide range of demands, so we need to ensure that we get maximum value from our investments.

“VMware®'s virtualization solutions have enabled us to meet this challenge in an efficient and cost-effective manner. VMware has given us the platform we need to scale for the future and to achieve our growth ambitions.”

Delivering Distributed IT Resources and Scaling for Growth

SIT planned to leverage virtualization from the datacenter to the desktop to meet its unique requirements. To do so, SIT reviewed products from vendors including Microsoft and Citrix. The institution ultimately elected to implement a virtualized infrastructure comprising VMware vSphere™ and VMware View™.

“We found VMware to be the market leader, and it had more robust and mature tools than the other vendors,” Huang said. The vendor’s technologies proved to be ideal for making desktop operating environments available to students across multiple locations.

“We evaluated a traditional model whereby most of the computing resources are installed locally on personal computers,” said Kok Boon Tan, Assistant Director, Communications and Information Technology, SIT. “However, given our unique educational model and network of distributed campuses, we realized that this would cause us a lot of implementation and support issues that would prove taxing in future.”
Tan said space at each campus “needed to be optimized fully”, making it important to find a way of delivering the technology resources students need without deploying considerable amounts of physical hardware.

The virtualized server and desktop infrastructure in place within SIT has been designed to cope with anticipated growth in demand, and to scale quickly as student numbers grow. “By 2015, we believe we will have more than 5,000 part time and full time students studying at SIT,” Tan said. “With a virtualized infrastructure in place, we will be in a position to quickly ramp up resources when needed, and also provide students with access to the applications and data that they require.”

**VMware ‘Very Cost Effective’**

Tan said opting for a virtual server infrastructure rather than rolling out multiple physical servers had enabled SIT to achieve physical space savings of around 50 percent. “This has also helped us to keep power consumption and cooling costs well down,” he added.

By deploying VMware vMotion, SIT has been able to protect its applications and data with redundancy beyond that available in a physical infrastructure. If a host server experiences a problem, or loads start to compromise its performance, the IT team can easily migrate running virtual machines to another physical server. This process does not affect users in any way. “VMware vMotion helps provide high availability for our applications,” Tan said. “We can set things up in a very quick manner and services will be always available. It is a very cost-effective way to do it.”

**Using Virtual Desktops to Deliver Desktop Environments**

To complement the virtual server infrastructure, SIT elected to make virtual desktops available to students. Rather than relying on traditional PCs, the institution has installed thin client devices on which students can access their individual desktops, applications and data.

Virtual desktops can be configured from templates to suit individual students, ensuring each has access only to the applications and data they require for their particular studies.

By early 2012, SIT had around 60 thin client terminals across labs in two campus buildings, serving about 200 students. This could rise to several thousand as the SIT model matures.

“Because of the high cost of software licensing, it’s not feasible to provide a license to each of the PCs in the labs or to the students,” Tan said. “Instead, we can make sure that a pool of resources is available for students to use as they require. The costs savings here are significant. License control and management is an important factor for us.”

With VMware virtualization, SIT has also greatly simplified desktop management across its distributed network of satellite campuses. “Everything can be managed from the datacenter rather than us having to physically attend to individual client machines, which is time and resource intensive,” Tan said. “It is possible now to provision a new virtual desktop around 30 percent faster than it would have taken to provision a physical machine.

“We estimate that adopting a virtual desktop strategy has reduced our overall server and desktop costs by 20 to 25 percent,” Tan added. “It also means that we can scale more easily as student numbers increase.”

**SIT Establishing a ‘Use Your Own Device’ Policy**

VMware virtualization at SIT has also enabled students to start using their own notebook computers to connect to the institute’s IT infrastructure and access their personal virtual desktops.

After completing a successful pilot in March 2012, SIT began expanding the project to its campuses island-wide.
Future Plans to Make Desktops Available from Home

“By allowing students to access their virtual desktops from their personal notebooks, we will be able to allow them to continue working on campus even when the computer labs are closed,” Tan explained. “We are also testing the desktops to make them available to students at home, and via iPads and other handheld devices. This is something that we will expand in the future so our students are not limited in the ways they can access their learning resources. This suits our students, most of whom are digital natives that want to be able to learn anytime, anywhere and from any device.”

Virtual Infrastructure to be Expanded in Future

Over the next two years, SIT plans to install small server rooms within each of its buildings at the polytechnics and is building another datacenter within its headquarters. Each on-campus server room will be equipped with two physical servers that could host between 10 and 12 virtual machines, plus another physical server to handle functions such as backup. “This configuration will allow us to meet demand for the very fast deployment of applications and services, and to scale quickly to support growing student numbers and demands,” Tan said.

The institute will manage a considerable proportion of its IT resources from its headquarters, further reducing costs and improving IT staff efficiency. The virtual servers at each campus will run a range of applications, depending on the courses being offered at that location. Typical applications include Adobe multimedia design and editing software, and AutoCAD engineering and architectural modeling software.

IMPLEMENTATION OVERVIEW

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