# Delivering 24x7 Learning with Virtualisation & Green Computing

Image credit: Temasek Polytechnic

## Cisco Systems helps Temasek Polytechnic build the foundation for a private cloud with a Green Data Centre and Virtualised Desktop Infrastructure

### EXECUTIVE SUMMARY

**Customer Name:** Temasek Polytechnic

**Industry:** Higher education

**Location:** Singapore

**Organisation size:** 15,000 students

#### Challenge
- Build an e-Campus for anytime, anywhere learning
- Deliver connected learning in a cost effective and sustainable manner
- Improve the provisioning and management of computing resources to users

#### Solution
- Cisco Data Centre Solutions for Virtual Desktop Infrastructure (VDI)

#### Results
- A more efficient and cost-effective data centre infrastructure
- Cost savings from lower energy consumption
- Ease of management and rapid deployment of new applications
- Recognition of its commitment to the environment
- A cloud-ready infrastructure for delivery of academic computing resources

Established in April 1990, Temasek Polytechnic (TP) is a significant contributor to the field of para-professional education in Singapore. TP currently offers 52 full-time diploma courses in the areas of applied sciences, business, design, engineering, humanities & social sciences, and informatics & IT to around 15,000 students. It also offers over 40 part-time courses, up to the Advanced Diploma level.

TP is committed to providing students with a holistic education that equips them with the right skills and relevant knowledge to succeed in the workplace. To this end, TP actively promotes independent study, self-reflection and creative thinking – qualities essential for responding to a dynamic and ever-changing economic landscape.

### Business Challenge

TP has been working with its technology partners to tap on the latest in smarter infrastructures to deliver 'anywhere, anytime' education to a new breed of students – one that has grown up in a world where Internet-based technologies and social media play an increasingly important role in their lives. This generation of students is used to consuming information and interacting with their peers; on-the-go via mobile devices, social networks and Web 2.0 applications.

Pre-empting new market demands and educational needs, TP is currently working towards its vision of an e-Campus, which places the student at the centre of a service-oriented education ecosystem. Students and teachers alike would have the flexibility to select appropriate services from the ecosystem - and personalise and accelerate their learning experience.

Image credit: Temasek Polytechnic

To achieve its vision, TP needed to create a learning delivery platform that would provide students and educators with the right tools and access to educational materials at all times, through a multitude of devices including PCs, tablets and smartphones. Ultimately, the platform would allow the creation of an environment that provides real-time synchronous learning and collaboration capabilities.

To realise its vision, TP looked for a solution that would maximises on its existing IT and physical resources and one that would be meet its budget guidelines. It had to bear in mind two fundamental considerations:

Firstly, it would need to build its IT infrastructure based on green principles. Studies have shown that 20 to 40 per cent in cost savings in energy consumption can be gained from implementing green technologies in data centres. A peripheral benefit was that a focus on sustainability would help TP strengthen its green credentials and contribute to global efforts to reduce our carbon footprint. TP's commitment is underscored by several awards and labels it has garnered including the Singapore Environmental Achievement Award in 2011, the Eco-Office Label for Green Data Centre in 2011 and 2012, and the Public Service Award (Resource Management) in 2012.

Secondly, TP needed to find a more efficient, cost-effective way to support an increasing number of applications and to deliver computing resources quickly and effectively to students and educators. Besides email and a few shared applications, the staff and students needed access to school-specific applications on-the-go, from any device and at any time. For TP administrators, an existing challenge was the time and management hassle of creating online student accounts; provisioning network, storage and online repository access; and installing the appropriate applications needed on students' and staff PCs

## Solution
### Green Data Centre
TP decided to work with Cisco to convert its vision of a green learning environment into a reality. The first step would be to build a data centre on green principles that would deliver the computing resources it needed in an energy-efficient and cost-effective manner.

Towards this end, the physical layout of the data centre was designed to minimise cooling requirements and its associated costs. For a start, blade servers and storage systems with small footprints were used to reduce energy consumption and the physical space required. In addition, the design of the cooling system took into consideration how heat can be transferred out of the room optimally, dealing specifically with hotspots within racks, and using top tray cabling for better airflow. Finally, the use of energy-saving fluorescent tubes provided better lighting per watt of energy consumed.

Power usage effectiveness (PUE) is a measure of how efficiently a data centre uses its power, and specifically, how much of the power is actually used by the computing equipment versus cooling and other overheads. A score below 1.8 indicates a high level of efficient power usage. The PUE of the TP data centre clocked in at an impressive 1.34, demonstrating the high level of energy efficiency in the facility

**Virtual Desktop Infrastructure**
However, building a Green Data Centre was only the first step.

In order to balance limited budgets and the need to improve the management and deployment of multiple applications - across multiple devices - to serve an increasingly mobile population, TP decided to work with Cisco and its partners on developing a virtual desktop infrastructure (VDI). TP sees this move as an important step towards building a private cloud which could be used to support the longer term objective of providing a flexible and scalable learning platform. Today, TP is working closely with Cisco and its partners from the Virtual Computing Environment (VCE) group, EMC and VMware, as well as system integrator partner Fujitsu, to make this a reality. The VDI will include the following components:

- Stateless hardware for provisioning, so that the TP IT team can clone and deploy resources rapidly

- 10 Gbps Unified Fabric, to deliver the performance required for VDI

- Embedded Unified Computing System (UCS) manager, so that the IT team can easily manage the VDI platform

- Low latency Memory Extension technology, which can help to support a larger number of virtual desktops in a single server

- Fabric-based computing, which will unify the network, compute, storage and application elements to form a high performance infrastructure suitable for virtual, and eventually, cloud-based environments

"Cisco and its partners brought to the table industry-leading desktop virtualisation technologies, services, and best practices combined with strong partnerships. Its Validated Designs approach gave us assurance and reduced the risk of moving from proof-of-concept to full-scale production," commented Ms Mandy Mak Yoke Lai, Deputy Director/Technology & Academic Computing, School of Informatics & IT, Temasek Polytechnic.

## Results
TP believes that the VDI can help cut the time and costs associated with maintaining its infrastructure, and free up resources to focus on the delivery of an exceptional learning environment for its staff and students.

## PRODUCT LIST

### Data Center

- Cisco® Nexus® 1000V Series Switches
- EMC® VNX®, Data Domain® and Networker®
- VMware® View™, Vsphere™, ThinApp™ and VCloud™ Director
- APC® InRow® RP Cooling System

**Improving Management, Reducing Costs**

Like other organisations, TP has had to deal with increased complexity and higher TCO in its IT environment as a result of departments adding servers and applications over the years. The VDI – which decouples software and hardware – running on the Green Data Centre is helping TP to reduce that complexity and improve the utilisation of its existing infrastructure, thereby increasing its responsiveness to user requirements while significantly reducing capital and operational expenses.

Based on Cisco's experience, VDI deployments can achieve up to 50 per cent savings in desktop management costs, and a one-third reduction in routine administrative tasks, without any compromises to performance or security. The VDI solution allows TP to improve its response to demands on its infrastructure through the automation of common operations. The solution will also offer a central dashboard for TP's IT team to monitor the performance of the infrastructure in real-time, and act to prevent potential issues before they impact end users.

**Enhancing User Experience**

TP's staff and students today expect 24/7 access to their coursework, data and applications, and be able to access them from a variety of devices - both from on and off campus. The VDI will allow TP to achieve this by enabling the School of Informatics & IT to deliver desktops as a service.

TP will be able to quickly and securely provision and deploy customised virtual desktops, applications and data to users across a range of devices and platforms, which means that users will always have access to the latest versions of their applications and data, regardless of where or when they log into the system.

**Achieving a greener, more sustainable computing infrastructure**

TP was awarded the Eco Office Label certification for its Green Data Centre by the Singapore Environment Council (SEC) in March 2011, in recognition of its commitment to environmentally friendly practices at the highest levels of management, as well as the environmental awareness of all staff members. Among the important contributing components to successful certification were the data centre's virtualisation capabilities and the energy-efficient blade servers. A certified Green Data Centre environment also presents a valuable learning opportunity for students to see first-hand how sustainable infrastructures work, thus enabling them to be trained in green technologies to support Singapore's requirements in the future.

## Next Steps

Ultimately, TP's longer term plan of delivering educational services and applications through a private cloud is fast becoming a reality. The building of the Green Data Centre and the introduction of VDI are just the first two but most important steps in its journey to deliver academic resources to schools that need it, when they need it.

## For More Information

For more information on Temasek Polytechnic, visit www.tp.edu.sg

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