“Universities are typically compared to commercial enterprises; however, distinct differences exist in requirements and resources present. Hitachi Data Systems has enabled us to achieve our technological goals through virtualization, open standards and a best-of-breed strategy. With these, we are now empowered to push the boundaries of knowledge even further than before.”

Darwin Gosal
IT Manager
Centre for Quantum Technologies
National University of Singapore (NUS)
Enabling Business with Hitachi NAS Platform and Modular Storage, One Quantum Bit at a Time

For the National University of Singapore’s Centre for Quantum Technologies (CQT), embracing virtualization, open standards and a best-of-breed strategy has enabled it to support some of the most resource hungry IT infrastructure users. CQT needed the ability to scale upwards without any additional head count. Thanks to a new infrastructure built on Hitachi NAS Platform and Hitachi Adaptable Modular Storage, CQT has been empowered to push the boundaries of knowledge even further than before.

The mission of the National University of Singapore’s Centre for Quantum Technologies is to conduct interdisciplinary theoretical and experimental research into the fundamental limits to information processing. In a nutshell, its goal is to further knowledge in the field of quantum information, not for commercial value, but for the practical application that this knowledge allows.

Originally a subset of the National University of Singapore’s Physics Department, the massive computational demands and unique utilization pattern of the CQT prompted the move to a stand-alone IT operation, which is independent of the Physics Department, in December 2007. Part of this new setup, which is funded by the Singapore Government, was to include a state-of-the-art laboratory. It was to be equipped with an IT system that allowed for the capturing of high speed information and file sharing of research data from various experiments and proof-of-concept activities conducted by the vast number of high profile researchers on the team.

Key clients of the CQT IT Infrastructure are the researchers who rely on the systems for their research computation. This population of users is equipped with a high level of technical and IT skills, with equally strict and rigorous infrastructure requirements.

One key driver for separating the CQT’s infrastructure from the other department was the ability to adopt a client centric approach instead of forcing clients to adopt a Microsoft® Windows® centric operating environment. The new IT infrastructure had to be able to drive unique systems (with varied operating environments) for each client from a unified IT back end.

The challenges facing the CQT were significant:

- Build the IT infrastructure of the CQT from the ground up on a tight budget and with one dedicated staff driving the change.
- Support extremely data intensive and high performance research applications.
- Cope with peaks in utilisation and data generation (for example, 3Gbit/sec sustained over three to four hours).
- Stretch target to support up to 200 specialised quantum information users, with stringent yet varied system requirements (for example, supporting Windows, Macintosh and Linux simultaneously), all running research applications that require high computing, network and storage performance.
- Provide two staff to manage the entire CQT operations upon implementation.

Hitachi Data Systems Provides a Winning Solution

Given the complexity of its client’s needs, it was logical for the CQT to adopt a virtualized infrastructure strategy. This enabled Thanks to an extensive vendor selection process and the choice of Hitachi storage, the entire IT implementation was executed within budget.
the center to push beyond physical implementation of hardware to the creation of virtual systems for each client, which were tailored to unique client requirements. Therefore, a virtualization component was an important aspect in the tender evaluation process.

The 2100 model of Hitachi NAS Platform, powered by BlueArc®, was chosen based on the following criteria:

- Open platform that supports virtualization
- Higher performance over competitors
- More scalable than competitors in class
- The high performance support BlueArc provides for Hitachi NAS Platform
- Direct and personalized support from Hitachi Data Systems

One key priority in the infrastructure design and implementation was the need for simplicity in both management and administration. This was to minimize the need for additional head count, to cope with increased utilisation.

The Hitachi NAS Platform fit the specific needs of CQT, offering a graphical user interface (GUI) as well as an advanced command line interface for flexible yet comprehensive management options. In addition, there was considerable documentation and support for the hardware and infrastructure. Ultimately, the key factors that gave Hitachi Data Systems the edge were simplicity in management, high performance and measurable cost-effectiveness.

Thanks to an extensive vendor selection process and the choice of Hitachi storage, the entire IT implementation was executed within budget.

Aligning IT with Business Objectives

The CQT IT team recognises that its clients are highly sophisticated IT users and forcing them into a standard operating environment would hinder their progress. One priority for the CQT, therefore, was to employ an IT strategy that enabled the clients to conduct research in an environment that they found most conducive. With the virtualized server infrastructure, each client was able to have an environment native to his or her research applications and software.

In terms of management of the IT back end, simplicity was the main consideration. While some vendors use a purely GUI interface, this is often too simplistic, and it is primarily used for scheduling “daily tasks.” The chosen solution provided both a GUI and a command line interface for more advanced controls. This flexibility enables the two CQT team staff to effectively manage its growing number of clients to date.

The CQT adopted a best-of-breed rather than a single shop strategy to their IT infrastructure. While single shop systems tout better interoperability, this is often associated with vendor lock in and higher costs. By using an open systems platform, a standard operating environment can be implemented to meet clients’ high performance needs and requirements.

Results that Speak for Themselves

The CQT went fully operational in the first quarter of 2008, meeting the tight timeline for deployment. It also met its five key business objectives and created a robust standalone IT back end capable of supporting the unpredictable and data intensive usage.

Other measurable results include:

- CQT’s clients are now able to operate in native environments that suit their research needs.
- With the infrastructure’s simplicity and easy management systems, CQT’s two staff are now effectively supporting 50 of the CQT’s high profile researchers, with the technical capacity to scale up to 200 users without additional IT spending or a head count increase.
- The IT infrastructure has the ability to cope with the CQT’s incredibly high utilization, traffic and storage peaks.

While work continues as usual at the CQT, its business now has an autonomous IT infrastructure, capable of supporting a pool of resource demanding users with limited IT staff.
# Success Story

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