

# McGill University Case Study

## McGill Backup installation

Quantum P4000 library with six  
SDLT drives and 322 slots

VERITAS NetBackup Datacenter  
Master server software version  
3.4.1 for Solaris

VERITAS NetBackup Datacenter  
clients

VERITAS NetBackup Oracle  
agents for Solaris: 2 x Tier 3 and  
2 x Tier 1

VERITAS NetBackup Oracle  
agents for Windows

QLA2200 Host Bus Adapters for  
Sun platform

## McGill SAN installation

Brocade Silkworm 12000 switch-  
es with thirty two (32) FC ports

Brocade Silkworm 3200 switches  
with eight (8) FC ports

Hitachi Data Systems Lightning  
9980V Storage subsystem with  
5.8 TB of usable storage and 8  
FC ports

Qlogic SANBlade 2310 PCI Host  
Bust Adapters

Qlogic SANBlade 2342 dual SBUS  
Host Bust Adapters



What do singer/songwriter Leonard Cohen, actor William Shatner, astronaut Julie Payette, inventor of basketball James Naismith and Nobel Prize

winner Val Fitch, David Hubel and Rudolph Marcus have in common? They are all graduates of McGill University in Montreal.

McGill University is one of the top ten universities in North America with 29,000 students from across Canada, and all over the world, 5,200 academic staff and 2,500 administrative staff. This huge, complex organisation works with 2 campuses, 160 buildings, an operating budget of \$700m, and an endowment fund of \$762m.

McGill is a leading international research university and its research groups are very active, and generate huge amounts of data with massive data storage and computational requirements.

## NCS (Network and Communications Services) Department

The NCS department, reporting in to the CIO, in the heart of the University, provides infrastructure services to all departments. It is responsible for campus-wide telephony (over 10,000 telephones); the voicemail system; the IP backbone and the maintenance of the network. It architects, runs and manages the network, and hosts all the enterprise servers, running applications like ERP, educational web-based applications, email and network security including computer network and an IP-based access control, intrusion alarm, and video surveillance system.

Gary Bernstein runs NCS and is also a graduate of McGill Engineering. He has seen how the IT department's function has changed and how the demands on it have risen exponentially, as applications like email and ERP have become widespread.

"Universities are not like businesses," says Gary, "Capital-intensive projects like IT infrastructure are not the first choice, or even on the top three spending options. But investment in infrastructure is becoming more and more critical as the volumes of data-rich applications increase." University research is now hugely IT dependent and research teams are demanding. One of NCS's

role is to advise the faculties and departments on the best way to manage their requirements.

Gary's philosophy has been to centralise the implementation of IT infrastructure as much as possible, and then de-centralise control back to the departments. That way, McGill University gets consistent technology, and saves on training and maintenance costs, while allowing individual departments to manage their own parts of the infrastructure, as required.

“You are always looking for the biggest bang for your buck.”

“The role of NCS is to save everyone money in the long run, by spending money on the core infrastructure. But universities typically don't have a lot of money to spend upfront, even when you can show long-term benefits. Everything requires “selling” in a university; there is always resistance to investment, especially capital-intensive projects and you have to sell on your reputation, not just the infrastructure project. Thankfully this has become easier as administrators have become more business-minded.”

## The IT infrastructure

NCS has a heterogeneous environment including an old IBM mainframe, 25,000 ports of Cisco network and a large Novell Netware environment. They were already moving from the mainframe to Solaris, and the ERP and Data Warehouse applications were running on a Sunfire 6800 server, while the email system was also Unix-based. (Following an earlier server consolidation project the department was already able to offer computing power almost on a per seat basis).

McGill implemented an education-focused ERP system for student information, HR, and financial data about 2-and-a-half years ago but found available back up windows, for the 4TB of data, were rapidly disappearing. And restores, particularly for email, which were becoming a frequent occurrence, were taking too much time.

Multiple platforms required backups – for example, mainframes, Sun boxes, Wintel boxes. In addition to the disappearing window, there were operational nightmares because they were running four different back up systems and had to keep rebuilding the catalogue. Different things had to be checked; different tasks had to be done each time.

NCS see their role as helping other faculties in providing cost effective solutions that resolve technology issues. Backup is a commodity and should be commonly, easily, available.

## Back up bottlenecks

With 55,000 active email accounts, students, staff and alumni are sending and receiving one million emails a day. Student enrolment and registration are now completed on-line – the students register once and the system propagates the information to the various sub-directories. More and more, departments run their course materials on-line (from lecture notes, to quizzes, to reports) and a quarter of the University's 8,200 courses use the on-line course development tools. From admission onwards the system is web-based, which makes everything seamless and easy-to-use, but it also means that the supporting IT infrastructure needs to be foolproof. It used to take 29 hours to back up the three to four 4 million files, and four-and-a-half days to restore them. A couple of times the backup bottlenecks were so bad that the email system was not being backed up at all. Off site tapes were not being collected and the mass of different formats and processes led to errors and oversights.

In reviewing their back up options, NCS spent considerable time researching the market. They decided on their priorities, looked at the future and assessed the growth in storage requirements, before researching the market. They looked at the technology, researched vendor/reseller capability, and its value to McGill University.

“Kanatek gave a very clear series of presentations, with no hype. They have a good reputation and we wanted someone that could take care of every installation aspect so as to avoid finger pointing and that would agree to do a technology transfer to McGill personnel. We settled on Kanatek”.

During the interview selection and technology assessment process, which included a mix of manufacturers and integrators, like Kanatek, the McGill team started to be impressed with Kanatek. Gary Bernstein remembers, Kanatek also guaranteed the project, staking its reputation on a positive outcome.

The solution was a scalable centralised backup architecture that included VERITAS NetBackup, Quantum tape library technology, a backup server from Sun Microsystems and integration know-how from Kanatek Technologies along with post-installation support services, from Kanatek.

The VERITAS NetBackup solution was a natural selection because its catalogue also keeps track of archived tapes and automates the restore in the event of a disaster.

Earl Lindberg, Senior Analyst at McGill, who worked with the Kanatek implementation team, says, “ The project went very well overall. There was a really short maintenance window and we ran a staged implementation over a few months. But Kanatek provided very knowledgeable staff, who were efficient at getting the job done.” Due to the seasonal nature of University timetables workloads take a huge spike as the start of the fall semester as new students enrol and new course material is prepared and downloaded. Kanatek worked

within the University schedules, through the period, and short maintenance windows to get everything up and running.

"Kanatek adds tremendous value, because they have the expertise and they know how all the pieces can be integrated together and made to work with the existing environment."

The web-based registration Course Tool System is now backed up using VERITAS NetBackup. As only 25% of courses are using this course development tool system, it's expected that its usage will increase dramatically over the coming months. NCS is confident that its implementation of VERITAS File System can handle the growth.

With the new backup system, NCS managed to reduce their backup time from 29 hours to 9 hours! And, this was at a time when the number of files more than doubled, from four million to between nine and ten million. They also reduced the restore time from four-and-a-half days to 28 hours.

### **SAN storm (Storage Area Network)**

With the backups safely under control, the NCS team started to look at the underlying infrastructure. By implementing a SAN, the NCS team planned to centralise their storage requirements and cut down on the amount of stand-alone storage required. Initially the specification called for 5.8TB of useable data, but it quickly increased 10%, to 6.3TB of useable data.

The SAN specification called for three objectives to be met:

- The Enterprise Data needed to be consolidated
- Better redundancy and off site replication were required to minimise the danger of lost data due to something like an ice storm
- The NCS department needed to be able to leverage the solution and offer storage to other departments

Once again, the NCS team did due diligence in the market, investigating technologies, examining SAN value propositions, talking to manufacturers and talking to partners. Having successfully worked with Kanatek on the back up solution, it was natural that they should talk again.

The high-end SAN solution provided by Kanatek included storage from Hitachi Data Systems that offered the ability to control storage locally, but manage clients centrally. Existing Novell, Solaris, and NT/Windows servers are all on the SAN.

The Course Tools System has 9 million little files, in a nested directory structure of about 7 layers and backing it up with other systems didn't work. Now, it's all been moved to the VERITAS File System, and it resides on the SAN.

Earl Lindberg recalls, “The SAN went in smoothly and now it’s working wonderfully. It is delivering all that it is supposed to. The SAN went in quicker than the Backup project and we were impressed with the Hitachi/Kanatek relationship. Kanatek did a very good job at presenting the solution. The machines have very limited maintenance windows so it’s difficult to find the time to do the work, but Kanatek worked around the issues. The Kanatek employees were very knowledgeable and focused on getting the job done. The continuity of staff, from one project to the next, made a lot of sense.”

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NCS implemented a SAN with 16 hosts that carry 8TB of usable data and improved the I/O performance 20-30% over the fibre backbone. There used to be occasional Array failures when they were standalone but now that they are all on the SAN, there have been no failures, better quality performance and higher availability. The department is seeing the benefits from caching with faster discs and the SAN also offers easy allocation of new storage. Lost power to the machine room would, in the past, have meant a 10-20% failure rate in the machines. Recently, there was a power failure and the machines on the SAN were recovered, without a single disc failure. Everything came back normally.

### A true partnership

Departments frequently used to buy their own servers but now they increasingly use NCS because the department is able to demonstrate value through the successful investment in IT technology such as SANs and backup infrastructures. NCS has to act like a solution provider to the other departments. They want to see hard numbers, not soft benefits in the university, and NCS is happy to oblige.

Technology without a purpose is like a university without students. You can implement it, but it loses a lot of its value. In the case of McGill, the NCS department has a clear understanding of the technology challenges facing the faculties and departments, and how these challenges will change in the coming years. The NCS group provide the vision and strategic direction, based on a sound understanding of the situation, and then look to the market for technology solutions and partners. Faced with huge backup problems, and the duplication of processes, NCS sought out the best available technology, (from VERITAS, Sun, Hitachi and Quantum) and the most experienced integration partner in these technologies, Kanatek, and provided a solution to their fellow departments that quickly resolved the challenges. McGill University is well positioned to focus on its role as one of North America’s top universities and to grow in size and international stature.