VIRTUALISATION HELPS UNIVERSITY SLASH IT

Toyo Gakuen University (TGU) cut hardware maintenance costs by 30 per cent by consolidating 16 servers onto four industry-standard Fujitsu Primergy RX300 systems and an Eternus NR1000F network attached storage (NAS) device, using virtualisation technology

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CASE STUDY

Challenges

- Create an integrated system
- Improve hardware return on investment (ROI)
- Reduce maintenance costs

Benefits

- System availability much improved and scalability ensured
- Reduced server numbers and less need to purchase additional boxes
- Continuous hardware operation ensured service levels improved.

TGU was able to dramatically improve ROI by consolidating its 16 educational servers onto four VMware virtualised industry-standard Primergy servers (Primergy RX300) and an Eternus NR1000F NAS device, The virtualised servers and VMware Infrastructure 3 suite also provided dynamic resource utilisation.

With increasing numbers of platforms, server maintenance costs had become immense. The new integrated system enabled TGU to cut their costs by 30 per cent. Computer education is mandatory for all students in today's IT society

Toyo Gakuen University (TGU) has two campuses – one in Hongo, Tokyo, the other in Nagareyama, Chiba. They strive to provide a diverse education and to foster and send young people into the world with enthusiasm and the values of internationalism. Since introducing basic computer courses 10 years ago, the university has recognised an accelerating IT trend in society. TGU believes that computer education should be mandatory for all students regardless of their academic fields. Six years ago, they implemented compulsory computer education courses for all students to ensure they learned basic PC skills and about the internet.

"TGU offers a computing environment for both students and faculty. Each student is provided with their own account and folder. Faculty can give students instructions using their respective folders. Students can also send/receive emails from anywhere via the internet. Students also publish their own websites both internally and externally" says Tomoo Shiina, Media Center manager at TGU. Server consolidation to solve excessive total cost of ownership (TCO).

TGU has always tried to provide a better computing environment to foster the needs of computer education. But more recently, high-performance applications have been required and that has placed rapidly growing demands on the system. This resulted in an increasing number of platforms, with the university facing a surge in server maintenance costs. "Our only choice, when we wanted to upgrade the system, used to boil down to "scale-out", which resulted in more and more boxes. We knew that maintenance costs were high and hardware ROI needed to be improved," states Mr. Shiina. As a result the university started looking for an integrated solution to revamp their IT infrastructure as well as support future growth. Work on server consolidation began in autumn 2006.

TGU chose an integrated virtualisation solution

TGU decided to refurbish their Hongo campus system first. In looking for a solution, they received proposals from four vendors, but only Fujitsu offered

virtual server consolidation. As the TGU media centre had always been interested in virtualisation technologies, the Fujitsu offering caught their eye. The virtualised system seemed to deliver much improved resource utilisation, upgrade flexibility, and improving system ROI. In taking all those benefits into consideration, it was natural for TGU to choose virtual server consolidation.

"Recently, virtualisation technology has matured, and we were hearing about many actual implementation cases. So TGU started considering server virtualisation solutions," says Mr. Shiina. He went on to describe Fujitsu as the university's most trusted vendor. "So far, we had configured our IT systems using open-source infrastructure, so we valued a vendor that can provide a great deal of hardware and software information. Fujitsu's extensive experience with server virtualisation and their comprehensive solutions gave us the confidence that their offering would do a lot for TGU," explains Mr. Shiina.

Following the decision-making phase, TGU media center started evaluating the planned system using an actual Primergy RX300 machine running the VMware Infrastructure 3 software. "Verification tests took place, to examine the possible options.

> Performance is excellent, and the NAS system provides great flexibility, enabling shared volume names between clients and Unix

Could VMware VirtualCenter run properly on the system? Would memory capacity settings remain the same when the numbers of guest OS increased? Would memory leaks occur when the system was heavily loaded? How would host OS memory consumption change?

We made many assumptions and verified each operation. We also tried a variety of virtual switches; which is a VMware function for connecting virtual servers to the external network. From this testing, we were able to prove that the planned system would run the way TGU wanted, prior to the actual cutover," Mr. Shiina states. University turns to Fujitsu NAS products

For storage, the other essential component of the system, TGU chose a network attached storage (NAS) system that was able to deliver high performance, convenience and reliability in an NFS environment. Mr. Shiina explains why the university chose the NAS system. "We had another UNIX-based NFS option, but we went for Fujitsu's NAS product (Eternus NR1000F) as it gave us the highest levels of availability and reliability." "Performance is excellent, and the NAS system provides great flexibility, enabling shared volume names between clients and Unix," Mr. Shiina continues.

How TGU achieved the consolidation

Sixteen servers reduced to four Primergy servers with virtualisation solutions TGU wanted to start operating the new system in April 2007. Thanks to good preparation, and the evaluations with an actual machine, the cutover was completed by March 2007, without encountering any major setbacks. A total of 16 servers (4 x web servers, 6 x webmail servers, 2 x mail servers, 4 x DNS/DHCP servers) were consolidated onto four industry-standard Primergy servers (Primergy RX300) and a NAS device (Eternus NR1000F) using VMware virtualisation technology. This resulted in significantly reduced operational costs.

For its virtualisation suite, the university chose VMware Infrastructure 3 Starter Edition and VMotion option for their system. "Based on empirical results, we now run two guest operating systems on one server for the two heavy-loaded webmail servers. Two more of servers run relatively lighter loads, with four guest operating systems on each. Currently, a total of 12 virtual machines are running on four physical servers. When requirements mean we need to increase capacity, VMotion functionality will allow

us to adjust the number of virtual servers. Proper operation will of course be verified with VirtualCenter," Mr. Shiina explains. "When we needed to port data from the old system, reliability was our major concern. We used Windows in our existing Samba environment to read the data, and wrote it back to NAS, which we believed was the most reliable way," continues Shiina.

VMotion enables zero-downtime and improved service levels

Since the new system started operating, TGU has recognised significant benefits from VMotion's zero downtime maintenance. "VMotion functionality allows us live migration of running virtual servers from one physical VMware machine to another, ensuring continuous service availability, which is what we appreciate the most. Service availability is not affected even with a disk failure in the RAID configuration or when adding additional memory," Mr. Shiina states. Takao Uda, planning department director also welcomed the great benefits from the new virtualized system. "Previously, we had to stop services once or twice a year for maintenance purpose or because of server failures. With the new system, we will be able to reduce downtime for sure."

Creating a snapshot reduces backup time

In addition to the reduction in physical machine numbers, high-speed disk-to-disk (D2D) backup has greatly contributed to maintenance cost reductions. Mr. Shiina recognizes the operational benefits from the snapshot function. "With the NAS snapshot function, the system takes a D2D snapshot once a day, and backups data up to tape monthly, enabling secure data recovery. We can even retrieve data from several days ago."

Future scenarios: TGU plans to implement a similar system at their other campus.

Based on the know-how and experiences acquired during this consolidation, the university is considering implementation of a similar system at their Nagareyama campus in Chiba. In order for students at the Nagareyama campus to see their own disks on the Hongo campus system, account synchronisation between the two campuses is required. "The Nagareyama campus will not have big problems using a NAS system, so there's a good possibility we will choose a NAS system for the Nagareyama campus, too. With SnapMirror, an extended NAS snapshot function, data backup is effective and efficient over the WAN. We may also be able to use this function for disaster recovery purposes in the future," Mr. Shiina explains. The virtualised, comprehensive solution deployed at TGU on industry-standard servers, with VMware and NAS, will be the inspiration behind solving system problems at many other universities with similar business needs and challenges. ●

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About Toyo Gakuen University

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