Virtualization Reality

St. Francis College cuts costs, improves operations and sets the stage for future growth.

The computing environment at St. Francis College in Brooklyn Heights, N.Y., has changed quite a bit since 1995 when IT personnel installed the school's first makeshift server room.

Today, St. Francis relies on more — and more complex — applications than ever to effectively fulfill its academic and business missions. The school's 2700 full- and part-time students and 500 faculty members, adjunct professors and staff expect to have access to whatever computing resources they need when they need them, even if that's in the middle of the night or on the weekend.

Despite the fact that the server rooms (a second one was added in 2005) remain somewhat outdated with older servers, standard air-conditioning units and power systems not exactly built to modern data center specifications, the IT team at St. Francis College has been able to successfully meet all of the new demands. And they've actually saved time and money in the process.

Their secret? Virtualization, an IT strategy that enables a single server to run multiple operating systems and applications at the same time. The technology promises a number of benefits, including less need for capital expenditures on new hardware, a significant increase in energy efficiency, much improved application availability and performance and greater disaster recovery capability.

St. Francis College first started experimenting with entry-level virtualization products and freeware nearly a decade ago when Joseph Hemway worked as the school's Assistant VP and CTO.

He's since moved on to the Pratt Institute, but the embrace of virtualization remained in place. "Recognizing its potential, I worked to obtain the funding needed to sustain our efforts" says Guy Carlsen, the current CIO at St. Francis. Finance and the president concurred with the initiative.

In 2010, the IT team at St. Francis College decided to commit fully to the concept. Working with CDW·G, St. Francis College made a full investment in the ESX enterprise version of VMware, as well as vCenter Server, a scalable platform that allows the IT team to better manage their virtualized servers.

Through its adoption of this technology, St. Francis College has been able to cut its server inventory from 62 physical servers down to just 43, including 10 physical servers in the fiscal year alone, even while consistently achieving a record of 99.9 percent uptime and saving nearly $70,000 in power costs. "It just makes us so much more efficient and effective," says Carlsen.

Most important, the IT staff has been freed up to focus on improving computing performance and supporting the school's long-term goals, which include a move to a new modernized data center some time in the next three years.

"We can offer the students more because we're able to do so much more with what we have, and the management of our servers is incredibly simplified," says Nicholas J. Paratore, academic systems administrator at St. Francis College. "Basically we can run up to five or six 'servers' on one piece of hardware. It's made all the difference."

VIRTUALIZATION BASICS

Before they started experimenting with virtualization, the IT team at St. Francis College struggled with its computing operations. "The reality is that our server rooms weren't really designed to be server rooms, and that continues to be the case," admits Paratore. "They don't have the right power systems or the right cooling equipment. Initially, we had to keep adding servers, and so we were quickly experiencing overheating and circuits were being tripped all the time."

Compounding this problem was the fact that the IT team had to maintain essentially a one-to-one server-to-application ratio, leaving each server significantly underutilized. This meant that St. Francis had to keep putting out money for new servers. Most, says Maciej Krupa, a network analyst at the school, were running at just 10 to 20 percent of their total capacity and, in the process, burning up excessive electricity and IT resources.

In 2001, St. Francis decided to try out virtualization. Doug Toombs, a senior analyst for Tier One Research, notes that

virtualization products basically provide software emulation for an x86 Intel chip, or what Toombs calls an "abstraction layer" between the bare metal hardware and the operating system.

"With virtualization, you can drop every type of operating system on top of the hardware and each one thinks it's running natively on its own piece of hardware," Toombs explains. "They don't really know the difference, so you can run a number of 'machines,' a number of virtual guests, if you will, on one physical server."

This reality means greater energy efficiency and greater cost efficiency for most organizations. Although calculating the return on investment (ROI) of virtualization is tricky since there are a number of variables involved, many organizations have seen savings in their hardware purchases and energy costs.

A second breakthrough that VMware also developed was the ability to vMotion, or migrate, the virtual machine to a second physical server even while it was booted up and running. "You can move around these virtual machines, from one physical machine to another without so much as a hiccup, and that has tremendous ramifications for maintenance, disaster recovery and application availability," Toombs explains.

St. Francis College's use of virtualization — and the IT Department's appreciation of it — evolved along with the technology. Although VMware, at its heart, is simple in theory, it is also complex and intricate software, almost like a third operating system, and, as such, involved a high learning curve, says Paratore.

"VMware is not necessarily something you jump into and starting using," he says, noting that even with the early virtualization products, the school was already realizing major resource and management benefits. "To make sure we were building a sound network foundation, we had to learn some of the fundamentals. I think the years of using VMware's free products [they were previously running only the free version of ESXi] definitely helped us confidently make the leap to the real ESX software."

Working through CDW·G to buy the full enterprise version of the ESX system also helped the team in its final transition. The account manager was always available to assist by getting answers to questions about a variety of issues, including licensing, according to Paratore.

"If we didn't understand something, our CDW·G rep would get a VMware tech on the phone and he would walk us through it," Paratore recalls. "It was really like having another tech guy on our staff, because that was time that we didn't have to spend researching the product or trying to figure something out for us, and that's a big deal since there are only four of us. Even now, CDW·G is giving us support after our purchase."

FRONT-LINE BENEFITS

With the full system up and running, St. Francis College has enjoyed a number of benefits. One of the most important is the ability to manage its servers, which run everything from Active Directory to Web Servers, in a proactive rather than reactive approach.

"All I need to do is log into the system and all of the servers that are running on it are right there in front of me, and there's no need to go the server room anymore," explains Paratore. "It makes configuration and management of servers more simplified and centralized."

Using VCenter, the IT administrators know immediately if a server is being overutilized and they can quickly add memory, disk space or even network interface cards to keep it from slowing or failing. They can also "thin-provision" the virtual servers, or shrink the hard disk space required for each application, enabling more efficiency.

The team can even program the servers to automatically vMotion the application to a new physical server if the original server detects a potentially debilitating issue.

"Instead of us finding out too late that the server is in trouble and then scrambling to fix it because the services on it have gone down, we now find out after the fact that the server has already taken care of the problem," Matthew C. Hogan, Director of IT Operations says. "So we can just skip the downtime and keep going. It's really disaster recovery starting right in the server room."

Hogan was instrumental in securing funding for the VMware Project at St. Francis College. With his help, the IT department was able to budget and start a project that would eventually restructure St. Francis' network topology. Hogan was actually one of the first to run critical services on VMware products in the early 2000s.

Krupa notes that with VCenter and ESX, the IT team has the luxury of logging in from home through a virtual private network (VPN) and troubleshooting any issues, which is critical given the very high demand that students and faculty have for 24x7 access to their computing resources. Moreover, if someone asks IT to add a dedicated server, the team can have a virtualized one up and running in ten minutes. Previously, to meet such a request, a new physical server would have had to be purchased and shipped.

"With our system, as long I configure the ESX OS [operating system] correctly, I can just keep installing servers on an as-needed basis, because with a template, they're pretty much all the same, and you can deploy a server within minutes," states Paratore.

One benefit that isn't always touted in product literature is the ability to test new applications without risk. "Before when we got a request to bring up a new service, we were forced to do it live, and that could be problematic if something went wrong," explains Krupa. "Now we have the benefit of actually bringing up a virtual machine, configuring it completely the way we want and making sure that it's working optimally. Then, once it's ready to go into production, we can easily turn it on and make it accessible to the whole campus. That's something we were unable to do before."

Carlsen notes that virtualization will also make it easy to consolidate and move the servers from the current server rooms to the new modern data center, which is under construction and will feature state-of-the-art cooling systems, power systems and the optimal layout.

"Virtualization has just been a major boon for us in terms of our ability to effectively manage our servers and applications, our ability to be agile and flexible, our ability to keep up and running even when there are issues and our ability to serve our end users on a continual basis," he concludes. "We're saving money on electricity and hardware and maintenance. We're helping the environment. And we're able to do all that with a really small staff. It's genius really."

The Next Step

Server virtualization has been such a success for St. Francis College that CIO Guy Carlsen is already investigating the next step: client virtualization. With this technology, virtualization software runs on top of a piece of client hardware rather than a server. The operating system and applications would then run on top of that, which essentially separates the computing environment from the physical machine it runs on.

"It's taking virtualization further, out of the server room and into the day-to-day operations at the desktop level, and gives us many of the same benefits such as agility and efficiency," Carlsen explains.

St. Francis College currently has about 850 computers on its campus in Brooklyn Heights, N.Y., that are used for administration, operations and pedagogy. Where Carlsen thinks client virtualization would be particularly beneficial, however, is in the academic computer labs, which are loaded with applications devoted exclusively to one subject area.

By incorporating client virtualization, those same computers could provide the image, or computer programs, required for one academic curriculum; for example, physics, in the morning and then transition to a second subject area, such as biology in the afternoon, accounting for the evening and communications on the weekend.

"With that step, I've made the room much more flexible as opposed to having to physically dedicate the entire room for one specific academic discipline," Carlsen says.

That capability could save the college a tremendous amount on the need to add real estate, which is at a premium in its location across the East River from Manhattan, to build additional computer labs/classrooms as demand for computing capability grows.

Despite the possibility of realizing these benefits, Carlsen is not rushing into client virtualization. The technology is still in its relative infancy, and he wants to do more investigating before making an initial investment, which he predicts will be in about a year.

"There is a learning curve on this, so to do it successfully, we want to make sure that we go back to VMware

for some additional training and expertise," he states.

CALL YOUR CDW·G ACCOUNT MANAGER TO SPEAK WITH A SOLUTION ARCHITECT TODAY.

011211