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FEATURE

Key Considerations

Ask these five questions before you move forward with virtualization.

By Karen D. Schwartz

With enrollment climbing steadily each year at Pima County Community College District as more local students choose community college, it is no surprise that the IT department had to scramble to keep up. How can a relatively small IT staff and computers scattered around six campuses in Tucson, Ariz., handle the needs of more than 70,000 students and hundreds of staff and administrators?

Thanks to a move last year to replace a sprawling and disparate server infrastructure with a more streamlined, virtualized mix of Sun servers and NetApp storage running VMware, the IT staff can now manage the load.

Today, largely because of that forward-thinking decision, the time that campus IT staff once spent procuring, provisioning and maintaining hardware is now spent providing support to students, faculty and staff.

An additional benefit is that the server virtualization project has made it easier for the school's academic departments to establish their own virtual servers instead of making do with aging equipment and limited space.

Pima and many other college IT departments around the country find that virtualization is one of the most effective tools available to help them keep pace with the ever-increasing demand for computing services while holding down costs.

Virtualization makes a great deal of sense, saving money and reducing management headaches. However, it presents a major change in the way IT departments have handled technology for decades. IT staffs are asking whether the change is worth the effort.

"We believe there are short-term or immediate payoffs, as well as long-term benefits to virtualization," says Keith McIntosh, Pima's director of technical services.

Short-term payoffs include the ability to provision new servers almost immediately. McIntosh believes organizations will see long-term benefits through a reduction in the number of physical servers, which correspond to a reduction in the maintenance costs of those physical servers.

Although many colleges have implemented some degree of virtualization, CIOs and IT directors still have questions and concerns. Some may have problems with startup costs; others might

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Server Virtualization Paves the Way

Keith McIntosh of Pima County Community College District in Tucson, Ariz., says virtualization will pay off for the college over five to six years.
Photo Credit: Steve Craft

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have critical software that does not run easily in a virtual environment; and still others may be dealing with an aging network infrastructure. Whatever the issue, here are five questions to ask before moving forward with virtualization at your college.

Will virtualization pay off in the long run?

Pima's McIntosh says that while virtualization does pay off, it's important not to take it for granted. Significant payback must be planned for.

McIntosh says when the IT staff started its virtualization project, it knew the initial up-front cost could be alarming. The team knew it had to do the right calculations to prove it would be economical over a five- to six-year period. Then it did comprehensive total-cost-of-ownership calculations specifically for the campus server virtualization.

To calculate TCO for the school's VMware server virtualization project, McIntosh's team evaluated the typical server it would purchase for its campus IT staff, including the initial purchase cost and all costs through the warranty and maintenance period. It then multiplied that number by the number of servers they planned to implement, giving them a base TCO for a five-year period.

> In 2009, more than half of newly installed servers used virtualization — a percentage that will rise to **80%** in three years.
> **Source:** TheInfoPro

"Once we did, we could clearly see that the cost seemed high in years one and two, but by years four, five and six it was a clear-cut winner," he says. "Pima expects to save over $106,000 during the five-year server lifecycle."

The IT team at Otis College of Art and Design in Los Angeles went about its thought process a little differently, but came to the same conclusion. Instead of performing a formal TCO calculation, the team examined its systems thoroughly to determine how much it was spending in various areas.

"What we were spending in power consumption alone with the traditional architecture would have been a good enough justification to virtualize our servers," says Sean Kennedy, server manager for Otis College.

Will my critical applications run in this environment?

This common concern really breaks down to two questions: How will virtualization impact the end-user experience for our most critical applications? And which applications should we virtualize?

At Scottsdale Community College in Scottsdale, Ariz., the IT team uses virtualization to offer access to the college's MySCC portal, a system that provides students and staff with access to applications, files and network resources.

Dustin Fennell, CIO at Scottsdale Community College, says the IT team's goal is to virtualize every application. Its main question, he says, is whether to use Citrix's XenApp or XenDesktop. While XenApp focuses on virtualizing the applications, XenDesktop virtualizes the end-user devices.

The first choice is always XenApp, Citrix's application virtualization environment, he says, because it tends to scale better than XenDesktop. Every application is first tested in the XenApp environment.

Only when it's not a good fit for XenApp — often the case with processor- and memory-intensive applications such as Autodesk's AutoCAD and Adobe Photoshop — does the team turn to XenDesktop. The difference is transparent to the end user, Fennell says. Students simply log on to MySCC and choose the application they need.

The University of Memphis, which offers applications to students with disabilities, also had difficulty providing some of the AutoCAD applications via the Microsoft App-V application virtualization system it was using to run most of its nearly 200 applications.

"Most of the applications that deal with system-level drivers tend to be an issue," says Sar Haidar, a systems analyst at the Tennessee university.

The reason, he explains, is because virtualized

applications run in their own environment. They can't add a system-level driver, such as a USB device driver or print driver, which is at the kernel operating system level. For those applications, Haidar says the IT department reverted to its traditional way of delivering applications — providing disks for the local technician to install on the image in the school's computer labs. That's in stark contrast to the way it handles most applications today, via a PC in a lab or via a notebook computer through a web portal. Once the student clicks on the application, the application is streamed to the computer in the lab.

The savings on power consumption alone was enough to justify virtualization, say Matthew Ballard and Sean Kennedy of Otis College of Art and Design in Los Angeles.
Photo Credit: Brian Davis

How will software licensing change when we introduce virtualization into our environment?

This is a sticky subject, because without knowing how virtualization changes licensing, colleges can quickly become noncompliant.

Each layer of software that supports a computing solution, including operating systems, database management systems, applications, application development tools and application frameworks, is typically licensed to users with a set of terms and conditions that require each copy be licensed separately. Once a virtual server or client is created, it can be seen by the host operating system as a file.

The challenge, explains Daniel Kusnetzky, vice president for research operations at 451 Group in New York, is that those files are very easy to copy and distribute, making it particularly difficult to track everything and ensure the suppliers' terms and conditions are met. Kusnetzky advises making sure each and every instance of an operating system, application development tool, data management tool and application is properly licensed.

What impact will virtualization have on our security infrastructure and management?

Virtualization has made the entire security equation easier, says Scottsdale Community College's Fennell. He says that when the operating system resided on 2,000 physical machines, the college had to manage security 2,000 times. Now that Scottsdale Community College provisions a virtual image of the operating system to many machines, the IT staff manages one single instance of the operating system.

"The same is true if we have to install a security or operating system patch," Fennell says. "It's easy to do in a virtualized environment, whereas in a traditional environment we'd have to push it out to every endpoint and then physically go to machines where the patch didn't take."

Two other valuable benefits of virtualization are that malware and inadvertent changes by users are no longer problems. "When an end user opens up XenDesktop, he or she may download a plug-in or make a change, but as soon as they log off, that virtual machine disappears and the next user has a fresh, clean image of the virtual desktop," Fennell says. "So there is no chance of anything inappropriate infiltrating the system."

At Otis College of Art and Design, the IT staff's most important concern was how virtualization would change the way it managed security.

"When we moved to VMware, we were concerned about having to rely on VMware's native switching capabilities," says Matthew Ballard, network manager for the college. "The software wasn't something we were used to using, and we wanted to make sure we could maintain the same security policies."

To address the issue, the IT team chose to implement the Cisco Nexus 1000V software switch into its virtual environment. Adding the Cisco switch let the IT staff maintain the network down to the server level within VMware with its existing Cisco infrastructure and security policies.

Everyone seems to be moving toward virtualization. Is there a reason we shouldn't virtualize?

It doesn't make sense to virtualize for virtualization's sake, says 451 Group's Kusnetzky.

Determine your goals and work backward from that point because, depending on your goal, virtualization may (or may not) be the right way to go.

If the goal is higher performance for specific workloads, using virtual machine software to create virtual servers is not the right approach. But if the goal is to create a consolidated environment and make optimal use of system resources, virtual machine software, combined with orchestration and automation software, makes a lot of sense, he concludes.