

## Ready or Not?

Ask these five questions before deploying virtualization in your school district.

*Karen D. Schwartz*

If you could implement a technology that would cut costs, improve manageability and upgrades, and make your end users happy, would you do it? Of course you would, and luckily such a wondrous technology exists.

Virtualization adoption is growing by leaps and bounds in K–12 environments, as it is in other types of organizations. The technology, which can apply to applications, servers, desktops or storage, conveys a host of benefits.

Server virtualization saves tremendous space, power and cooling, while desktop virtualization lets administrators control which applications and data each student and administrator can access. Virtual application environments make it possible for formerly incompatible applications to coexist on the same system.

But no one technology is a panacea. Each school district's environment and challenges are different. One district may have problems with the startup costs, while another might have to deal with an aging network infrastructure or have critical proprietary software that might not run properly in a virtual environment. IT leaders who have faced such issues and solved them recommend answering the following questions before deploying virtualization:

### 1. Will our critical applications run in this environment?

That's always an issue, says Charles Kanavel, director of technology for Campbell Union High School District in San Jose, Calif. The school district has standardized on Citrix XenDesktop for its desktop virtualization and Citrix XenServer for its server virtualization.

To address the issue, Kanavel's team performed extended proof-of-concept testing that included trying to run the standard classroom applications in a virtual environment.

"We came up with a few things that we had to find workarounds for — especially processor and memory-intensive applications like Photoshop and AutoCAD," he says. "We found that those types of applications are better kept on the virtual desktop image because the applications don't stream very well."

That's exactly the issue confronting CIO Nick Jwayad and Enterprise Architect James Jung with Portland Public Schools in Portland, Ore. Jung is part of a team that is virtualizing dozens of servers using a combination of VMware, HP c7000 BladeSystem servers and an EMC CX4-240 SAN.

"Our primary focus in implementing virtualization was aimed at strategic migration of systems, so prior to any changes, we conducted a proof-of-concept with existing application servers to get acquainted with the technology," Jwayad says.

Although all systems are important, systems least critical to daily activities were migrated first, such as building-based instructional applications and department-based issue tracking systems. More mission-critical applications such as ERP and e-mail will follow in future phases.

"We have confidence in the technology. Our success in this project has been driven primarily by the sequence and timing



Nick Jwayad and James Jung of Portland Public Schools recommend performing extensive testing before virtualization deployment.

Photo Credit: Lee Emmert

of system migration,” Jwayad says.

## 2. Should all of our servers, desktops or applications be virtualized, or should we pick and choose?

Douglas Noell, director of IT operations for Chapel Hill–Carrboro City Schools in Chapel Hill, N.C., believes it’s best to virtualize all servers, even if it’s done in stages. The district started by virtualizing 20 of its lower-performing physical servers, 10 of which are Citrix servers. The server performance has been solid, and Noell says he accomplished one of the project’s initial objectives of reducing the power, cooling and footprint requirements of an important part of the infrastructure.

“The concern lies in whether or not we can continue this momentum by virtualizing at least 30 of our higher-performing Citrix servers onto new server hosts without compromising the balance in power and cooling that is now present in our data center,” he says.

“We have competing infrastructure priorities, and our financial resources are limited,” Noell says. “The primary competition is expanding our wireless networks to the elementary schools, easily perceived as a visible and direct impact on instruction. Enhancing server and data center performance may not be as easily visible to end users, but it’s still important.”



Douglas Noell has virtualized 20 of Chapel Hill–Carrboro City Schools’ servers and hopes to complete at least 30 more.

Photo Credit: Forrest MacCormack

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

This is a sticky subject, and one that IT should move forward on cautiously. Without knowing how licensing will change when virtualization is introduced, school districts 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 requires 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 problem, explains Daniel Kusnetzky of The 451 Group consultancy, is that those files are very easy to copy and distribute, making it particularly challenging to keep track of everything and make sure that the suppliers’ terms and conditions are met. To address the issue, Kusnetzky advises making sure that each and every instance of an operating system, application development tool, data management tool and application is properly licensed.

Portland Public Schools follows that practice, and Jung says the challenge is far from insurmountable.

“The ability to rapidly spin up and provision servers means you have to license properly and put the correct organizational controls in place, but it’s manageable,” Jung says. “It just means that for each vendor you license from, you have to explore the options. For example, Microsoft offers some assistance on the server side by allowing us to license Windows Server Datacenter with the understanding that we can run as many Microsoft servers as we want. It just depends on the vendor.”

## 4. Will virtualization pay off in the long run?

The answer is yes, if you’re willing to do the math and be patient. For Portland Public Schools, the adoption of virtualization was part of a larger green IT initiative that includes several new technologies and systems that together yield a lower data center total cost of ownership (TCO) and carbon footprint.

Portland’s Jwayad says virtualization as a stand-alone solution represents a high cost of admission, but it offers a more efficient existing and future platform.

“Phase I of our virtualization effort showed us that we can replace 40 legacy servers with eight virtualized blade servers,” he says. “That’s a reduction of 32 machines that require power, produce heat and demand administration. We predict that the financial lines of virtualization will cross in the second or third year, and the district will enjoy significant reduced TCO in future years.”

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

Source: *TheInfoPro*

Campbell Union’s Kanavel says virtualization is great, but if the district doesn’t save money, it’s not worth doing. “We found that for us to put a virtual desktop in a classroom costs \$600, including all of the backend infrastructure, versus \$1,100 for a stand-alone PC,” he says. “When we added everything up, we found that we’ll save \$4 million over eight years — money that can help save teachers’ jobs, which affects the kids.”

## 5. Everyone seems to be moving toward virtualization. Is there any reason why we shouldn't virtualize?

It doesn't make sense to virtualize for virtualization's sake, The 451 Group's Kusnetzky says. Instead, determining your goals and working backward from that point is the right way to approach the issue, because depending on your goal, virtualization may or may not be the right way to proceed.

If the goal is to create 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 adds.

That's exactly the approach Thuan Nguyen, CIO of Kent School District in Kent, Wash., took with the district's three virtualization projects.

Nguyen's team at Kent School District started slowly with its application virtualization effort, focusing on providing one school greater technology access.

"We have three different types of virtualization — application, server and desktop — but each time, we didn't approach it with the idea of virtualization as the goal," explains Nguyen, who used Microsoft's App-V for application virtualization and VMware for desktop and server virtualization. "Instead, we were trying to meet an organizational need, and virtualization happened to be a good solution."

### Virtualization Hurdles

When it's running smoothly, virtualization can be a godsend to school districts. But often, there are hurdles to overcome before getting to that point. Here are five hurdles worth watching out for:

**Deciding whether to implement and manage the virtualization infrastructure in-house.** Sure, outsourcing the implementation of a virtualization system speeds up the process, but it has costs, in terms of money and staff knowledge. For Kent School District in Washington state, the answer was to hire a consulting group to help architect the system while having the school district's IT team do the actual implementation. "When you're finished, your team owns the system in terms of managing and troubleshooting," says CIO Thuan Nguyen.

**Changing your billing infrastructure.** When you implement virtualization, billing may not be the first thing you think of, but it is affected. For example, how do you bill back to a project housed on a virtual server? And as you add virtual servers, how do you bill back to specific departments or projects to create the funds to add those virtual servers? The answer will differ for every organization, but thinking it through is a worthy exercise, says James Jung, an enterprise architect with Portland Public Schools.

**Making sure it works seamlessly with a variety of end-user devices.** Not all users will access your system via a PC. Some will use thin clients, traditional PCs, notebooks or older computers reaching end of life. Still others will use handheld devices. Some will access the system wirelessly, while others will tap in via a wired network. "The perception is that when you build up your server infrastructure, your world will get better; and if it doesn't, users will believe their experience hasn't been improved, so they won't buy in to the concept in general," says Douglas Noell, director of IT operations for Chapel Hill–Carrboro City Schools.

**Shoring up your network infrastructure.** Running multiple virtual servers can place an additional load on established network infrastructure, so make sure you've got the infrastructure in place to handle it before diving into virtualization, says Daniel Kusnetzky of The 451 Group.

**Keep in mind that multimedia doesn't always run smoothly in a virtual environment.** That's a fact that's particularly relevant in education settings, where audio and video are critical to learning. Many of the leading virtualization manufacturers have made great strides in multimedia support, but organizations should still develop their own plans for dealing with this issue. Chapel Hill–Carrboro City Schools has chosen to deal with streaming video issues by developing a system that will tweak virtual server resources to add more processing power or RAM for applications when needed.

### A Virtualization Primer

The term "virtualization" is used as a catch all, but there are actually several different types of technology. Here's a brief rundown:

**Server Virtualization:** This is the partitioning of a physical server into smaller virtual environments. Dozens of virtual servers can reside on the same computer, and multiple operating system environments can be housed on a

single piece of hardware. Benefits include lower cost; easier management and upgrades; and space, cooling and power savings.

**Storage Virtualization:** This technology makes the location of storage (as well as the type of device used for storage) transparent. It also allows multiple systems to share the same storage devices and allows for real-time backup without disrupting applications.

**Desktop Virtualization:** User preferences, applications and data are stored on a remote server, able to be pulled up via a web browser at any place or time. Benefits include increased security, user satisfaction, and easier maintenance and upgrades.

**Application Virtualization:** This separates the application from the operating system so that it can run from a remote server instead of on a user's computer. The process lets applications coexist with other applications and be patched or updated without interfering with other applications.

