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Now and in the Future: Meeting Higher Education IT Challenges

The Citrix Virtual Computing Solution for BYO, Cost and Efficiency Demands

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Executive Summary

The information technology (IT) challenges in higher education today surpass anything that previous generations could have imagined. Virtually every class and every student depends on the delivery of data and applications as an integral part of the learning experience, and the challenge of maintaining the necessary computer lab environment becomes a consuming task for the IT manager. In addition, the traditional brick-and-mortar computer lab is no longer enough when the entire student body needs access to different applications for each class in every semester. Adding to the IT burden, students today expect immediate and flexible access to information and applications. The college or university IT team must find more efficient ways to deliver data and applications to students anytime, anywhere and on any device without exceeding current staffing and financial resources.

A growing number of higher-education IT professionals have already identified the solution to their computer lab challenge: virtual desktop delivery. The survey highlights concerns about the maintenance-intensive computer lab and also illuminates the benefits that colleges and universities can expect from the virtual environment. Virtual computing solutions give higher education the means to:

- Deliver a full user desktop as an on-demand service and provide a personalized set of applications and other resources to each computer, laptop, tablet and more over the network;
- Optimize computer labs to improve delivery of applications while reducing the strain on IT resources;
- Bolster security and identity management capabilities through the use of multi-factor authentication solutions;
- Oversee IT governance more efficiently for controlling resources and costs, managing risk, and making the right investments;
- Provide flexible, secure student access to a wide range of applica¬tions via the broadest array of end devices available;
- Centralize administration and reduce IT costs to bring technology initiatives within reach of available resources.

Virtual desktop delivery and other virtual computing solutions also improve the green IT profile of colleges and universities of all sizes. Longer lifecycles for expensive desktops, the ability to use power-conserving thin clients and dramatic reductions in the power consumption of the datacenter all add up to green IT solutions that also positively impact budgets. Additionally, virtualization helps to facilitate other campus initiatives like the move to digital textbooks, online instruction, interactive learning resources for faculty, podcasting, blogging and blended learning.

Read on to Learn…

How virtual computing solutions from Citrix Systems, Inc. address the desktop, data infrastructure and datacenter to ease the strain on IT while improving and expanding the delivery of applications to any student or faculty member, in any location, on any end device with an Internet connection.

Addressing BYO, Cost and Efficiency Challenges in IT

For the current school year, higher education is forecasted to funnel well over $10 billion into technology-related upgrades, acquisitions and initiatives. From public universities like UCLA ($195 million) to private institutions like the University of Pennsylvania ($227 million), schools are spending on ed tech like no other time in the past. For colleges and universities of every size, dependence on computers and software applications for coursework is no longer limited to just engineering and science students. The traditional, physical computer lab places extreme demands on the limited resources of the IT management team, ties up valuable space and limits the way students now choose to work.

Student-owned computers are not much help in terms of the strain on IT resources. Now more than ever, students are bringing every kind of device under the sun to campus. The logistics of physically installing the correct software and access for each student, and then removing that same software and access at the end of the semester, is staggering.

New technologies and fresh approaches are needed to bring the computer lab in line with the needs of the current higher education environment. Virtual computing presents a set of solutions that reach from the desktop level all the way to the datacenter to give higher education an IT solution that truly addresses the unique challenges of the computer lab.

In Citrix surveys at the 2010 EDUCAUSE and STEMtech Annual Conferences, IT managers outlined the challenges of the traditional computer environment, as well as the benefits they expect to achieve from moving to a virtual solution. Based on the survey results, virtualization—and desktop virtualization in particular—has a prominent role in many higher education IT initiatives:

BYO and Desktop Availability: The growth of the "bring your own" (BYO) device learning environment presents both new opportunities for instruction and its own set of hurdles. Faculty and students gain new device options and an anytime, anywhere, on any device computing freedom, but the trend also presents fresh challenges for IT staff including application delivery, personalization preferences and security.

The Move to Distance Learning: The demand for alternative learning environments from a more diverse student body has led directly to the explosion of eLearning courses, where faculty and students conduct courses online instead of in a brick-and-mortar classroom. According to a poll taken this year by the Digital Community Colleges Survey, close to a half of responding institutions have 35-65 percent of their student body enrolled in distance or blended courses. As a result, IT is being asked to personalize web-based education while making it cost-effective, and to provide online content in a variety of formats for professors to use.

Harnessing New Classroom Technologies for Faculty: The days of chalk and erasers—and now wipeboards—are fast becoming a distant memory. Today, colleges and universities are looking to eTextbooks, whiteboard systems, interactive software and projectors, lecture capture, podcasts and more to enhance the experiences of tech-savvy students. Yet these teaching aids

The Far-Reaching Push for More Robust IT

More than 95 percent of higher-education IT professionals cite a growing demand from students and faculty alike for a broader selection of technology-based resources, including:

- Digital textbooks
- Wireless campus solutions
- Web-based distance learning
- Emergency notification systems
- Mobile/BYO computing
- Enhanced data security
- Video annotators and hi-def AV capability
- Identity management

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create more need for technical assistance from the IT staff and device maintenance.

Ongoing Security Threats: Delivering higher education applications over the network (particularly the Internet) demands a security solution that can safeguard data from hackers and other cyberspace threats. Across an entire campus, it's extremely difficult to ensure that remote devices—especially classroom terminals—have full and up-to-date protection. Therefore, it is critical to have a method for remotely controlling the degree of user access to applications based on how secure each device is.

Redefining the Computer Lab: The traditional computer lab—a physical location on campus with a limited number of desktops available to serve an ever-growing number of students—presents a host of challenges to the IT team:

Instituting a virtual computing environment can help to increase course offering diversity, support computer-based research initiatives and strengthen student recruitment and retention efforts.

- **Management:** Time-consuming maintenance and support for lab desktops and applications
- **Security:** Assurance of data, application and device security
- **Semester provisioning:** Timely updates required for each semester's applications and data
- **Access:** Optimal student access to data and applications
- **Cost:** The need to work within the limits of decreasing budgets and aging equipment

Maintenance and management of individual desktops takes precious time, with hundreds of hours dedicated to patches and upgrades alone.

Advantages for Administrators and Faculty

The dawn of the virtualization era is not just a boon for Generation V alone. School administrators and professors also benefit from academic virtual computing in a variety of ways that make both teaching and managing administrative tasks easier and more effective. Instituting a virtual computing environment can help to increase course offering diversity, support computer-based research initiatives and strengthen student recruitment and retention efforts. For class deans, a virtual system provides greater visibility into student performance to ensure higher graduation rates and improved academic performance.

Going virtual also simplifies class scheduling, registration systems and financial aid delivery, while affording simpler solutions for issues associated with rising enrollment. It augments counselor efforts to provide online academic advising and career guidance services, and enhances professional development in virtual computing skills. Any electronic health record system for campus physicians benefits from virtualization, as does an institution's online academic tutoring program.

The Virtualization Solution for Higher Education

Virtual computing has become one of the most talked-about technologies in recent years. It breaks the hard-coded link between hardware and software, allowing individual computing components to be dynamically combined and reassembled for maximum efficiency and agility.

A complete virtualization infrastructure that spans from the datacenter to the desktop is the leading method for delivering applications to users. The ability to orchestrate the functional components at the datacenter, front end, gateway, remote location and desktop assures that the overall system has the required intelligence to adapt to dynamic requirements. Through this effective orchestration of desktop delivery, IT is able to instill lasting improvements in performance, flexibility and security. Virtual computing solutions give colleges and universities the ability to securely deliver data and applications to any student with an Internet-capable end device—while reducing costs and drastically cutting IT management hours required to manage desktops and applications.
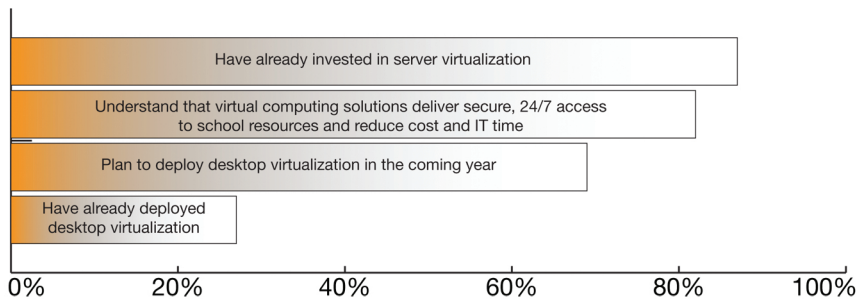
The Results are In: Polling Higher Ed IT Experts at EDUCAUSE and STEMtech

This past year, Citrix interviewed 200 higher education IT professionals at the EDUCAUSE and STEMtech annual conferences. The survey asked about virtual computing issues important to higher education, including improving IT function through desktop virtualization, alternatives to physical computer labs, addressing new technology needs and demands, student use of BYO devices, key benefits of virtual instruction, competitive benefits of virtualization and the use of cloud computing service providers. Responses strongly indicate that desktop virtualization is positioned for a growing role in the future of higher education IT.

Percentage of IT professionals polled that:

The Word around Campus

Today's IT administrators are paying particular attention to the advent of virtual learning, cloud computing, digital content and eBooks, social networking, podcasting, smartphones and lecture capture on college campuses. Within their own offices, they're focusing on consolidation, funding and expenses, staff productivity, increased help desk/tech support demands, bandwidth issues and student mobility.

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The conference survey also revealed manager recognition of virtual computing as a means for improving the IT function at colleges and universities. According to the survey's results, higher education IT professionals believe that virtualizing operations will:

- Reduce costs by eliminating the need to maintain physical lab and equipment (56 percent)
- Provide easy delivery of semester-based instructional applications and resources (53 percent)
- Secure delivery of applications/resources to the right students at the right time (47 percent)
- Free IT staff to work on other projects (44 percent)
- Enable BYO computer opportunities for students (41 percent)

The proliferation of BYO computer use on campus was also a hot topic in the survey. A question about student-owned devices showed the continued spread of personal computer use in colleges and universities across the country, with IT managers outlining user frequency as follows:
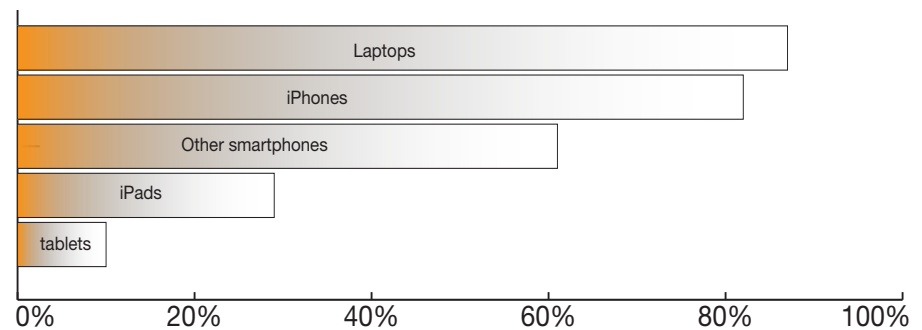
BYO: Embracing the Transition to Student Device Management

Freedom, choice and flexibility are just a few things that students constantly demand. Be it curriculum, projects or schedules, they want convenience and the power to choose. The rise in online universities, online courses and eTextbooks indicate that students want the flexibility to study and work from anywhere, anytime. Brick-and-mortar educational institutions can offer learners similar flexibility, while reaping other benefits such as cost savings by replacing the outdated desktop model and introducing a virtual desktop experience thereby reducing maintenance and management overhead of lab infrastructure, streamlining support and retaining students.

"Bring your own" (BYO) computing is a phenomenon that enables this transition and is becoming popular not just in the corporate world but other areas such as health care, professional services and education due to the exceptional benefits it brings to the user and the organization. BYO means that students bring and use their own devices rather than relying on ones provided in the computer lab, therefore helping IT get out of managing a host of devices. The cost savings also enable institutions to re-allocate limited budgets toward other services including research programs, scholarships and academic support.

Providing More Options—and Solutions

Modernizing the educational process is a top-priority challenge for all institutions. The traditional approach is to set up computer labs, which requires managing each device for updates, new applications, security measures and so forth. However, limited budgets and lack of IT resources can be a roadblock to setting up a full-fledged lab or upgrading an existing lab by replacing legacy devices that cannot run some of the more complex applications such as graphic intensive applications and engineering applications. A BYO program is the answer to these hurdles and is also the choice of students of Generation-Virtual (Gen-V) who prefer virtual and digital media channels to access information anytime, anywhere.

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Accepting the BYO option affords the ability to simplify ownership, management and data security while saving costs and enhancing student experience. It creates an environment where IT doesn't manage anything except the server farm, and instead invests its time enabling new business initiatives as opposed to troubleshooting hundreds and thousands of devices. Planning for and managing complex applications and OSs on every device, limited mobility options and ad hoc data recovery mechanisms are now seen as old school. Now, a single solution affords zero device management, centralized application management and enabling remote access—this is the paradigm shift a BYO program can bring to educational institutions.

The Extreme Lab Makeover

Managing physical computer labs is costly and a huge burden for IT teams. New and complex education applications such as AutoCAD®, Adobe® and engineering applications that sometimes need to be added or updated every semester require a robust device. IT has to continuously scrub and polish existing devices or get rid of legacy devices altogether and purchase new ones to support these requirements. On the other hand, students also demand extended hours or 24-hour labs that can provide them the option to learn anytime. Setting up such labs and maintaining round-the-clock facilities is often difficult, if not impossible, for institutions working on limited budgets. In reality, educational institutions have other development areas that they need to allocate budgets to including scholarships, academic support (libraries and research services) and auxiliary enterprises (dormitories, bookstore and meal services).

Desktop virtualization provides 24-hour access to the labs, while simplifying IT. Instead of providing physical computer labs that may not be open around the clock or have student-friendly devices, institutions can provide access to virtual labs on student-owned laptops, notebooks or other devices. In a virtualized environment, entire desktops and applications are delivered from the datacenter. Instead of installing software on a lab computer or student's personal device, the applications and the data reside in the datacenter and are accessed remotely; applications run on the server and not a device, and can therefore be delivered to any type of device securely.

This also means that IT can instantly provision new labs while reducing hardware expenses, capital infrastructure expenses (land and building) and energy consumption in the datacenter and cutting down on tech support needed to run physical labs. When introducing new applications, IT can test and develop them quickly while keeping other services running 24/7.

Citrix XenDesktop™ technology enables IT to quickly and easily institute a BYO infrastructure. It also provides IT with the power to deliver custom desktops to users based on their needs with the kind of control and security policies suitable for IT. Hosted shared and hosted VDI desktops are good options for labs and student-owned computers while streamed desktops and hosted blade PCs are ideal for professors and IT staff who have a heavier computational requirement. Using these delivery models, IT can enable security policies that prohibit saving data on local devices. When virtualizing applications and streamed to endpoints as an on-demand service, Citrix XenVault™ technology enables IT to automatically and transparently encrypt all data created through Citrix XenApp™-delivered applications streamed to endpoint, even allowing IT to remotely wipe the data if the device is ever lost or stolen.

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The different types of desktops available with XenDesktop.

Student Orientation for BYO

The success of any BYO initiative depends upon the extent of user adoption and satisfaction; therefore, a superior user experience is key. IT needs just the right strategic partner and an efficient virtual computing solution to implement this program. Generation V is experimenting with everything virtual including eTextbooks that are cheaper and explain complex concepts better with high-quality images and charts. The rise in popularity of eBooks is also acting as a key catalyst for the increase in student-owned devices.

Students are also eager to adopt BYO as it empowers them with a sense of ownership, flexibility and freedom. More and more students now own personal devices that range from netbooks to laptops. They want university applications on these devices for convenience of managing personal and university data on a single device of their choice. However, students cannot be expected to purchase, install and manage expensive software; institutions must provide access to these applications using desktop virtualization.

XenDesktop can deliver the same desktop experience that students are familiar with including all of the applications a physical university lab offers, 24/7. The type of device and OS does not matter since XenDesktop works on any device, anywhere. Students have the flexibility to work from their dorm, a café, with a study group outside campus—anywhere, on any device. With Citrix HDX™ technology, students enjoy a rich, fast and high-definition experience even with the most complex or graphic-intensive applications. This is also true for legacy machines that may not be able to run these applications effectively if installed locally. With XenDesktop, students connect to a virtual desktop and run these applications on any machine, thus extending the life of their legacy machines or other personal devices.

BYO Initiative Enrollment

Some institutions have experimented with launching mandatory BYO laptop programs, where students are required to own a personal laptops, tablets or notebooks. The advocates of the mandatory program claim that it fosters equality among students where all students have the same set of tools and resources to succeed. Other institutions are making the process elective by encouraging students to bring in their devices, and the advent of new devices such as the tablet has made adoption easier and more affordable. Institutions can either offer subsidized devices to students, or provide devices after incorporating the subsided cost of the device in the tuition fee.

Some schools opt out of the mandatory programs since most students entering college already own a device and those who want to purchase a new one want the flexibility to choose rather than receive the one mandated by the institution. Almost all large institutions offer student discounts and this model works well for students who are looking for the latest devices. Some schools also provide a stipend to faculty to purchase a device of their choice to eliminate the need for classroom devices.

In schools where bringing a personal device to classrooms is not mandatory, some students may not want to own a device due to lack of funds or desire to own and manage a device. For such reasons, the institution may still have to manage computer labs. However, these labs do not have to use the dated desktop model; instead, they can centralize the delivery of virtual desktops to each lab computer. IT can manage and provision desktop images to thin clients or any other device thereby reducing individual software installation and maintenance efforts and extending the desktop refresh cycles.

BYO can help educational institutions embark on a strategic shift that lets them optimize budgets by saving costs and redirecting funds toward research, academics, facilities maintenance, scholarship funding and other student services while keeping up with the virtual computing revolution and empowering learners. Now more than ever, schools need to reset priorities to gain maximum leverage from limited funding. With Citrix providing a strong vision and solutions, BYO can bring benefits to the administration, students, teachers and IT, and start a new chapter in modernizing higher education.

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Revitalizing Desktop Management through Virtual Computing Solutions

Within the traditional computer environment, desktop management includes the maintenance of hardware, software, upgrades and patches for each individual desktop—an extremely time-consuming set of responsibilities. True desktop virtualization, however, only requires the management of one "golden image" of the desktop in the datacenter. Applications are installed, upgraded or patched once, and that single image is delivered directly to the computer lab or even to individually owned end devices. Each faculty member, student and administrator benefits from the fast, virtualized desktop and the IT manager is free to apply personnel and budget resources to other important projects.

Colleges and universities can take computer lab virtualization one step further and eliminate the physical lab altogether.

The virtual desktop presents clear benefits to the computer lab:

Efficient management of semester-based instructional application: Installation of and access to semester-based applications are implemented at the server level, with no need to physically handle each desktop. For colleges and universities with multiple campuses, this creates a phenomenal benefit in terms of the time it takes for IT to deploy new or upgraded applications. Data and applications reside safely in the datacenter while only pixels and mouse clicks are transmitted over the network to the lab or the student's personal end device, creating an added level of security for applications, data and hardware.

Improved around-the-clock student access: Virtualization's ability to deliver secure, on-demand access creates 24/7 availability to students, who can use instructional applications from the lab or from any end device with an Internet connection. Students enjoy the freedom of working when they want, where they want, and can leverage their own laptops to access college or university resources.

Extended lifecycles for expensive hardware components: Desktops and other end devices achieve significantly greater lifecycles, lasting years longer and cutting the expense of replacing high-cost hardware. This also reduces waste and allows the institution to gradually replace aging desktops with more energy-efficient thin clients or desktop appliances—all with no negative impact to performance.

Colleges and universities can take computer lab virtualization one step further and eliminate the physical lab altogether, delivering applications on-demand to each end device. The computer lab becomes a virtual experience, which frees up lab space for other uses and creates a more efficient IT management scenario.

Citrix technologies allow the IT department to deliver virtual applications and manage access from the server level, with no need to touch each student device. Add the benefit of allowing students to not only use the end device of their preference, but also to have access to applications and coursework whenever and wherever they want, and application delivery from Citrix becomes a true competitive advantage. XenDesktop centralizes and delivers desktops as a service to students anywhere, reducing total cost of desktop ownership for colleges and universities. Centralizing desktop lifecycle management in the datacenter improves data security, while students receive a high-definition experience and personalized, pristine desktops over any connection.

Leveraging Application Delivery Infrastructure for More Efficient IT

"Application delivery infrastructure" refers to the distributed infrastructure components that organizations deploy along the line-of-sight between datacenters and end users to ensure the successful, reliable and secure delivery of any application to any user in any location. Application delivery infrastructure enables true end-to-end virtualization—from the secure datacenter to any end device. For higher education, Citrix application delivery solutions help colleges and universities enhance the learning experience by:

- Delivering the freedom of anywhere, anytime access to education resources to students and faculty who want to study and work on their own schedule;
- Integrating and delivering administrative, ERP and information systems in minutes instead of months;
- Enabling security and identity management by providing authenti¬cated access to critical assets; and
- Reducing total cost of ownership for technology investments.

From a centralized and scalable Citrix application delivery infrastructure environment, applications and information are easily web-enabled and securely delivered to any device, at any location, over any connection, including low-bandwidth and wireless—enabling colleges and universities to meet their top IT challenges.

Virtual Computing Solutions Open the Door for More Learners

More than 85 percent of higher-education IT executives believe that the use of desktop virtualization gives more students access to the benefits of a college education.

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Server Virtualization to the Rescue

As colleges and universities expand their IT function to meet the educational needs of students across multiple campuses, server sprawl can be a cumbersome side effect. Large, expensive datacenters require significant time to maintain and manage, and power and cooling costs grow right along with the number of servers—servers that often run well below capacity due to lack of optimization.

Server virtualization transforms an institution's datacenter from unwieldy and expensive server farms into a performance-optimized, energy-efficient hub. By using one server to process multiple virtual machines handling different applications, colleges and universities increase server utilization while running far fewer servers. This drastically cuts the power needed to operate, cool and maintain equipment and multiplies efficiency many times over.

Citrix Essentials for XenServer™ is open, powerful server virtualization that radically reduces datacenter costs by transforming static and complex datacenter environments into more dynamic, easy-to-manage server workload delivery centers. Based on the open source Xen hypervisor, Citrix Essentials for XenServer delivers a secure and mature server virtualization platform with near bare-metal performance.

Improving the Bottom Line: Lowering Costs with Virtualization

With 41 of 50 states enacting budget cuts for higher education, these are trying times for school leaders. Resulting shortfalls have led to staff layoffs, service delivery reductions, and project delays or outright termination—but also an increased reliance on virtual computing, datacenter consolidation and digital content in order to minimize costs. Consolidation and standardization of the IT environment—not to mention heightened use of the Internet and web-based services—are largely driving the movement in higher education toward virtual computing. Increasingly, ed tech is seen as the key to both improving learning outcomes and cost reductions.

Keeping school infrastructure modern, secure and fully functional can be both costly and labor-intensive. With so much hardware and software to manage, the funding needed to install, test and secure only grows over time. Multiply this need across the total extent of education's reach and it becomes easy to see why a simpler means of computing is needed.

The shift to virtual computing makes the most sense when considering what IT professionals currently need more than ever—a lasting solution for attaining maximized flexibility and capacity, without requiring extra expense or labor time. Virtualized desktops and applications ensure that colleges and universities no longer need to oversee upgrades and worry about securing hundreds if not thousands of individual devices. Instead, users merely pay as they go for what they need and scaling up or down becomes simple.

Heads in the Cloud?

Nearly 60 percent of higher education professionals surveyed have considered leveraging cloud computing services to support desktop and application virtualization.

In one consideration of virtualization's Total Cost of Ownership (TCO) benefits, an institution has 1,000 desktops with 600 being considered for virtualization via hosted VM-based dedicated desktops (all thin clients). In light of the proposed costs and benefits of the XenDesktop solution versus staying with current "As Is" opportunities, implementing a Citrix solution results in a projected TCO savings of $869,874 for the institution over the course of three years.

Implementing the proposed project will require a three-year cumulative investment of $846,606 including:

• $549,000 in desktop infrastructure expenses
• $216,000 in desktop infrastructure maintenance costs
• $81,606 in server and storage power and cooling expenses

TCO Comparison: Three-year cumulative	Current (As Is)	Proposed w/ XenDesktop	Savings	
Desktop Infrastructure (Capital Expenditures)				
Desktop Infrastructure	$463,320	$549,000	($85,680)	-18%
Desktop Infrastructure Maintenance	$0	$216,000	($216,000)	-
Desktop Infrastructure Management				
Desktop Administration	$1,009,800	$369,000	$640,800	63%
Application Administration	$295,920	$70,200	$225,720	76%
IT Planning and System Management	$437,040	$331,200	$105,840	24%
Standard Utilities and Office Applications	$397,800	$324,000	$73,800	19%
Custom Applications	$414,000	$338,400	$75,600	18%
Power and Cooling	$144,000	$12,600	$131,400	91%
Server and Storage Power and Cooling	$0	$81,606	($81,606)	-
User Training	$451,800	$451,800	$0	0%
Total Cost of Ownership (TCO) - 3 year cumulative	$3,613,680	$2,743,806	$869,874	24%
Cost per Device per Year	$2,008	$1,524	$484	24%
Total Direct Benefits	$3,613,680	$2,743,806	$869,874	24%

Future Areas of IT Investment in Higher Ed

• Enterprise resource planning
• Server/storage consolidation
• Mobile applications and access
• Business continuity/ disaster recovery preparation
• Broadband and connectivity
• Web-based solutions
• Identity and access management
• Improving security

Case Study: Scottsdale Community College Expands Educational Access

The Challenge: Cost-Effectively Expand Education Access

Arizona's Scottsdale Community College (SCC) is a two-year institution with 800 staff and about 11,000 students. In addition to traditional programs of study, including university transfer and career programs, SCC offers continuing education for practicing professionals, developmental education and English as a Second Language. It is the only public community college in the nation on Native American land.

When SCC's distributed infrastructure came due for yet another round of desktop hardware upgrades, CIO Dustin Fennell decided to jump off the PC refresh treadmill. The college had many reasons for seeking a fresh approach to IT. Constant spending for new hardware meant there was no funding left for expanding the solution, adding advanced technology or even purchasing new educational software. Further, SCC needed a way to strengthen its market advantage in an area with fierce competition for students from more than 15 other colleges and universities, many of which are much larger and perceived as offering more technologically advanced services to students. SCC also has a mandate to provide pervasive technology services to the community, particularly to low-income residents and non-traditional students.

"We wanted to make our education resources more widely available and affordable for all types of students," said Fennell. "Many students were struggling to afford software required for our courses, or a particular type of computer needed to run that software. The alternative meant having to come on campus to use one of our PCs, which was not only inconvenient for students but also hampered our efforts to expand enrollment with non-traditional learners such as working adults and people who wanted to take online courses."

Implementing an End-to-End Virtual Computing Solution

Fennell was familiar with Citrix XenApp from a previous job at another college. So when he made the decision to move beyond distributed PC computing to a central web portal, he chose the Citrix Delivery Center portfolio of virtualization products. The MySCC portal provides a single point of connectivity to applications and desktops as well as files and network resources.

Working with Thin Client Computing, a Platinum Citrix Solution Advisor, SCC implemented the MySCC portal solution in two phases. First, Citrix XenApp, Platinum Edition was rolled out for virtualized delivery of many different applications, including the Microsoft® Office Suite, specialized math tutoring programs, Microsoft Visual Studio® and Adobe® Creative Suite®. Currently, more than 60 applications are delivered and offerings are growing in response to requests from students and staff.

The college then implemented Citrix XenDesktop, Advanced Edition to deliver two Windows® XP virtual desktops: one features AutoCAD, AutoDesk Revit and Google™ SketchUP™ software and is delivered to about 100 interior design and AutoCAD program students; the other delivers Adobe Creative Suite to Business Institute students as well as any other students and staff who need it. All virtual desktops have access to mapped drives, personal files and network resources.

Citrix XenServer, Platinum Edition, chosen to replace a competitive server virtualization solution due to superior performance, serves as the platform for XenApp and XenDesktop. The provisioning functionality of XenServer streams a single workload image to multiple servers. The SSL VPN capability of Citrix NetScaler®, Platinum Edition secures portal traffic over the network in high-availability mode. SCC also uses Citrix GoToMeeting® for online collaboration.

Fennell said, "We port everything through MySCC. This single interface allows students and employees to access their personal files (via published folders), network resources (via published network shares), applications via XenApp and specialized desktops via XenDesktop. We have chosen this approach at this stage in the project for simplicity, so students and employees have a consistent user experience no matter where they access MySCC."

Improving Accessibility for the College—and the Community

The MySCC portal, powered by Citrix virtualization technologies, is expanding and simplifying information delivery for faculty, staff, students and the community as a whole. With a tagline of "any time, place, device," the free portal makes it easy to connect from any browser. With MySCC, students no longer have to purchase software licenses and a specific brand or model of computer for coursework because the latest software is made available to them via the portal. In fact, the system supports thousands of Macintosh® computer users. It also supports thin-client devices, which has been implemented in SCC's new IT building.

With Citrix virtual computing solutions, all students in a course use the same resources, ensuring a consistent learning environment. Fennell noted, "There is an adjunct faculty member who lives in Colorado and teaches Adobe Creative Suite applications online. She is very pleased knowing that her students all have access to the same version of Adobe. She can post project files in a shared folder that all the students can read."

Further, web-based access is making a significant difference for low-income students who previously had many challenges in pursuing a college degree. "A young woman came to me in tears because she was so happy about MySCC. She lives in a group home with limited access to a single, shared computer and wasn't allowed to install any software on it. She couldn't afford her own computer or software. Because of the Citrix solution she is now able to do her class work, use all the software she needs and progress toward her degree."

Fast ROI and Lower IT Costs

By adopting server, application and desktop virtualization, SCC has achieved significant ROI. According to Fennell, "We did not have to come up with new funding to finance this two-phase project; we simply redirected money that would have been spent on PC upgrades over those two years to pay for the Citrix solution. In the end, rather than having 500 new computers on campus that only benefit the students and employees who use them, we have provided a high-speed, highly available system that benefits every student and employee at our college."

Moving forward, the college is saving $250,000 per year that would have been spent on hardware refreshes, providing SCC the choice of saving that amount or applying it to other strategic needs and technology innovations. In the face of current and anticipated statewide educational budget cuts, SCC is better positioned than other colleges and universities to continue adding new technology and access.

For the IT team, Citrix solutions have simplified administration, enhanced data security and kept staffing lean. For example, according to Fennell, "Previously, we had to maintain three different versions of AutoCAD on our campus PCs because the software is expensive and some students had older versions. It was a nightmare. Delivering AutoCAD over XenDesktop means we only have to maintain one version—and that administration is done in the datacenter instead of on the devices."

XenServer has enabled SCC to consolidate physical servers, thus reducing server administration tasks. Provisioning capability, which allows standard server and desktop images to be created, stored and dynamically delivered, reduces storage space by nearly 1,000 GB. He explained, "We provision 100 virtual desktops from two images of 10 GB each. Without Citrix provision¬ing, we would require a terabyte of storage."

Another benefit of centralized management was the college's ability to use existing IT staff to support a new science building and redirect one full-time position to fill a more strategic need. Embracing end-to-end virtualization has also led to expanded skill sets and greater job satisfaction for the SCC IT staff, many of whom had previously handled hardware only.

Standing Out from the Competition

With the implementation of Citrix virtualization solutions, SCC has moved from technology underdog to technology leader. The MySCC initiative has not only generated tremendous interest from the community—with a thousand unique visits to the site before it even officially launched—but has made area colleges and universities take notice.

With broader and easier access to its offerings, SCC can tap the growing market of non-traditional students who provide the greatest potential for increasing the college's enrollment. "The biggest opportunity that we have is in the online environment, but there is a lot of competition. Today, no other college in our service area can provide students with applications the way SCC does with Citrix. Our online students can use the same applications and network resources as the traditional day students. We hope to leverage that competitive advantage in the marketing of our college." Fennell concluded, "Virtualization with Citrix Delivery Center is enabling SCC to fulfill its service mission, expand application availability, improve our technology and achieve a competitive advantage without having to increase the budget."

Embracing the power of virtual computing has gained community attention and expanded skills sets and job satisfaction for SCC's IT team.

Become More Effective on Campus—and Competitive in the Market

Today's IT managers recognize the importance of virtualization to the continued success of colleges and universities. Virtual computing solutions optimize the computer lab and even create a virtual lab that reaches any student, anywhere, at any time. Citrix technologies also deliver improved management of IT resources, as well as the benefits of mobile computing, to colleges and universities that are often strapped for IT funding.

Leading the Way—the World Over

Citrix, the leading provider of virtual computing, provides the technology solutions needed to deliver data and applications to students across the campus or around the world.

By understanding the far-reaching capabilities of virtual computing and application delivery, colleges and universities can design and implement the solution that achieves lab virtualization, improves the student experience, reduces strain on IT resources and helps the school maintain a competitive edge. On-demand education and improved allocation of IT resources can become reality.

Citrix application virtualization delivers Windows®-based applications directly to the student via the network—including the web. That student gets access to the most effective educational tools, while software is managed cost-effectively at the server level and end devices last longer—freeing precious budget dollars for other projects.

Learn more at www.citrix.com/education.

CİTRIX ®

Citrix virtual computing solutions help colleges and universities build simpler and more cost-effective environments that deliver IT as a service and make it easy for students and faculty to work in the most optimal way.

Citrix® XenDesktop™ is a desktop virtualization solution that delivers Windows desktops as an on-demand service to any user, anywhere.

Citrix® XenApp™ is an on-demand application delivery solution that enables applications to be centralized and managed in the datacenter and instantly delivered as a service to users anywhere.

Citrix® XenServer™ is an enterprise-ready, cloud-proven virtualization platform with all the capabilities needed to create and manage a virtual infrastructure at half the cost of other solutions.

Citrix® NetScaler®, available as a network device or as a virtualized appliance, makes web applications run better by accelerating application performance, optimizing application availability, and enhancing web application security while substantially lowering costs.

Citrix® Access Gateway™ is a secure desktop and application access solution that provides administrators granular application-level control while empowering users with access from anywhere.

Citrix® Branch Repeater™ is a branch optimization solution that provides a high-definition desktop and application experience to branch and mobile users while dramatically reducing bandwidth costs and simplifying branch infrastructure.

Citrix Receiver™ is a high performance, universal client technology that enables on-demand delivery of virtual desktops, Windows, web and SaaS applications and IT services to any device.

About Citrix

Citrix Systems, Inc. (NASDAQ:CTXS) is a leading provider of virtual computing solutions that help companies deliver IT as an on-demand service. Founded in 1989, Citrix combines virtualization, networking, and cloud computing technologies into a full portfolio of products that enable virtual workstyles for users and virtual datacenters for IT. More than 230,000 organizations worldwide rely on Citrix to help them build simpler and more cost-effective IT environments. Citrix partners with over 10,000 companies in more than 100 countries. Annual revenue in 2010 was $1.87 billion.

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