Scottsdale Community College Provides their Students Open Access with End-to-End Virtualization

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Abstract: Due to shrinking budgets and new demands for technology, Scottsdale Community College (SCC) IT department needed an effective, sustainable solution that would provide ubiquitous access to technology for students, faculty, and staff, both on- and off-campus. This paper explores how SCC implemented a complete virtualized computing environment.

Scottsdale Community College (SCC) is located on the eastern boundary of the city of Scottsdale, Arizona, on 160 acres of leased land, belonging to the Salt River Pima-Maricopa Indian Community. SCC is a two-year institution with 800 staff and about 12,000 students. It is the only public community college in the nation on Native American Land (About Scottsdale, 2010). SCC is one of the ten community colleges that make up the Maricopa County Community College District (MCCCD). With a shrinking budget and new demands for technology, the IT department needed a solution that was cost effective, sustainable, and provided ubiquitous access to technology for students, faculty, and staff, both on- and off-campus. The solution also needed to work with the existing infrastructure and provide a complete end-to-end solution. This paper documents how Dustin Fennell, SCC Vice President and CIO, implemented an end-to-end virtualized computing environment, which met all of these requirements and provided additional advantages to the institution.

Theoretical Framework

The refresh cycle both replaces technology, including outdated computers, with newer models and varies by institution. According to the *2010 Campus Computing Survey*, of the 121 community college responders, 19% have a 5-year cycle, 52.1% have a 4-year cycle, 25.6% have a 3-year cycle, and 3.3% have a 2-year cycle (Green, 2010). In addition, students come to the college with many types of personal devices including laptops, personal digital assistants, smart phones, and tablets, or connect from home with a variety of personal desktop computers to the institution's network. Colleges are confronted with varying types of students, those who are younger and more technologically driven, and those who are older and more career driven (Fullan & Scott, 2009). As part of the master plan at SCC, CIO Dustin Fennell decided to look at a different approach when it was time to replace the college's computers.

Several reasons prompted a look at the way technology and computers were replaced. Like most states, during these tough economic times, Arizona is in extreme economic crisis. State funding for the MCCCD has decreased. As a result, SCC has experienced a 3% budget decrease since 2008, and all indications point to additional budget reductions at the college-level as state funding decreases even more. In addition, the District's Governing Board has been reluctant to increase tuition or levy property tax increases. At the same time, Maricopa has experienced significant increases in enrollment. This increased enrollment is causing the college to serve more students with the only increase in budget coming from additional tuition (which does not cover the entire student cost).

In addition, there was a need to meet the current and future technological demands of the institution and its students. In order to provide up to date educational content, there was also the need to upgrade not only the computers but also the software. Both of these had to be done with an increasingly dwindling budget. "Continuous spending on refreshing hardware left little budget to acquire advanced technology or to purchase new educational software" (Fennell, personal communication, June 4th, 2010).

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 were much larger and perceived as offering more technology to their students. In addition, SCC has a strategic mandate to provide pervasive technology services to the local community, particularly to low-income residents and non-traditional students.

"We wanted the IT resources to be more widely available and affordable to all students" (Fennell, personal communication, June 4th, 2010). Students were struggling to afford software required for their courses, or a particular type of computer needed to run the software. As a result, students were using student versions or trial versions of the software, which may not be fully functional or last for the entire duration of the course. Students were forced to come to campus to use one of the college PCs if their personal computer did not have the software. Having to come to the campus to use a college-owned computer is inconvenient for students, especially for those who live far away or have no transportation. Moreover, it hampers SCC's efforts to "expand enrollment with non-traditional learners, such as working adults and people who wanted to take online courses" (Fennell, personal communication, June 4th, 2010).

Desktop virtualization, as a concept, uses software to abstract the operating system, applications, and data from the user's physical machine (Brodkin, 2009). In this model, the virtualized desktop is stored on a remote central server in the data center. When the desktop is accessed by the end-user, it is either streamed to the end-user's device to run locally (client-side), or the end-user is presented with a view of the desktop as it runs remotely in the data center (server-hosted). In essence, desktop virtualization centralizes the desktop management lifecycle and delivers virtual desktops as a service to the end-user. This allows users to access a desktop on any capable device, such as a traditional personal computer, notebook computer, smart phone, tablet, or thin client device connecting over the Internet or a network. For a good end-user experience, as little as 128kbs bandwidth is sufficient, though at least 256kbs is recommended (Seay & Tucker, 2010). With desktop virtualization, users are no longer tied to a particular locale or limited by a particular workstation environment, and organizations are no longer limited to applications that use platforms commensurate with the expertise of their IT-support staffs (Seay & Tucker, 2010).

Methods

Information on how SCC was successful in implementing an effective end-to-end computing environment was discovered through a process of reviewing case studies, recorded webinars, review of the literature, and personal communication with Fennell. Familiar with virtualization, Fennell decided to implement a Web portal using the Citrix Delivery Center portfolio of virtualization products partnering with Thin Client Computing (TCC). Working with TCC, a Platinum Citrix Solution Integrator, the institution created the MySCC solution, a portal that provides a single point of access and connectivity to over two hundred applications and desktops, as well as personal data and network resources.

The MySCC portal solution, located at www.scottsdalecc.edu/myscc, was implemented in two phases. First, Citrix XenApp Platinum Edition was rolled out for virtualized delivery of

many different applications, including Microsoft Office Suite, specialized math tutoring programs, Microsoft Visual Studio, and many other typical business and educational software applications. To this day, software application offerings continue to grow in response to requests from faculty, staff, and students.

Second, SCC implemented Citrix XenDesktop Advanced Edition to deliver two specialized Windows XP virtual desktops: one delivers AutoCAD, AutoDesk Revit, and Google SketchUP software and is available to approximately 100 interior design and AutoCAD program students; the other specialized desktop delivers Adobe Creative Suite to SCC's Business Institute students as well as any other students and staff who need it (Citrix, 2009). Today, the mySCC solution supports Windows, Linux, Mac OSX, iPad, iPod Touch, iPhone, Windows Mobile, Blackberry, and Android-based devices. Virtualization enables the implementation of platform-independent solutions (Bleicher, 2007; Hutt, Stuart, Suchy, & Westbrook, 2009; Seay, & Tucker, 2010). Once the end-user logs into the virtual environment, they will have access to applications, desktops, mapped drives, personal files, and network resources. This allows for simplicity in access and a consistent user experience.

SCC continues to expand the way they leverage virtualization technologies. Fennell states that the mySCC solution continues to evolve as the technologies mature and the college IT staff learn how they can best leverage various strategies to improve services and increase access. Fennell goes on to state that one of the reasons SCC has been so successful in implementing a complete end-to-end virtual computing environment is because they took the time to implement the various technologies one layer at a time. This has ensured the solution, as a whole, remains high-performing, stable, and gives the end-user an exceptional experience. Fennell goes on to state that the most important strategy in implementing a successful virtual computing environment is to allow the end-user experience to drive all decisions.

Results

The mySCC portal is expanding and simplifying information delivery for faculty, staff, students, and the community as a whole. From vision to implementation, the solution took six months to implement. Currently, SCC has been contacted by over 100 institutions of higher education across the nation that want to implement a similar solution. Moreover, during the Spring 2010 semester, SCC completed a proof of concept where they extended the mySCC solution to three other MCCCD colleges. The proof of concept project was a huge success, showing the solution to be highly scalable. With mySCC, students no longer have to purchase software licenses (Burd, Seazzu, & Conway, 2009) or a specific brand or model of computer for coursework because the latest software is made available to them via the portal—either at the college or from home. Fennell states, "With mySCC, students are no longer required to make educational decisions based on the software they can afford or the age of their computer" (Fennell, personal communication, June 4th, 2010). The mySCC system supports virtually any computing device that can connect to the Internet.

Fennell states that the mySCC solution provides organizational, financial, and IT Department benefits to the college. Organizational benefits include providing the college with a competitive advantage; a controlled and secure un-tethered delivery of computing resources; increased availability, stability, and performance of computing resources; easy access to complex and resource intensive applications; and a superior end-user experience. Financial benefits include providing a cost-effective and sustainable solution to the technology refresh challenge; reducing technology related costs by $250,000 per year; reducing the number of IT staff required to support and expand IT services; reducing hardware and software costs by pooling resources;

extending the life of current hardware resources; and lowering the overall total cost of ownership (TCO) of providing IT services. IT Department benefits include increased availability and performance of IT services; rapid application deployment is a reality; simplified IT procedures for delivering applications to end-users through a centrally managed solution that does not require manual desktop device installation and support; reduced IT hours required to manage desktops and applications; secure access for authorized users via the Internet; enabling IT to do more with less.

The mySCC virtualization solution has simplified administration, enhanced data security (Kroeker, 2009) and kept staff needs to a minimum. Previously, the IT department had to maintain three different versions of AutoCAD on the campus PCs because the software is expensive, and some students had older versions. Delivering AutoCAD over XenDesktop means that the most current version is available to everyone over the network or the Internet and that administration is performed *virtually* in the data center instead of on the end devices.

The physical servers were consolidated by XenServer, which has enabled SCC to reduce server administration tasks and energy costs. Energy savings by using virtual servers can be upwards of 85% (Creeger, 2008; Kroeker, 2009; Seay & Tucker, 2010). Moreover, provisioning services, which allows multiple servers and desktops to boot up and run from central *golden* images,significantly reduces storage space requirements. In SCC's environment, provisioning services reduces the required storage space by over three terabytes. Provisioning services reduces administrative costs because only the golden images need to be updated during the patch-update cycle (Creeger, 2008). Centralized management of the servers, desktops, and applications allows the college to use existing IT staff to support strategic needs and other areas of the institution.

Discussion

In his position as CIO, Fennell considered the needs of the institution during implementation of the virtualization solution by aligning with the organization's strategic goals and objectives. Two key factors that were important in the successful implementation of the mySCC solution included the development and communication of the vision and buy-in of the vision from the stakeholders. According to Fennell, "you have to become an enabler of change" (Fennell, personal communication, June 4th, 2010). The most important factor is achieving buy-in from stakeholders. Once stakeholders got involved, implementation moved according to plan.

There was a strategic business need to increase access to technology in the institution to students, faculty, and staff. The greatest value in virtualization occurs when an entire institution, across functional units and academic disciplines, uses it to seamlessly access computing resources (Seay & Tucker, 2010). There was also a need to replace and update technology. An increase in student diversity and the need to increase market share were additional motivators to the implementation. Using virtualization, all students in a course use the same resources (Burd, Seazzu, & Conway, 2009), ensuring a consistent learning environment; students no longer have to worry about having the right software or equipment to take a course. According to Fennell, adjunct faculty who teach applications online are very pleased knowing that all students have access to the same version of software without additional cost (Fennell, personal communication, June 4th, 2010). Also, faculty can download project files and assignments into a class shared folder on the network that all the students can access (Burd, Seazzu, & Conway, 2009).

Web-based access is significantly increasing student success rates, particularly low-income students, who previously had many challenges to pursuing a college degree (Seay & Tucker, 2010). MySCC provides web-based access with no need to make an additional

investment in software or hardware. Students have access to all the software they need, regardless of their financial situation, and can progress toward their degree without having to worry about that additional hurdle. All of the on-campus computers have the software clients need to access mySCC. To use mySCC off-campus, students need to perform a one-time installation of the Citrix *client* software (MySCC, 2010). Although SCC has chosen to implement a Citrix solution, North Carolina State University has implemented a similar virtual computing lab using open source tools (Seay & Tucker, 2010). The mySCC system provides end-users instant on-demand access to all applications, desktops, personal data, and network resources (Fennell, personal communication, June 4th, 2010). In contrast, with the North Carolina system end-users must choose the applications and resources they wish to use, submit a request for the virtual desktop to be deployed, and then wait up to 20 minutes for the virtual desktop to be ready (Virtual Computing Lab, n.d.).

　　To finance the solution, the IT department redirected funds over two years that were originally allocated to the computer refresh budget at a total of $550,000. By redirecting money that would have been spent on approximately 500 PC upgrades (which would only benefit the end-users who physically sit in front of those computers), the virtualization solution provides a high-speed, highly available system that benefits every student, faculty, and staff member at the institution (Fennell, personal communication, June 4th, 2010). Not only is the institution providing access to the latest technology for all of their students, faculty, and staff, the college is saving $250,000 per year that can be applied to other strategic needs of the institution. In fact, IT is now funding $50,000 in technology grants through a Technical Improvement & Innovation Project that is being funded via savings from the mySCC project (SCC Techgrant, 2010).

　　According to Fennell, to be successful in the implementation process, methodologies have to be standardized and any applications and system changes tested before being delivered to the end-users (Fennell, personal communication, June 4th, 2010). He also recommends not going alone in the implementation process, but rather partnering with experienced integrators or other institutions of higher education that have successfully implemented a virtual computing environment. Perhaps the most important factor for a successful implementation, according to Fennell, is to never forget to focus on the end-user. Fennell recommends letting the end-user experience drive the decision and implementation.

　　Virtualization also has its thorny issues, particularly with independent software vendor (ISV) licensing. It is important to resolve any ISV licensing issues before implementing a virtual computing environment. Most vendors are good at working on agreements for virtualization of their software. However, license review is a prudent and highly recommended component of implementing a virtualization solution (Bleicher, 2007; Hutt et al., 2009).

Conclusion

　　By using virtualization, SCC can tap the growing market of non-traditional students who provide the greatest potential for increasing the college's enrollment. Additionally, SCC is in a strategic position to compete with for-profit and other institutions of higher education. According to Fennell, the biggest opportunity for growth is in the online environment; however, there is a lot of competition. Fennell goes on to state that no other college in our service area can provide students access to applications, data, and network resources the way SCC does via mySCC (Fennell, personal communication, June 4th, 2010).   All students, whether they are traditional or non-traditional, can use the same applications and network resources via any time, any place, any device access.

Virtualization is enabling SCC to fulfill its mission of providing access to students, faculty, and staff regardless of location; improving technology; and achieving a competitive advantage without having to increase the budget. Other benefits include reduced cost to the students by making learning more affordable; reduced cost of delivering IT services by $250,000 annually; reduced cost on maintenance and software updates; reduced software and hardware compatibility issues and software piracy; and an increase in opportunities for teaching and learning.

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Appendix I: Interview Questions for Dustin Fennell

Interview Questions Scottsdale Community College

Mr. Dustin Fennell, Chief Information Officer, Scottsdale Community College

1. What characteristics are important for leadership in IT projects?

2. What types of support are needed to achieve that purpose?

3. What critical issues lead to the development of the virtualization?

4. To what extent does your institution rely on technology as a component of instruction?

5. How do faculty and students respond to the use of technology as a learning and teaching tool?

6. Are there academic integrity issues associated with the utilization of technology as a primary learning tool in the college environment?

7. How is competition from for-profit institutions changing the learning environment at the Community College level?

8. What changes are being made, or need to be looked at, in the future in order to remain competitive in regard to instructional delivery – technology, specifically?

9. What alternate sources of funding internally or externally are available to finance virtualization at your institution?

10. What is your perceived level of commitment among community colleges, in general, in regards to implementing new techniques to deliver education to your students?

11. Anything else you believe is important in the implementation process?