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tech spotlight: virtualization

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Taking Virtualization All the Way

An all-encompassing approach to virtualization has resulted in cost savings and operational efficiencies for one North Carolina school district. It's also helped the district deliver technology to students in a way that it couldn't before, providing anytime, anywhere access to school computers and learning materials. BY BRIDGET MCCREA

Chapel Hill-Carrboro City Schools didn't mess around when it came to server and desktop virtualization. Unlike districts that approach similar implementations on a piecemeal basis, these Chapel Hill, NC-based schools jumped in by virtualizing 20 of its lowest-performing physical servers two year ago.

With one fell swoop, servers that were performing poorly or handling very low capacities were brought up to speed and made into useful components of the district's IT infrastructure. The district, which serves 12,000 students in 19 schools, immediately saw its power bill reduced due to lower cooling requirements, and freed up space that was previously occupied by hulking, physical servers.

Virtualizing Student Computers

Desktop virtualization (where multiple personal computers share the same resources and software) would soon follow, according to Douglas W. Noell, director of IT operations. In search of a way to provide "anytime, anywhere computing" to students, faculty and staff, the district began virtualizing classroom desktops in 2010.

"We've basically been in different stages of both the server and desktop side of virtualization for the last two years," said Noell, "but we've been thinking about it–and deciding how to integrate it into our infrastructure–for the last 10 years."

Desktop virtualization solved another problem for the district, whose older computers were becoming obsolete and in need of replacement. Also on Noell's mind was the need to load both Windows and Mac operating systems on a single unit–something that couldn't be done on older equipment.

"Using virtualization, we've been able to put all of the applications on one machine that allows students access from any platform," said Noell. That move brought other advantages for the district, which suddenly found itself able to use its older equipment to run newer, memory-intensive programs. "We've been able to delay our computer refresh cycle and still have access to the programs," Noell said.

Noell said the desktop strategy kicked off with "just a few licenses to test it out" and figure out, for example, how well the district's older machines could handle multimedia programs in a virtualized environment.

Of particular interest during the testing phase was the virtualized machines' ability to share multiple applications without negatively impacting performance. "When you have a lot of CPUs used up in the traditional computing environment, the only option is to log off and get on a server that's not as busy," said Noell. "With a virtual desktop, you don't run into that."

This year, Noell said, the district will expand its desktop virtualization testing and

involve users who would prefer to use memory-intensive programs from their computers, rather than having those programs delivered through a server. "We're already talking to our vendor about upgrading our licenses to include desktop [options]," said Noell, "because we know that eventually a lot of our users will want to be able to have that rich experience from their desktops."

Challenges of Virtualization

The district's IT team has run into challenges on both the server and desktop virtualization fronts, according to Noell, who said computer printers can be a particularly onerous hurdle to overcome. On the server side, he said users are able to access at least 20 printers, for example. The desktop side isn't so easy.

"You can't put printers on a desktop without doing a lot of upfront work," said Noell, who is also challenged by a larger mission: to create a common desktop delivery that students, administrators, and teachers can all use. The district's desktop imaging package generates different background images, he said, but it takes time to set those up, store them, and provision them out to individual users.

"That's the challenge we're working on right now," said Noell, "and we're still early in the testing phase."

Virtualizing Servers

On the server side, Noell said, the district has virtualized 30 machines so far, with just a few high-end servers remaining in their traditional state. "We're really not sure if we'd get better performance from them if they were virtualized," explained Noell. More pressing concerns include deciding the fate of 10 older servers that aren't performing up to speed.

"Virtualizing those work horses would give them new life while eradicating physical servers and the costs associated with them (namely, power and physical space)," said Noell. "We've targeted some funding scenarios for expanding our server virtualization and are looking at whether we have the budget to do all 30 remaining servers at once."

Noell said budget numbers should be top of mind for any district looking to introduce server and desktop virtualization, both of which can produce significant cost savings for schools. And while power savings and the need for less physical space are two key benefits, the fact that the university IT department doesn't have to spend all day setting up and supporting individual pieces of equipment is priceless, said Noell.

"Sure there's a cost investment to get involved with virtualization, and it can take one to three years before you see real savings," said Noell, "but when done right, the payoff on the operational side alone can be pretty significant."

About the Author

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Designing the 21st Century K-12 Classroom

Six design elements that shouldn't be left out of today's smart classroom.

BY BRIDGET MCCREA

It's not enough to take a traditional K-12 classroom and fill it with technology. The smart classroom requires a more methodic approach that factors in the design of the basic shell, the teacher's space, and the students' independent and collaborative work areas.

Schools that ignore this step, said Issac Herskowitz, director of New York-based Touro College's instructional technology program, will wind up with smart classrooms that fall short of their goals. "Designing classrooms for today's learners requires a different approach than what's been traditionally employed in K-12 settings," said Herskowitz.

Here are six design elements that should be incorporated into the 21st Century classroom.

1. Desks and furniture that support collaboration. The days of the single desk and chair are gone, according to Herskowitz. He said he envisions a time when all K-12 classrooms are developed around the concept of collaboration–between student and teacher and among the students themselves.

"You want students to be able to do discovery learning and to work together on projects and problem-solving," said Herskowitz.

To support that concept, he said, furniture should be able to accommodate multiple learners and then be repositioned for independent learning (such as testing). "When you start with this foundation," said Herskowitz, "the collaboration comes naturally."

2. Ample electrical outlets. Not all students will come to class with their iPads and laptops charged up and ready to go. To make sure 21st Century learners have the power they need to engage in classroom activities, Amber Golden Raskin said her school uses a combination of electrical outlets, some of which are integrated into the classroom furniture, and power strips that are distributed through the classroom.

"Think about your students' current and future power needs early in the design phase," said Raskin, executive director of business development and operations at SCVi Charter School in Castaic, CA, "and you'll avoid the hassle of having to add more at a later date, post-construction."

3. A "smart" teacher lectern. Teaching in a smart classroom requires a "smart" lectern,

said Herskowitz, who advised schools to put time and money into the structures that teachers will use as their home bases. USB ports that allow for easy document camera connections, interactive whiteboard equipment controls, and other features should be incorporated into the fixtures.

"You really want to make everything accessible for the teachers that are using the technology," said Herskowitz. "If instructors are comfortable in the space and able to use all of the tools that you put in front of them, half the battle is won."

4. Lighting that's easy to control. With audiovisual technology becoming more advanced and even more useful in the K-12 classroom, the need for lighting that's easy to dim or enhance is imperative. The student sitting furthest away from the projection screen, for example, must be able to see the workspace clearly and without interference from shadows.

"Factor in the natural lighting, the fixtures, and the controls," said Herskowitz, "and focus on accessible lighting controls that allow the teachers to adjust quickly."

5. Physical space that goes beyond the single classroom. Who says the 21st Century classroom has to be a single room? At SVCi, a four-year-old charter school, Raskin said holes were intentionally punched in classroom walls to help create a collaborative environment that expands beyond a single room. "Students and teachers can go in and out of the openings, which are covered by curtains when not in use," said Raskin.

The strategy works particularly well when teachers collaborate on interdisciplinary projects. "Being able to share across classrooms is a big deal here," said Raskin, "and something that we strived for when designing our learning spaces."

6. Fewer expansive gathering areas. The traditional, campus-wide auditorium didn't have a place at SVCi. Instead there are several mid-sized gathering areas designed to accommodate three or four classrooms full of students who need to come together to share, collaborate, or watch a live presentation.

"We went with smaller common areas rather than just one big assembly room," said Raskin. "Our goal was to get students exercising the 'expression' muscles in smaller groups that lend themselves to more participation and collaboration."

At its core, Raskin said, the modern-day classroom's design should revolve around the idea that students should no longer be sitting alone at desks "spitting out answers" to a teacher who stands behind a podium. "In the last century we were a factory-driven society and schools were designed around that concept," said Raskin. "Today we must create spaces where students can collaborate and participate in real-life environments where they can learn how to work on teams; that's what they'll be doing in the work world."

About the Author

Bridget McCrea *is a business and technology writer in Clearwater, FL. She can be reached at bridgetmc@earthlink.net.*

Hoover City Schools save $357,000 with server virtualization initiative using technologies from Dell and Intel

- Backup/Recovery/Archiving
- Consolidation
- Desktop/Laptop Refresh
- Mobility
- Virtualization

"We're able to empower students and give them the skills they need to succeed in the 21st Century."

Andy Craig, superintendent, Hoover City Schools

Customer Profile

Company:	Hoover City Schools
Industry:	Education
Country:	United States
Students:	12,800
Employees:	2,000
Web:	www.hoover.k12.al.us

Business Need

Linking up-to-date technology with student preparedness, Hoover City Schools wanted to update its servers, storage, client hardware and operating systems to the most current solutions available.

Solution

Deploy Dell™ PowerEdge™ servers with Intel® processors, Microsoft® Hyper-V™ for server virtualization and Dell EqualLogic™ storage in the data center; upgrade client hardware and enhance mobility with Dell Latitude™ netbooks and tablets.

HOOVER CITY SCHOOLS
Learning For Life

Benefits

- 90% less time required for deployment of client systems with Dell ProManage Deployment Services
- "Five-nines" server reliability
- Operating system conflicts eliminated
- Enhanced security by separating teacher and student file shares
- 20% reduction in downtime for software repairs with Intel® vPro™ technology
- $357,000 savings by virtualizing servers at schools

Public school districts may not come immediately to mind when one considers the types of organizations that tend to be early adopters of the latest technologies; however, that perception is quickly changing. As more educators and parents grasp the value of a technology-based education and IT skills become ever more critical in a tight job market, many school districts are emerging as technology leaders in their communities.

"With low power consumption, optimized memory and Intel Hyper-Threading Technology, Dell PowerEdge servers are perfect for virtualization."

Keith Price, chief technology officer, Hoover City Schools

Hoover City Schools, the third-largest city school system in Alabama, is committed to keeping both its technology and its students current. The district's dedication to quality in education has been nationally recognized: Newsweek ranked two of its high schools among the nation's best.[1] For its IT infrastructure, the district chooses the latest hardware and software solutions from Dell, Intel and Microsoft.

"Five Nines" Server Reliability

For years, Hoover City Schools has used Dell PowerEdge 2950 servers with Intel Xeon processors as the foundation of its IT infrastructure. "Dell gives us great service, reliable machines and a very positive overall experience," says Keith Price, chief technology officer at Hoover City Schools.

In addition to 25 Dell servers in its main data center, Hoover City Schools maintains a local server at each of its 17 schools that acts as a domain controller and student information system host. Prior to a recent consolidation effort, these two systems were in some instances hosted on different physical machines. "We had about 30 servers between all the schools, all with direct-attached storage," says Price.

The district recently completed a refresh of the in-school servers using Dell PowerEdge T710 and T610 tower servers and refreshed the data center servers with Dell PowerEdge R710 and R610 rack-mount servers, all with Intel Xeon 5500 Series processors. Designed with virtualization in mind, the servers come with a choice of embedded hypervisor. Intel Intelligent Power Technology lowers energy costs while minimizing impact to performance by automatically putting processor and memory into the lowest available power state.

Technology at Work

Services

- Dell™ CompleteCare Accidental Damage Service
- Dell ProConsult Windows 7 Application Compatibility Reporting
- Dell ProManage Asset Recovery & Recycling Services
- Dell ProManage Laptop & Desktop Deployment Services
- Dell ProSupport for IT
- Dell Warranty Parts Direct

Hardware

- Dell 1409X projectors
- Dell EqualLogic™ PS6500E iSCSI SAN arrays
- Dell Latitude™ 2100 netbooks with Intel Atom™ N270 processors
- Dell Latitude XT tablets with Intel Core™ 2 processors
- Dell Mobile Computing Station custom netbook carts
- Dell OptiPlex™ 760 and 755 desktop PCs based on Intel Core™ 2 processors with Intel vPro™ technology
- Dell PowerEdge™ 2950 rack-mount servers with Intel Xeon processors
- Dell PowerEdge R710 and R610 rack-mount servers with Intel® Xeon® 5500 Series processors
- Dell PowerEdge T710 and T610 tower servers with Intel Xeon 5500 Series processors
- Dell PowerVault™ DP500 Powered by Microsoft

Software

- Microsoft® Active Directory®
- Microsoft Hyper-V™
- Microsoft System Center Data Protection Manager 2007
- Microsoft Windows® 7
- Microsoft Windows Server® 2003
- Microsoft Windows Server 2008 Datacenter Edition
- Software Technology Inc. (STI) student information system

"For us, server reliability is key," says Price. "We're dependent upon our applications being up and running 24x7. Using Intel-based Dell hardware, we've come to count on five-nines reliability from our server infrastructure. And with low power consumption, optimized memory and Intel Hyper-Threading Technology, Dell PowerEdge 11g servers are perfect for virtualization."

Saving $21,000 Per School

Since Hoover City Schools uses Microsoft software for many of its key applications, it was natural for the district to choose Microsoft Hyper-V, part of Microsoft Windows Server 2008 Datacenter Edition, as its preferred hypervisor. Now the Microsoft Active Directory domain server and student information system server can run as separate virtual servers—each running its own operating system—on the same physical server. As a result of this hardware consolidation, the district has saved $21,000 per school for a total savings of $357,000.

"We're using virtualization so we can have just one physical server at each school while still eliminating the operating system compatibility issues that can arise when you're running multiple applications on a single server," Price explains. "We've separated the student and teacher workspaces onto different virtual servers as well, to improve security."

To provide scalable, shared storage for the virtual machines without adding Fibre Channel infrastructure and expertise, Hoover City Schools selected Dell EqualLogic PS6500E iSCSI SAN arrays. "With Dell EqualLogic storage, we are able to provide consolidated, centralized storage with improved reliability, full data protection and more efficient access over the network for our users," says Price.

Simplified Data Protection

To ensure that critical data from the local schools is backed up centrally, Hoover City Schools uses a Dell PowerVault DP500 Powered by Microsoft appliance based on Intel Xeon processors. "We use Microsoft System Center Data Protection Manager, which comes embedded with the Dell PowerVault appliance, to move data from the local school back to the data center," says Price.

The Dell PowerVault DP500 automatically captures data changes as they occur in real-time and synchronizes with the data center every two hours. All backup administration is now performed centrally in the data center. "The Dell PowerVault appliance has improved our backup and restore success rates, allows us to restore data faster, and since using it we've had no incidents of data loss," says Price. "We're confident that our data is well protected."

20% Reduction In Downtime For Software Repairs

Hoover City Schools has been standardized on Dell desktops for many years, and is currently using Dell OptiPlex 760 and 755 machines based on Intel Core 2 processors with Intel vPro technology. Intel vPro enables the Hoover IT team to reduce downtime in the high schools by troubleshooting software issues such as operating system problems remotely, without having to deploy a tech to the site. "We estimate that Intel vPro reduces downtime for software repairs by as much as 20 percent," says Price.

The Dell Warranty Parts Direct program allows the IT team to keep spare parts on hand and perform its own warranty repairs on Dell hardware, resulting in faster break-fix.

Tablets And Netbooks Enhance Learning

To offer the benefits of mobile computing to its elementary school students, Hoover City teachers are using Dell Latitude XT tablet PCs with Intel Core 2 processors. Dell 1409X projectors make the screens visible to the entire class.

"We decided that mobile, tablet-size devices would be best for engaging children from kindergarten through the fifth grade," says Price. "Teachers and students can write and draw with the built-in pen instead of being confined to keyboard input. We felt that the design, ease of use and durability of the Dell Latitude XT tablets were just what we needed, and the price-performance ratio was excellent. With Intel Core 2 processors, the Dell Latitude XT tablet has the power and performance to run all of our applications, including graphics-intensive art programs. The energy-efficient processors also contribute to long battery life."

Dell CompleteCare Accidental Damage Service covers repair and replacement for accidental damage to the Dell tablets, including spills, drops, surges and breakage.

> "We've come to count on five-nines reliability from our server infrastructure."
>
> *Keith Price, chief technology officer, Hoover City Schools*

The district is also using Dell Latitude 2100 netbooks with Intel Atom processors, along with Dell Mobile Computing Station custom netbook carts, as mobile student labs.

"Dell actually listens to educators, and the Dell Latitude 2100 netbook is a good example," says Price. "The educational community asked for a mobile device in a smaller form factor that still runs a full operating system, yet was affordable and that students would want to use. And we've really found that with the Dell Latitude 2100s."

Deployment In 90% Less Time

Hoover City Schools relies on Dell ProManage Laptop & Desktop Deployment Services to meet stringent deadlines for its client hardware refreshes.

"Dell Deployment Services is the key for us when we have to cover 375 classrooms in less than 30 days and have everything ready when the teachers come back," Price says. "We estimate the Dell team completed the most recent project in approximately 90 percent less time than we would have been able to complete it ourselves. As a result, the teachers were able to focus on instruction from day one and not worry about how to set up the systems."

Dell ProManage Asset Recovery & Recycling Services provide the logistic and disposal capabilities to recover and dispose of computer equipment in a manner that follows local regulatory guidelines. "Following the most recent refresh, we actually received payment of more than $33,000 for the difference between the market value of the used equipment and the work done by the Dell recovery team," says Price. "Dell also provided us with the documentation required for our records, certifying that they disposed of the used items properly."

A Smooth Migration To Windows 7

The district is in the process of migrating its client systems to the Microsoft Windows 7 operating system. To confidently make the transition and ensure that all its critical applications would run on Windows 7, the district turned to Dell Global Infrastructure Consulting Services (ProConsult).

"Dell is a Global Application Compatibility Factory partner for Microsoft, so we partnered with Dell for application compatibility testing," says Price. "Dell saved us months of testing time. They helped us identify which applications weren't directly compatible with Windows 7 out of the box, and helped us find solutions for making them work. This allowed us to leap forward in our deployment of Windows 7, and saved us the expense and hassle of replacing those applications."

A Tradition Of Continuous Improvement

By providing students and teachers access to the latest technology tools, Hoover City Schools is continuing to improve the quality of the educational experience.

"Our community is very supportive of the technology in our schools and has really come to expect the best," says Andy Craig, superintendent, Hoover City Schools. "With technology partners like Dell, Intel and Microsoft, we're able to empower students and give them the skills they need to succeed in the 21st Century."

[1] Source: www.newsweek.com/id/39380/?s=AL

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TECH BRIEF

Cost-Planning for a Windows 7 Migration

Introduction

Microsoft Windows 7 is earning positive reviews for its productivity and security features, and experts agree it is the right OS for organizations in 2010 and beyond. When you're planning an upgrade to Windows 7, one major factor is budget planning. This tech brief will discuss the three main—and sometimes overlooked—budget considerations every organization should keep in mind: Hardware costs, application compatibility assurance, and deployment costs.

Hardware Costs

When Windows Vista was released, one of the loudest complaints was that 'typical' hardware could not support its advanced display features. And while it's true that Windows 7 places fewer demands on its host hardware, many groups will need to upgrade their PCs in order to run Windows 7 effectively.

Microsoft recommends a 1-GHz processor, 1GB of RAM, and 16GB of hard drive space for a PC running the 32-bit version of Windows 7, and 2GB of RAM and 20GB of hard drive space for the 64-bit version. Experts from Dell, speaking from real-world deployment experience, point out that these are minimum requirements, and they're actually not always sufficient. In addition, as we'll discuss in the next section, some applications may have to be run in XP Mode in order to work on Windows 7, and that feature requires processors that support virtualization natively and more RAM and hard drive space.

Because of these considerations, Dell recommends a dual-core processor, 2GB of RAM, and at least 20GB of hard drive space for any machine running Windows 7, with additional hard drive space available for organizational applications. If your PCs are more than 2 years old, your budget should include the cost of upgrading them or replacing them with more powerful hardware.

One other consideration for hardware budgeting is the need to ensure that printers and other peripherals will work with Windows 7. Peripheral compatibility is one of the areas many customers overlook, and it can lead to costly surprises during your rollout. Fortunately, there are simple solutions to identify incompatible peripherals. In many cases, it may be a simple matter of updating drivers, but some units will probably need to be replaced. A thorough assessment of your existing hardware will ensure that you have a clear picture of what you'll need.

Application Compatibility

The next major budget consideration is your applications. Every application that your organization needs to function should be tested against your Windows 7 image. Just because an application works natively in Windows 7 does not mean that your customized application package will function. For this reason, it is critical to test your packages instead of relying on testing done by software vendors or public databases. This is also one of the most common services for IT departments to outsource. Few IT departments have enough application packagers internally to test and remediate all of their software quickly enough.

Dell experts estimate that around half of the average organization's applications will work seamlessly in Windows 7, with 35 percent needing some form of remediation or repackaging, and 15 percent not working at all. To simplify, we'll refer to these three categories as green, yellow, and red.

Yellow applications will require some adjustments in the packaging layer—often new DLLs or a change to the way the installer writes to the Registry—to achieve compatibility with Windows 7.

Red applications represent a budgetary wild card. You may choose to retire these tools, replace them with others, or upgrade them to Windows 7-compatible versions. Windows 7 does offer some stopgap measures that enable red applications to run on its systems. Specifically, XP Mode and Microsoft Enterprise Desktop Virtualization (MED-V) create virtual PCs, running Windows XP, on the Windows 7 system. The red applications operate on this virtual machine as if they were still in a native XP environment. (Note that Windows XP Mode comes as a separate download and works only with Windows 7 Professional, Ultimate, and Enterprise editions.) From a budgeting standpoint, these features do

Windows 7 Budget Planning: At a Glance

Hardware
- Windows 7-compatible PCs
- Peripherals

Software
- Application compatibility testing
- Remediation where needed
- Upgrade/replacement of incompatible apps

Deployment
- Desktop imaging
- IT management upgrade
- IT/support training

enable organizations to hold on to their legacy applications for longer periods, but they do require virtualization support built into the hardware. In some cases Microsoft Application Virtualization (App-V) can help, but those applications can usually be handled with adjustments to the packaging layer.

It's important to emphasize that these features are not permanent solutions, but they can work in the short term as part of a phased migration strategy. In the long term, though, organizations should plan to upgrade their applications to versions that take full advantage of Windows 7's performance enhancements and leverage the more-powerful hardware on which it runs.

Deployment Costs

The third budgeting issue is deployment. Obviously, this will vary depending on the scope of the project, but some important things to keep in mind are management tools and training costs.

When you're upgrading your PCs to Windows 7, it's a good time to consider upgrading your systems management framework, as well. Your IT department can install Windows 7 manually on each machine, or create an automated process where the OS and all the necessary applications are 'stamped' into an organizational image and pushed out to each PC over the network. This kind of simultaneous deployment is carried out via a centralized management console, which brings additional benefits such as systems monitoring, proactive problem-solving, and tight control over maintenance and updates. One challenge is that few networks have sufficient capacity to deploy image, apps, and user data to hundreds of computers at once. The problem is compounded for branch offices and remote users who rely on lower-bandwidth connections. Because of the scale of an OS refresh, Dell recommends solutions that reduce the required bandwidth. Dell has a number of best practices and services that can deploy and rebuild computers using little or no network bandwidth.

On the training side, most end-users will not have a difficult time adjusting to Windows 7, but tech support and IT personnel will require significant training to learn the OS's new management and maintenance routines. Your budget plan should include several seminars for these workers.

Partner with Dell

Dell offers the blend of hardware, software, and expert services that can make planning and carrying out a Windows 7 upgrade smooth and successful for IT organizations of any size.

Beginning with a readiness assessment that determines the scope of the project and the needs of your organization, Dell helps with budgeting, application remediation, pre-installing images on new systems, and deployment. Dell employs best practices to ensure your organization is up and running quickly and provided with ongoing support.

To learn more about how Dell can help you plan and execute a Windows 7 migration, visit: www.migrationexpertzone.com

Bowling Green Independent School District improves performance, saves 200+ IT staff hours a year with solutions from Dell and Microsoft

- Backup/Recovery/Archiving
- Cloud Computing
- Consolidation
- Desktop Computing
- Messaging
- Mobile Computing
- Storage
- Virtualization – Server
- Windows 7

"Our users have really taken to Windows 7. It's very user-friendly, and a benefit I didn't expect is that Windows 7 can actually improve the performance of older machines."

Lee R. Jordan, Jr., Chief Information Officer and District Technology Coordinator, Bowling Green Independent School District

Customer Profile

Company:	Bowling Green Independent School District
Industry:	Education
Country:	United States
Students:	3,900
Faculty & Staff:	600
Web:	www.bgreen.kyschools.us

Institutional Need

Bowling Green Independent School District wanted to keep its technology current to provide students, faculty and staff with the best possible instructional experience. However, budget constraints dictated that client hardware serve a useful life of at least seven years. The district also wanted to improve efficiency and performance in its data center.

Solution

Upgrade client hardware to Windows® 7 operating system. Virtualize servers and upgrade to Windows Server® 2008 using the latest Dell™ PowerEdge™ servers with Intel® processors and Dell EqualLogic™ iSCSI SAN storage.

Benefits

- Improved performance for older PCs with Windows 7
- Threefold faster client machine rollouts with Windows Deployment Services
- 200+ hours a year saved in email account management by migrating to Microsoft Live@edu
- Five-figure cost avoidance in Microsoft Exchange hardware refresh
- Twofold faster backups with 64-bit Windows OS and Symantec Backup Exec™ 2010
- One-third reduction in physical server footprint
- $200,000-$300,000 savings in hardware costs with server virtualization
- Fivefold faster server provisioning (1.5 hours vs. 1 business day)

The Bowling Green Independent School District in Bowling Green, Kentucky (Bowling Green ISD) traces its history all the way back to the 1880s, when the Industrial Revolution was in full swing. In the century that followed, much of the region's economic growth continued to be driven by manufacturing.

"We keep client hardware for as long as seven years, and we had machines that were struggling with our existing operating system. We put Windows 7 on them, and they're giving us much better performance."

Lee R. Jordan, Jr., Chief Information Officer and District Technology Coordinator, Bowling Green Independent School District

Like many communities in the United States that have traditionally depended heavily on manufacturing jobs, Bowling Green, Kentucky, has shifted to a more knowledge-based, technology-driven economy. Home to Western Kentucky University, Bowling Green has become a hub of education, medical services and commerce for the area. The city was named to *Forbes* magazine's 2009 list of the "Best Small Places for Business." While many of the manufacturing jobs are still there— for example, every Chevrolet Corvette since 1981 has been built in Bowling Green—city schools are busy preparing students for 21st century careers.

Finding the right technology partner

To provide students, faculty and staff with access to the latest technology, Bowling Green ISD relies on its partnerships with Dell and Microsoft. Formerly a Digital Equipment/Compaq shop, the district switched to Dell when HP bought Compaq.

"A lot of school districts in the area switched to Dell around that time," says Lee R. Jordan, Jr., chief information officer and district technology coordinator, Bowling Green ISD. "We saw that Dell was making a big move in Kentucky and had some really good products. We decided to go with Dell, and we've never regretted that decision. We don't have a lot of warranty work—we know that when we get equipment from Dell, it's going to last a long time."

The district has around 2,000 computers, including Dell OptiPlex desktops, Dell Latitude E-series laptops and Dell Latitude netbooks. "The kids love the Dell Latitude netbooks, and they work very well with our wireless network," says Jordan. "I have one that I carry around, and it's like part of my arm. It's small and it's rugged, which is great because I have a tendency to drop things. We also have several Bretford laptop cart configurations that we purchased for

Technology at Work

Hardware
Bretford laptop carts
Dell™ EqualLogic™ PS5000E and PS4000E iSCSI SANs
Dell Latitude™ E6510, E6410, E6500 and E6400 laptops with Intel® Core™ processors
Dell Latitude 2110 and 2100 netbooks with Intel Atom™ processors
Dell OptiPlex™ 960, 780, 755, 745, GX620 and 380 desktop PCs with Intel processors
Dell PowerEdge™ R710 and 2950 servers with Intel Xeon® processors
Dell PowerVault™ 132T tape libraries
Integrated Dell Remote Access Controllers (iDRAC 6 Express)

Software
Microsoft® Live@edu
Microsoft Office 2010
Symantec Backup Exec™ 2010
Windows® 7 Enterprise
Windows Server® 2008 R2 Enterprise

some of our elementary schools where teachers roll them up and down the hallway and pass them out, and that has been working really well—we're able to put more computers in students' hands."

Extending the life of client hardware

Keeping technology current is important because students and teachers expect their computing experience at school to be consistent with what they use at home. Bowling Green ISD has upgraded 98 percent of its client systems to Windows 7 Enterprise and is deploying Microsoft Office 2010 at the same time.

"Our users have really taken to Windows 7," says Jordan. "It's very user-friendly, and a benefit I didn't expect is that Windows 7 can actually improve the performance of older machines. We keep client hardware for as long as seven years, both because of budget constraints and because the Dell equipment has a very long lifespan. We had machines that were struggling with our existing operating system. We put Windows 7 on them, and they're giving us much better performance."

Users are benefitting from the enhanced search functionality in Windows 7 Enterprise, as well as the Snipping Tool, which captures a screen shot of any portion of the screen, then allows users to annotate, save or email the image using buttons in the Snipping Tool window.

Threefold faster client deployments

To roll out Windows 7 across the district quickly and efficiently, Bowling Green ISD used Windows Deployment Services, a feature of Windows Server 2008 R2, to deploy images remotely. "The Windows 7 deployment would have taken three times as long without Windows Deployment Services," says Jordan. "We would have had to touch a lot of machines." Simplified imaging also means the district will be able to keep its software up to date using minimal staff resources. "We support around 450 productivity and educational applications, so that's important," Jordan adds.

The district is benefiting from improved stability in the data center with Windows Server 2008 R2 Enterprise, which it runs on Dell PowerEdge R710 and 2950 servers. "Windows Server 2003 was really good, but Windows Server 2008 has been rock solid," says Jordan. "Very seldom do we ever have to take anything down. The operating system is very easy to manage, and when you have a tiny IT staff like we do, that's really important. We try not to physically visit the servers; we remote to them. We're also benefitting from improved network access control."

Jordan appreciates the fact that the Dell PowerEdge R710 servers include Integrated Dell Remote Access Controllers (iDRAC 6), which are integrated on the system board along with other components. "If a box goes dead for some reason, we always have a way in," he says. "Those used to be independent cards that you had to add, but now they're just built in."

Reclaiming 200 hours a year

Along with the rest of Kentucky public schools, Bowling Green ISD has migrated student, staff and faculty email from Microsoft Exchange to Microsoft Live@edu, a free, cloud-based service intended to help educational institutions reduce messaging costs and provide higher availability for email systems.

> "The kids love the Dell Latitude netbooks, and they work very well with our wireless network. I have one that I carry around, and it's like part of my arm."
>
> *Lee R. Jordan, Jr., Chief Information Officer and District Technology Coordinator, Bowling Green Independent School District*

"We provide email accounts for all students grade four and up," Jordan explains. "Previously, when we used a locally hosted Exchange-based infrastructure, we were responsible for hardware maintenance and account management. Since moving to Live@edu, my admin is saving four to five hours a week because she no longer has to perform account management duties—that's more than 200 hours a year that she can dedicate to more valuable tasks."

The district also avoided a five-figure refresh of its Exchange server infrastructure. "We had some older servers that were really worn out, so the migration was great timing," says Jordan. Overall, the state of Kentucky expects to avoid $6.3 million in operational costs over four years by moving to the cloud with Live@edu.

Backing up twice as fast

Since moving to a 64-bit Windows operating system, Bowling Green ISD can take advantage of applications that leverage the 64-bit architecture for improved performance. One example is Symantec Backup Exec 2010 data protection software, which the district recently purchased through Dell. "The latest version of Backup Exec actually requires Windows Server 2008 R2," says Jordan. "We're seeing a tremendous performance increase over the previous version—backups took half the time they used to in one of the tests we ran when backing up to the same Dell PowerVault tape library."

The district has also realized substantial savings by consolidating physical servers onto Dell PowerEdge R710 and 2950 servers and Dell EqualLogic PS5000E and PS4000E iSCSI SANs. "We've reduced our physical server footprint by one-third, and we've avoided $200,000 to $300,000 in hardware costs," says Jordan. "We can also provision servers much faster, in an hour and a half as opposed to one business day."

Excellence is worth the effort

The district's official motto, "excellence is worth the effort," is reflected in its commitment to teaching 21st century skills. The relationships that Bowling Green ISD has established with Dell and Microsoft go a long way toward creating that level of excellence.

"Any proposed changes to the IT infrastructure require me to put together a business plan and defend it as if I were working for a corporation, so the value of good planning can't be overstated," Jordan concludes. "Our Dell account manager has always been very helpful in terms of bringing in resources and people who will talk with us and help us come up with the right solutions. Our relationships with Dell and Microsoft have been very good for our school district. We get value for our money, and we get good performance as well as good advice."

Microsoft®

Bowling Green City Schools

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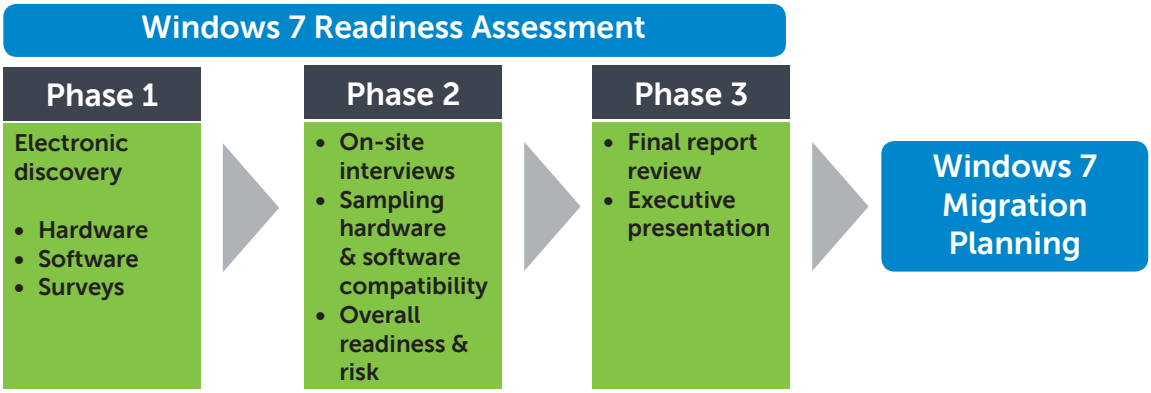
Prepare your end users	Dell helps prepare your end users for the impact of new features of Windows 7 by evaluating your training plans and recommending effective training strategies.
Access your infrastructure	Dell helps determine the impact of Windows 7 data security features on your existing infrastructure. The impact of Windows 7 Group Policy Objects (GPOs) is assessed and advice is provided on how to take advantage of GPO features.
Complete your migration plan	Dell provides project plan templates for use in developing your deployment project plan. Hardware refresh plans, version guidance, imaging strategy, and completed deployment plans are evaluated based on your Windows 7 licensing terms, security requirements, and deployment needs.



For more information about any of our service offerings, please contact your Dell representative or visit dell.com/services.

November 2011 | ProConsult_Win7ReadinessAssessment_DS.indd | Rev. 2.0 20111109JTOD

Resources

Q&A: The Relationship Between Windows 7 and Hosted Virtual Desktop Technology

- Windows 7 and hosted virtual desktops are approaching maturity. Gartner answers questions about whether to combine them into a single project, and how migrations change with HVDs.
- *http://www.gartner.com/reprints?id=1-184ONXG&ct=111130&st=sb*

The Benefits Side of a Windows 7 Business Case

- Organizations should build a business case around Windows 7 deployment to ensure the project's funding and success. The strength of the business case should help decide when the project should be completed.
- *http://www.gartner.com/technology/reprints.do?id=1-184ONXD&ct=111130&st=sb*

Microsoft Windows 7 and Office Key Initiative Overview

- To avoid disruptions, CIOs and IT leaders must position their organizations to complete a migration to Windows 7 in a timely and cost-effective manner. But, as they work through the preparation and deployment processes, they will be confronted by a host of challenges and risk. In this research paper, Gartner research presents tools, best practices and policies to reduce Windows 7 and Office 2010 migration costs by as much as 50%.
- *http://www.gartner.com/reprints?id=1-181X2FD&ct=111118&st=sb*

Creating a Timeline for Deploying Windows 7 and Eliminating Windows XP

- Windows XP support ends April 8, 2014. Therefore, organizations must decide when to begin their migration to Windows 7, set a target date to have Windows XP out and define the scope of the project. This research paper reviews Gartner's key findings and recommendations for deploying Windows 7.
- *http://www.gartner.com/reprints?id=1-181JXLM&ct=111118&st=sb*

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