


Earning a Virtual A+

Lake Elsinore Unified School District relies on server virtualization to bolster uptime while dramatically reducing costs.

A photograph of two men in a server room. The man in the foreground is wearing a blue shirt and a patterned tie, smiling at the camera. The man in the background is wearing a light-colored shirt and an orange patterned tie, also smiling. They are standing in front of rows of server racks with blue monitors.

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Delivering greatly enhanced availability, significant savings in power and cooling, and drastically reduced costs for ongoing hardware acquisitions, Lake Elsinore Unified School District's new server virtualization solution is nothing short of virtually amazing.

Deployed last year within the Riverside County, Calif., school district, which serves about 22,000 students at 15 elementary schools, five middle schools, three comprehensive high schools and four alternative education schools, server virtualization is transforming the manner in which the district is able to utilize its technology.

For teachers and students, that translates to increased uptime. For administrators, it represents an enormous return on investment and a bright spot in the education budget, where across-the-board cuts have become regular. And for Lake Elsinore's IT professionals, the solution means no more lying awake at night wondering about the integrity of the district's data or the efficiency of its computing resources.

"It really helps me sleep easy," confirms Jeff McCullough, systems administrator for the Southern California district, which encompasses an expansive 147-square-mile region.

A software technology that has rapidly changed the IT landscape, server virtualization enables multiple operating systems and multiple applications to run on the same server at the same time, increasing the utilization and flexibility of hardware while conserving time, money and energy.

Through server virtualization, it is possible to borrow CPU and memory capacity from other servers that are not being heavily used. When the memory is no longer needed, the borrowed capacity can then be returned to its original server in an unaltered state. Administrators can basically trick servers into thinking they have unlimited CPU and memory capacity and as a result, never encounter processing or workload thresholds.

With so many advantages, it's no wonder that virtualization is being lauded by the education community and corporate world alike. In fact, a recent survey by IDC estimated that more than 75 percent of large organizations are in the process of deploying virtual servers, while current users of server virtualization technologies maintain that 45 percent of their new server purchases this year will be virtualized. After testing the VMware ESX server technology in 2006, the Lake Elsinore district joined the virtualization movement, officially launching the solution in January 2007.

Benefits of Virtualization

While the district has yet to complete a formal analysis of its return on investment (ROI), the savings and benefits being reaped from the solution are anything but "virtual." For starters, the district was able to immediately retire 26 physical servers by investing in three ESX devices, which are currently running 22 virtual machines. A project slated for completion next month will see an additional 76 server boxes removed when Lake Elsinore connects all 27 of its satellite sites via a point-to-point fiber network. At that time, the district will most likely augment its network with six additional VMware ESX servers.

"Looking at it from a budget standpoint, we've been able to get rid of a lot of old iron," reveals J.R. Rea, director

of information technology services for the district. “In addition to clearing out the servers, we’re experiencing a large electricity savings. We also have a lot less requirements for air conditioning, all of which is very helpful for us.”

By consolidating server hardware, an organization can increase utilization of existing resources from 10 percent up to 80 percent, while reducing hardware requirements by a 10:1 ratio or better, according to VMware findings. Furthermore, VMware helps organizations reduce hardware and operating costs by as much as 50 percent, while saving more than \$3,000 per year for every server workload virtualized.

Within the Lake Elsinore district, Rea predicts the ROI will be significant. Considering the amount currently being spent on servers, and the fact that a total of 98 will have been retired by the time its fiber network project is completed, the district expects to save somewhere between \$568,000 to \$754,000 on future servers that now will not need to be purchased. “The ROI on that alone is pretty amazing,” notes Rea.

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The district is reaping additional financial rewards from its local utility provider, Southern California Edison. Through an energy efficiency incentive for server consolidation with VMware, the utility awards incentives to customers who undertake server virtualization projects that result in the removal of server computing equipment and thereby reduce energy consumption. Based on the net reduction in kilowatt-hours that will result from the project at the rate of 8 cents per kilowatt-hour, McCullough estimates the district will receive an incentive of \$350 to \$650 per server from Edison.

Preservation of manpower is yet another benefit of server virtualization, as VMware reduces the time required to provision new servers by up to 70 percent. “I can literally provision a new server in one hour,” McCullough reports. “Before, it would take me half a day or even a full day.”

Virtualization also enables administrators to experiment freely and test new applications without the possibility of damaging expensive hardware. In the education field, for example, IT administrators are often asked to test new programs. Before rolling out the virtualization solution in Lake Elsinore, the district’s IT staff was forced to set up a separate dedicated server every time a new program was requested. Now, administrators are able to run 10 to 12 virtual servers on each of the hosts.

“One thing that I really like about this solution is that in education, we have to deal with a lot of different programs,” McCullough explains. “Virtualization has been a great playground for us to test educational programs. If anything ever goes wrong, we can just start over again.”

Replication and Storage

The district is equally enthusiastic about its investment in Double-Take software, which delivers advanced, real-time data replication and failover solutions for complete data protection. Reducing the window for data loss, while offering an option that is more efficient and cost-effective than tape, Double-Take replicates data in near real-time and ensures that an up-to-the-second copy of data is always available on the backup server.

Providing administrators with centralized management capabilities for ease of use and lower total cost of ownership, Double-Take replicates the entire virtual environment including the operating system, applications and data, enabling users to copy everything to any location and resume operations with minimal downtime. The district finds the solution especially useful for maintaining attendance records at its 27 individual sites. “This is helping us out quite a bit,” McCullough reports. “It’s up to date every second.”

Real-time replication with Double-Take also uses unique compression and bandwidth throttling features that allow administrators to control the amount and timing of bandwidth used for backup. In addition, Double-Take can utilize existing infrastructure and is hardware agnostic. The product also offers the advantage of a flexible licensing model with no per-host charge. Instead, licenses protect groups of virtual machines, regardless of the host or configuration.

Because Double-Take captures changes regularly, the target virtual disks are kept up to date and ready for recovery at any time. Furthermore, during a disaster or outage, the replicated virtual machine can be started on a second ESX server with the most recent data. This benefit will be especially helpful in Lake Elsinore, as the district plans to launch a disaster recovery initiative later this year.

Lake Elsinore Unified School District rounded off its comprehensive server virtualization solution with the addition of three LeftHand Storage Area Networks (SANs). Responsible for housing a vast amount of critical district information, including employee data, attendance records, personnel files and SQL server databases, the SAN devices help the district derive maximum benefit from virtualization and leverage all the advanced features of the VMware environment.

“The performance we get out of these boxes is just amazing,” McCullough says. “One of the reasons we went with LeftHand is the ability to add storage on the fly. Being able to accomplish that without rebooting a server is fantastic.”

LeftHand’s SAN/iQ software stripes and mirrors multiple copies of data across the storage modules in a cluster using a patented capability, eliminating any single point of failure. “That is what makes their solution rather unique,” notes CDW•G account executive Alex Major. “The LeftHand SAN comes with its own virtualizing software, so the district didn’t have to purchase any additional software from VMware, as the LeftHand software does the virtualization for them.”

Delivering continuous data availability in the event of a network, disk, controller or entire storage module failure, the SAN also can be integrated into environments where application servers are clustered, thereby enabling true, seamless, geo-cluster solutions that provide both application and storage clustering across geographies.

An additional benefit for Lake Elsinore’s IT administrators is the product’s ability to store all replication points at

the central district location. Furthermore, looking ahead toward its future endeavors, “LeftHand gives us the ability to inherently add in for disaster recovery,” McCullough reveals. With three boxes currently storing approximately 4 terabytes of data, the district is already considering supplementing its capacity with another device.

Seamless Implementation

Acknowledging that prior to implementing its comprehensive virtualization solution, the district was susceptible to periodic downtime events, Rea says that ever since the servers, software and SANs were deployed, high availability has been par for the course throughout the organization. “It’s really not a problem anymore,” he says.

Adds McCullough: “Teachers don’t complain about e-mail being down anymore, because it’s never down.”

The district has also enjoyed a noticeable improvement in its student information systems. In fact, when Lake Elsinore’s most recent elementary school opened its doors at the end of last summer, administrators were poised to remedy anticipated glitches in the system. “This has always been a big headache when we open a new school,” McCullough explains, “but we haven’t heard a thing about it, and the school opened back in August.”

Equally seamless was the district’s purchase of its equipment through CDW•G. Working with Major and account manager John Hart, the district’s IT administrators were introduced to both the Double-Take and LeftHand products. “Were it not for CDW•G, we never would have known about them,” notes McCullough.

In addition to receiving “very tenacious pricing,” Rea praises CDW•G for its problem-solving capabilities and ability to quickly resolve any issues. “With the power of CDW•G behind us, we never have to fight with our vendors,” Rea says. “If there’s ever a problem, Alex Major and John Hart handle it.”

Even more, the busy IT director appreciates the initiative of his account managers, who regularly research products, troubleshoot problems and follow through with all the details of every order. “Working with CDW•G is like augmenting our staff,” Rea says. “We don’t have to make the phone calls or track down the information. They handle it all for us.”

The district also takes advantage of the opportunity to sample products through CDW•G’s demo program. “I think they send us a new product to demo every couple of months,” notes Rea. “CDW•G has been a great partner.”

On the Virtual Horizon

What does the future hold for server virtualization?

From a technological perspective, server virtualization offers organizations many advantages, from providing increased efficiency and flexibility to delivering maximum ROI and the lowest possible total cost of ownership. The need for organizations to maximize IT resources and adapt quickly to change is driving worldwide server virtualization adoption, according to recent research from IDC. The research firm found that more than 15 percent of new server shipments will undergo virtualization in 2010, up from 5 percent in 2005.

But the days of virtualization being used only as a tactical tool to drive consolidation and higher system utilization are quickly coming to an end. New uses for virtualization include cases that range from high availability and disaster recovery to hosted clients and true utility computing. Looking ahead, expect to see some changes in the virtualization arena, including:

- Expanded uses for virtualization. While early server virtualization adoption was largely because of

consolidation and migration of projects, new motivations for virtualization include availability solutions and disaster recovery programs.

- More virtualization technologies. In the near future, VMware will face competition in a market that previously included few players, meaning data-center managers will be offered a variety of options. The development of a heterogeneous virtualization management platform is also a likely prospect.

- Virtualization beyond servers. Data-center managers are considering virtualization not only for server resources, but also for storage, network, desktop and application resources, which will drive a need for more comprehensive management tools.

- Enhanced automation capabilities. Automation is expected to play a strong role in managing virtualization resources in the next 18 months, as customers evaluate more sophisticated management tools, according to IDC.

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