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TECH TRENDS

Looking to the Future

Schools are optimizing their storage devices through virtualization.

By Karen D. Schwartz

The Illinois Mathematics and Science Academy (IMSA) prepares talented students in grades 10 through 12 to become world-class scholars, ground-breaking researchers and trailblazing entrepreneurs. While at IMSA, students work on inquiry-based projects that deepen their knowledge of science, technology, engineering and mathematics concepts, as well as their facility with a variety of modern technologies. The video- and data-intensive portfolios of work they assemble equip them for whatever future they may choose.

But over the years, those portfolios also created a storage challenge for the IT department. Eventually, something had to give.

About five years ago, "we found ourselves growing disk space at a rate that didn't make sense anymore for the direct attached storage we were using," explains Steve Terrell, IMSA's network and IT security engineer. "What we had was becoming increasingly slow and difficult to manage, but the biggest problem was our lack of space."

Steve Terrell relied on FalconStor and VMware products to virtualize 10 terabytes of Illinois Mathematics and Science Academy data into a single, scalable storage repository.

Photo: Katrina Wittcamp

Terrell's team decided their only solution was to move to a virtualized storage environment. Implementing iSCSI-based FalconStor IPStor software running Linux on SATA disks added a good deal of disk space. But it soon became clear that this wouldn't be enough to keep up with the school's daunting storage requirements. The IT department further enhanced the performance of the iSCSI storage area network by using VMware and FalconStor's Network Storage Server HC Series SAN appliance. This tripled the amount of available disk space.

Now, instead of buying new hardware when storage needs arise, IT staff can create and expand a virtual environment at will. According to Terry Jones, the school's UNIX system administrator, FalconStor's central management capabilities speed
up and simplify all provisioning, configuring and maintenance tasks.

And that's just the beginning. To keep up with speed and space requirements, IMSA purchased a 1.2-terabyte solid-state storage array last June. The enterprise system includes two FalconStor technologies that Jones believes are critical to the long-term success of the school's virtualization effort: HotZone, which maximizes the SAN's performance by automatically remapping frequently accessed data to higher-performance virtual disk devices; and SafeCache, which speeds up writes and reads to increase performance.

Fruitful Fibre

Virtualized storage had always been a goal for Matt Cozzolino, systems administrator for the Renton (Wash.) School District. When he joined the district in June 2010, he found an IT infrastructure that was already about 60 percent virtualized. But the IT staff had chosen to start with the most easily virtualized storage and had not progressed beyond that — mainly because of budget and time issues, he says.

For example, there was an HP EVA SAN and a fully virtualized main data center in the district office. But none of the servers providing local storage at each of the district's 23 schools had been virtualized. Instead, those 23 servers were being replicated back to the main data center nightly.

"What they had set up was hard to manage and expensive," Cozzolino says of the configuration. "And the hardware was approaching end of life." As he saw it, there was no time like the present to finish what his IT colleagues had started.

Over three months, Cozzolino and six others on staff remodeled the primary data center, buying new equipment to replace aging servers and rewiring the facility. (According to Cozzolino, the district was spending 45 percent more on power than

necessary.) The storage and heating and cooling improvements were funded through a state grant, and the rest of the work was financed through a technology levy. The virtual server component, which isn't covered by grants, will cost the district about $200,000, he estimates.

Today, the data center is equipped with a NetApp V3140 open storage controller for virtualizing storage across a 10-gigabyte converged network; Cisco Unified Computing System blade servers; and an older HP EVA SAN for Tier 3 storage. All of these components run VMware.

For disaster recovery purposes, the district operates a secondary location four hours away that houses a 48TB NetApp FAS2040 storage system. Although the FAS2040 is designated as a replication target, Cozzolino says that in a worst-case scenario, it could offer the same services as the primary unit.

Seamless Storage

In 2009, Colorado Springs School District 11 began its own virtualization effort, reducing 600 to 700 physical servers down to about 100 using Microsoft Hyper-V.

The Colorado district now operates several dozen virtual servers in its data center, plus at least two virtual server hosts in each of its 59 schools. The ultimate goal, says Executive Director and CIO Robert Curran, is to eliminate those servers in favor of virtual ones once they are no longer needed to host legacy education software (which, for now at least, won't run in a virtualized environment).

A district with 100TB of storage can save **65%** in capacity and almost **$78,000** by virtualizing.

SOURCE: NetApp Storage Efficiency Calculator

With the server virtualization effort well under way, Curran and his colleagues have turned their attention to consolidating and deduplicating the district's storage devices. They've installed a 128TB EMC Clariion CX4 SAN in the data center and are doing nightly backups of the school servers using Double-Take replication software. The district also has installed Nexsan's SATABeast and SATABoy for disaster recovery. "All of these efforts will lead to a smaller overall footprint while giving us even greater capability than in the past," Curran says.

To maximize the management and cost savings of its virtualization efforts, Curran's team soon will install a suite of CA Technologies products that will allow them to monitor the entire IT infrastructure — both physical and virtual — from one console in one location. "We'll be able to see everything in our environment," Curran says of the deployment, which is scheduled for this summer. "And because it's vendor-agnostic, we won't be tied to any particular brand for any equipment, giving us maximum flexibility."

The More, the Merrier

Most school districts that turn to virtualization start with their servers and then, seeing the benefits, begin considering other forms too. As analyst David Hill points out, virtualization begets virtualization.

"Once you've virtualized your servers, you realize that your virtual machines can be anywhere, and where is your storage?" asks Hill, principal of Mesabi Group, a storage advisory firm in Westwood, Mass. "If you can't move your storage to keep up with the rest of your virtualized infrastructure, you won't get the benefits, and you'll run into trouble eventually."

Besides providing flexibility and cost savings, storage virtualization delivers advanced storage management functionality via more reliable backups and snapshots. It's also a natural step on the path toward infrastructure as a service — a provisioning model that Hill says is on the horizon for many districts.

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