

ILLINOIS SCHOOLS TURN TO THE CLOUD.



THE NEW **IlliniCloud** IS PROVIDING STATE-OF-THE-ART COMPUTING RESOURCES TO THE STATE'S K-12 SCHOOL DISTRICTS.

With cash-strapped schools holding bake sales to buy classroom supplies and fund student programs, the concept of having state-of-the-art IT systems rivaling those of Fortune 500 companies would seem impossible. But a grassroots effort spearheaded by Bloomington Public Schools in Illinois is doing just that.

The district's Technology Director Jim Peterson and Systems Administrator Jason Radford have created a cloud infrastructure that offers Illinois' 869 school districts access to virtual servers, online storage and high-speed network connectivity along with cutting-edge applications and important IT services, such as disaster recovery.

"We're all doing the same things. We're implementing student information systems, ERP [Enterprise Resource Planning] applications and e-mail. So why should all the school districts scramble for money every year to pay for these services when we could set up a cloud and pool our resources?" Peterson says.

The IlliniCloud, a nonprofit consortium launched two years ago,

Jim Peterson, Technology Director; Jason Radford, Systems Administrator; Bloomington Public Schools

is made of three data centers across the state that allows school districts – as well as private and parochial K–12 schools – to share hardware, applications, services and IT support. Each educational institution that joins the cloud can potentially cut its annual IT spending by 30 to 50 percent and free up money for other important educational needs, Peterson says.

Cloud computing has grown in popularity as education, government agencies and businesses seek ways to provide technology services more cost-effectively. Some are turning to the public cloud for hosted applications, such as e-mail. Others are taking advantage of virtualization to build their own private clouds, allowing IT departments to maintain full control of their infrastructure.

The IlliniCloud is technically a "community cloud," which is a form of private cloud, but instead of one organization managing and using the cloud, it is shared among a group of organizations that have the same technology requirements, which, in this case, are Illinois' schools, says Gartner analyst Thomas Bittman.

The community cloud is built through participating school districts' IT investments, equipment donations from tech vendors, and state and federal grants – and the effort is still in its infancy. The IlliniCloud's organizers have spent the past year championing the cloud's virtues across the state, building out the infrastructure and ramping up services with proof-of-concept projects to demonstrate its capabilities.

So far, about 150 school districts have joined the initiative with early adopters using the cloud to back up their data or host their critical applications, such as student information systems. Organizers are also testing software-as-a-service offerings and making applications, such as educational videos, available over the Internet.

During the pilot phase, cloud services

are free, but this year, the IlliniCloud expects to officially roll out several services and start charging for them. The first such service is disaster recovery, which includes replicating servers and data backup and recovery. Through a self-service portal, districts will be able to rent virtual machines (VMs) and storage through the cloud. It's a pay-as-you-go model where they can add or decrease computing resources as their requirements change, and they will only be charged for the amount they use. This allows them to deploy applications and provision IT services quickly and affordably without having to buy and install the hardware themselves.

"The IlliniCloud is a collective effort. It's about pooling our resources and allowing small districts to have the same enterprise-level gear as large school districts. It's about equality," Radford says. "We are not here to make money and will only charge for the exact cost of the services."

BUILDING THE CLOUD

Illinois school district IT administrators have talked about collaborating on technology services since the mid-1990s. In their most recent effort, in 2005, they agreed on an "Illini Plan" to share hardware and software resources to save on IT costs. But at the time, they didn't know how to make it happen.

Two years ago, however, two converging forces propelled the Illini Plan's proponents to create the IlliniCloud: the maturation of virtualization software and other advances in data center technology; and the devastating budget cuts that many school districts have endured during the recession, Radford says.

During that time, Bloomington Public Schools, which has a stable IT budget, began implementing the latest data center technologies, which served as the pathway to creating the IlliniCloud.

For example, the district's IT staff implemented server virtualization, which consolidates servers and allows the district to carve up its physical servers

into many virtual servers. That, in turn, allows them to host applications for other districts. They also installed new storage technologies including deduplication, which eliminates duplicate copies of the same files and saves disk storage space. The new infrastructure gave Bloomington excess capacity that it could share with other districts, Peterson explains.

With the new infrastructure in place, Peterson tapped his statewide contacts to build the rest of the cloud. Peterson, president-elect of the Illinois Chief Technology Officers association, is well-respected and has the relationships to build consensus and organize the effort, says CDW·G Senior Account Manager Ryan Parvis.

"He's got the vision and the relationships, and he's excellent at navigating the educational landscape to do this the right way," Parvis says.

Peterson assembled a core team of a dozen K–12 officials from throughout the state, including finance experts to help with funding and organizational leaders to help with the consortium's bylaws. The team includes IT directors from two other school districts who agreed to connect their data centers with Bloomington's data center to form the cloud.

Together, the core team partnered with the Illinois Century Network, which provides a high-speed telecommunications network to state schools, libraries and government agencies; and the state's 15 Learning Technology Centers, which provides IT resources to school districts.

Today, the IlliniCloud is made up of three strategically placed data centers across the state with Bloomington in the center, DeKalb School District 428 in the north and Belleville Township High School District 201 in the south. They are linked up through the Illinois Century Network.

"We had three school districts that got together, realized we could set up a cloud and share the excess capacity that we had," Peterson says.



**“ WE REALIZED
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START GENERATING REVENUE
AND HELP THE SMALLER
SCHOOL DISTRICTS OUT
BY LOWERING THEIR COST OF
ACQUIRING RESOURCES. ”**

– Jim Peterson, Technology Director,
Bloomington Public Schools in Illinois.

CLOUD INFRASTRUCTURE

The IlliniCloud is built using a new data center architecture, called unified computing, which integrates blade servers, networked storage, networking equipment and virtualization software.

The cloud is standardized on Cisco's Unified Computing System (UCS), which includes Cisco blade servers, Cisco Nexus 7000 Series 10 Gigabit Ethernet switches and VMware vSphere virtualization software. It's the convergence of data center equipment, which unifies what is historically separate networks, such as local area networks and storage networks, and reduces the number of network adapters, switches and cabling that are needed. All of it can be managed with Cisco management software.

"Having a simplified, converged architecture is huge," Radford says, because it makes it easier for administrators to manage the cloud and offer services.

Rounding out the cloud infrastructure are Fibre Channel storage arrays and enterprise-level networked-attached storage (NAS) equipment, which centralizes storage and allows IT administrators to better utilize storage capacity and more easily manage and back up data. The IlliniCloud also takes advantage of F5's BIG-IP load-balancing equipment, which eases traffic congestion and improves reliability and stability; and F5's ARX storage virtualization equipment, which automates storage tiering in the cloud and eliminates the need for expensive Tier 1 storage by about 80 percent, Radford says.

In addition, the IlliniCloud team will install Juniper Networks 10 Gigabit Ethernet networking gear in the DeKalb data center to boost bandwidth. And in the future, as the number of members grows, the cloud organizers might add more data centers to the mix.

Because districts house sensitive student, staff and financial data,

security is a priority. Therefore, data is encrypted. VMware vCloud Director management software, combined with the rest of the infrastructure, allows administrators to separate each district's software and data.

"We are using next-generation, multitenant converged infrastructure," Radford says. "We can implement virtual data centers inside of it and logically separate them out, so the tenants are segregated and secure from each other."

Peterson and Radford bought some F5 equipment from CDW-G, but they turned to the company mostly for its consultation services. The pair talked to several CDW-G solution architects and visited the company's data center in Madison, Wis., which provides hosted and managed services. During the site visit, they spoke with CDW-G technology specialists about ensuring reliability and security in the IlliniCloud.

"CDW-G has a good set of networking and storage people," Radford says. "A lot of their people had some great knowledge in areas we lacked, so they gave us some good guidance and served as a sounding board for us."

GROWING ORGANICALLY

In the cloud's proof-of-concept phase, the IlliniCloud has provided services for free as long as school districts pay a small annual membership fee based on their size.

Initially, Peterson and Radford have focused on providing services

to districts that are in urgent need of services. The cloud infrastructure is currently running 150 VMs and has enough capacity to handle the IT workload of up to 400 districts, but without a large budget to work with, the core IlliniCloud team are ramping up services slowly. They want to make sure the initial cloud services work and want to work out the kinks before officially launching services and charging for them.

While piloting infrastructure-as-a-service offerings, the IlliniCloud has hosted other districts' web servers, library management software, student information systems, course management systems, as well as provided test environments for district IT administrators.

The IlliniCloud team plans to eventually offer enterprise applications as hosted software that districts can subscribe to and not have to install themselves. In the meantime, the cloud's administrators are testing some software-as-a-service offerings, including e-mail listservs; online file storage for teachers and students; and an open-source video-sharing system that allows teachers to record videos of lectures and share them online.

The IlliniCloud also hosts Discovery Education videos, serving as a content delivery network that speeds the delivery of videos to Illinois schools. Accessing the videos locally on the IlliniCloud data center, rather than on Discovery Education's

servers, provides students with better quality video, Radford says.

As budget allows, the IlliniCloud hopes to launch a statewide data collection and data warehousing system that will allow each district to integrate disparate school systems, so they can have one view of student enrollment and demographic data, grades and state test scores, and data from food service, transportation and special education systems. The goal is to improve operational efficiencies and allow educators to quickly generate reports to track student performance and analyze other data, Peterson says.

The IlliniCloud officially launched its first service – disaster recovery – with a pilot in February and expects to start charging for it on July 1. Cloud organizers plan to start charging for several other infrastructure and software services by year's end.

"Once we determine what the costs are for us, we will give schools a price tag," Peterson says.

FUTURE PLANS

As the IlliniCloud builds out its services, its leaders hope to increase membership from 150 to 400 school districts within three years. Peterson and Radford expect districts will opt in and out of the program as their technology needs grow and change over time. They believe the IlliniCloud will succeed because it provides schools with state-of-the-art IT resources that they couldn't otherwise afford, and because the cloud is specifically built for local schools.

Unlike public clouds, the data stored in the IlliniCloud will stay within the state – on a trusted, secure, internal network. Districts will always have complete control of their data, Radford says.

"Schools trust us because we are a network of peers," he says. "We won't try to raise rates and make money off the backs of schools." ■

The IlliniCloud Comes to the Rescue

Prairie Grove Consolidated School District 46 in Crystal Lake, Ill. was in a bind last summer when its student information systems vendor upgraded its software, requiring the district to switch from Apple servers to Windows-based servers.

Technology Director Mike Swanson had already allocated his budget for the upcoming school year and didn't have \$5,000 to buy the two required servers. So he turned to the IlliniCloud.

"They saved me," he says. "It's been phenomenal. We are seeing great speeds. It's reliable and the hardware stays up 24x7. My users have no idea that server access was moved."

Instead of Swanson having to spend a few weeks purchasing, configuring, testing and deploying new servers, the IlliniCloud staff provisioned a virtual machine (VM) for him in 30 minutes. Swanson downloaded the new version of the student information system, migrated the student data over to the cloud, and the application was up and running within a few hours.

"It's like we own the server," says Swanson, who accesses the VM and data remotely through a web-based console.

Swanson, who manages seven servers in his own data center, is also considering moving his district's web server to the IlliniCloud for disaster recovery purposes. If a tornado knocks out the Prairie Grove servers, having the website hosted on the cloud will allow him to keep the site up to communicate with parents and the community.

Because Swanson is part of the IlliniCloud's pilot, he hasn't been charged yet. Once they start charging, it will still be cheaper than purchasing his own servers or turning to a public cloud provider, he explains.

"It's as good as a commercial solution, but because they are a nonprofit, no one will beat their prices," Swanson says.

