Major research institute gets a refresh

By replacing old servers with a new virtualized infrastructure based on Microsoft Hyper-V, the Cornell Institute for Social and Economic Research gained flexibility and scalability, and cut monthly maintenance downtime by two-thirds

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Janet Heslop, IT Director, Cornell Institute for Social and Economic Research (CISER), Cornell University

Customer profile

Cornell University
Cornell Institute for Social and Economic Research

Company	Cornell University, Cornell Institute for Social and Economic Research (CISER)
Industry	Higher Education
Country	United States
Employees	13
Website	ciser.cornell.edu

Business need

CISER's aged servers were at full capacity due to user growth of at least 20 percent a year, and the system administrator had to consistantly work overtime to keep up with maintenance chores.

Solution

CISER gained flexibility and scalability for growth and cut monthly maintenance downtime by two-thirds, with Dell Networking enabling a virtualized server architecture designed by Dell Infrastructure Consulting Services.

Benefits

- Offers greater availability while cutting CPU utilization in half
- Increases system scalability to accommodate annual growth of 20 percent more users
- Eliminates 13 servers and cuts rack space in half
- Reduces monthly maintenance downtime by two-thirds
- Cuts number of system-related help-desk tickets by more than half

Solutions featured

- Infrastructure Consulting Services
- Deployment Services
- Support Services

Number-crunching is usually associated with hard sciences, but the social sciences also must process lots of data, both quantitative and qualitative. This data is used to draw inferences and conclusions from a wide range of demographic and socio-economic statistical sources. Since its founding in 1981, the Cornell Institute for Social and Economic Research (CISER), has provided university researchers with access to the computing power and the many applications their disciplines require.

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>
> *Kim Burlingame, Senior Systems Administrator, Cornell Institute for Social and Economic Research (CISER), Cornell University*

Today CISER operates an advanced computing cluster that's divided into two domains: one that offers secure access to about 2,500 scientists conducting social and economic research with unrestricted data; the other providing secure restricted access to about 500 researchers using highly confidential data sets. At any one time, the unrestricted domain will have up to 200 users running projects of varied complexity, while the restricted domain will have up to 30 users accessing it. Across both domains, users can access any of 44 powerful data analysis applications, such as SAS, SPSS, STATA, Gauss, R, Matlab and many others.

Growing user numbers but exhausted capacity
Janet Heslop, CISER's information technology director, says that the facility was overdue for an update. She explains that while its user base has continued to grow by about 20 percent a year, the capacity of its five-year-old infrastructure was effectively exhausted. Not only were the servers tapped out, but we were running out of resources."

One resource that CISER was especially short on was the time of senior systems administrator Kim Burlingame. She was often working 60-hour weeks to keep up with all the patches and upgrades needed for CISER's six racks of servers hosted in Cornell's data center as well as all the applications.

Needed system maintenance leads to excessive downtime
On the second Thursday of each

month, in fact, Burlingame would have to perform monthly maintenance downtime to install security patches, as mandated by university policy. In addition, server software updates were installed across the entire data center. "I'd have to physically update each server," she says. "That's what consumed the most time, especially if there were hiccups in rebooting any of them. If that

Technology at work

Services
Infrastructure Consulting Services
- Virtualization and Cloud Consulting
- Dell | Microsoft Private Cloud Accelerator
Deployment Services
Support Services
- Dell ProSupport

Hardware
Dell EqualLogic SAN storage
Dell Networking
Dell PowerEdge rack servers

Software
Microsoft SQL Server 2012
Microsoft System Center 2012
Windows Server 2012 with Hyper-V™

DELL

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> *Janet Heslop, IT Director, Cornell Institute for Social and Economic Research (CISER), Cornell University*

would happen, I'd have to go back to the data center that's located elsewhere on campus, to take care of the problem."

With CISER's system utilization at nearly 100 percent, Burlingame faced two other problems. The first was that she didn't have a server to spare when one of CISER's 44 applications needed a patch or update. These updates can require as much as an hour to install, so she'd have to wait until her scheduled monthly maintenance window. Fielding up to 20 help-desk tickets a month — her other issue — was particularly vexing because she never knew when one would come in or how long its resolution would require. "Users would want to know why a program was not running or running so slow," she says. "Or they'd want help in running an application differently."

A new approach: Server virtualization and advanced system management
Heslop knew that CISER's existing solution needed replacement and was well aware of virtualization's potential to solve the capacity issue. She realized, however, that she needed outside expertise and experience to assess CISER's current state and to help design a solution that would provide flexible functionality and scalability to handle anticipated 20 percent growth in users for years to come. Then she wanted help in deploying the solution. This led her to contact Dell Infrastructure Consulting Services.

Dell's consultants used a proven, multi-step methodology for addressing the kinds of complex issues CISER faced. Working closely with Heslop and her team, they first evaluated CISER's existing infrastructure to determine how much could be optimized, keeping in mind the considerable investment it represents. Next came a strategy discussion with Heslop and her team about their strategy and business objectives. Their third step was a thorough analysis of CISER's readiness for server virtualization, out of which came a remediation report that defined

CISER's "sweet spot" between too little and too much infrastructure.

Recommended options based on a proven discovery process
Dell made a series of recommendations based on its comprehensive consultative investigation. This included advanced workload and modeling analytics from CiRBA software, which provided Heslop with several options, along with the pros and cons of each. Heslop chose the all-inclusive option because it would build on CISER's existing infrastructure while increasing capacity and providing the scalability to keep up with growing user numbers for the lifecycle of the hardware. At the same time, it offered much simpler and more efficient administration to help lighten Burlingame's workload.

After implementing a successful proof of concept, Dell Deployment Services, in concert with Infrastructure Consulting colleagues, rolled out the full Dell solution. It comprised four Microsoft Hyper-V clusters — a pair of management and compute clusters for each of CISER's domains — all managed by the Microsoft System Center 2012 Virtual Machine Manager (VMM).

VMM uses a dedicated Microsoft SQL Server 2012 database to manage CISER's 19 physical host servers, a combination of CISER's legacy Dell PowerEdge rack servers and newer 12th generation PowerEdge rack servers; its Hyper-V virtual servers; and the virtual machines that run CISER's applications. Hyper-V provides the virtual machines with direct access to the Dell PowerEdge host servers' hardware. That's in contrast to software virtualization that uses the virtualization server's operating system to provide indirect access to the server's hardware.

Dynamically optimized private cloud infrastructure with server mobility
A key architectural concept of VMM is its provisioning of a private cloud infrastructure. This is an abstraction

DELL

layer that masks the underlying technical complexities of CISER's physical infrastructure. It also enables Burlingame to use the VMM management console to administer specific resource pools comprising the Dell PowerEdge rack servers and Dell EqualLogic SAN storage, interconnected with Dell Networking technologies. Altogether, CISER now has a robust solution that includes built-in failover for all of the computational servers and networking components.

With the VMM management console, Burlingame can easily and quickly create private clouds from Hyper-V to dynamically optimize CISER's infrastructure, including migrating live virtual machines. In effect, she can create and move the Hyper-V virtual servers and machines around as needed — a technology called server mobility. This enables her to conduct maintenance on the host machines without taking live servers offline. She can also use the console to manage all the system updates remotely.

In addition, the Dell solution architecture features failover clustering. This provides high availability, shared storage, and fault tolerance. As a result, if one cluster node fails, another node can take over processing tasks without interrupting a researcher's project or without the researcher even knowing that system resources were swapped. And, better yet, Burlingame doesn't have to come into the office on the weekend.

Less downtime and administrative overtime

Heslop is delighted with the new Dell solution that takes advantage of Hyper-V server virtualization across CISER's entire computing facility. "Our host servers' CPU utilization now runs under 50 percent, thanks to Dell's virtualized solution running on its 12th generation servers," she says. "We also eliminated 13 physical servers and cut our rack space in half."

She reports that the reduction in servers helps to trim the university's energy costs. "At the same time," she says, "our social science researchers are getting a lot more processing cycles with Dell's virtualized server solution."

For her part, Burlingame is enjoying CISER's new system simplicity, it's much easier administration and, above all, the time it has saved her. "I love that I can build a virtual machine with Dell's virtualization solution," she says. "Just by right-clicking and selecting 'Build it,' I have a fresh new machine an hour later with all my updates. It's a huge time-saver." In addition, Burlingame notes, the new CISER virtualized servers have cut her monthly maintenance downtime from 12 hours to just four. At the same time, her monthly help-desk trouble tickets have been cut by more than half.

Expertise and experience: Keys to success

Both Heslop and Burlingame are quick to acknowledge the value of the Dell Infrastructure Consulting and Deployment Services teams. For example, Heslop says, the university's summer calendar limited the amount of time that was available for implementation. So, instead of the three weeks it would have required, the Dell team and Burlingame worked on a compressed schedule to get the Dell solution deployed in just a week.

As another example, Burlingame says, the Dell Infrastructure Consulting team recommended that CISER deploy Microsoft virtual network switching in order to create three separate virtualized local area networks. This way, CISER's network traffic can be balanced based on provided metrics for the local area network, live migration network, and cluster shared volumes.

She explains that this approach — one she says she wouldn't have thought of — turned out to be much more effective than using a single network. As a result, she now has fewer networking cables to connect. This in turn results in real savings on physical switch ports, NIC cards and 10Gb network cables.

"We were always getting insights that went above and beyond what I would have known to do from Dell's Infrastructure Consulting Services," Burlingame says. "What's more, they were extremely patient in explaining everything they were doing, because they wanted to be sure I understood it all."

Heslop sums up her thoughts on engaging Dell's services teams by saying: "We could not have accomplished so much, in such a short period of time, without Dell's expertise."

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