

Indiana University

"Intelligent Infrastructure" leverages HP servers, virtualization



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HP customer case study: HP ProLiant servers, virtualization combine to turn infrastructure into a service at Indiana University

Industry: Education

Objective:

Cut costs; improve sustainability, agility; simplify infrastructure management

Approach:

IU consolidated approximately 450 existing servers onto 34 HP ProLiant DL585 physical servers (a consolidation ratio of more than 13 virtualized servers per physical server) running VMware ESX

IT improvements:

- Higher system availability
- Faster deployment of new systems and applications
- More accurate capacity planning

Business outcomes:

- Cost savings of up to 87% in application-specific infrastructure costs
- Energy savings of 80-85%
- Space savings of 90%
- More outreach to regional campuses and nonprofit organizations



Virtualization has become a powerful tool to improve the cost-effectiveness, flexibility and reliability of IT infrastructures. Few organizations appreciate this more than the technology team at Indiana University (IU), where a pioneering virtualization initiative has dramatically cut costs, enhanced flexibility, and changed people's thinking about IT.

IU established a new paradigm for its IT infrastructure, which it has dubbed the "Intelligent Infrastructure." Beginning in 2003, it began virtualizing servers and providing infrastructure as a service. To date, the university has virtualized some 450 servers on just 34 HP ProLiant DL585 physical servers with the Linux operating system. That translates into a ratio of more than 13:1. Applications consolidated include the ERP (PeopleSoft) Course Management System on the large end to web/application and file servers on the small

Customer solution at a glance

Primary application

Centralized cloud computing infrastructure

Primary hardware

• HP ProLiant DL585 G5 servers

Primary software

• VMware ESX

HP Services

• HP consulting

end—ranging from the database layer to application and web layer.

“The Intelligent Infrastructure running on HP servers just lets us do more with less,” explains Rob Lowden, director of Enterprise System Infrastructure for IU.

“When we began this, it was very innovative. Some might even say risky. But we were confident in the virtualization strategy, and in HP as a partner to help us make it all happen.”

Pioneering virtualization project

Indiana University is the largest university network in Indiana with more than 100,000 students spread across eight campuses. Lowden’s team, working from the main campus in Bloomington, provides infrastructure support for the entire university.

The project’s basic goals were cost savings, improved sustainability, agility and simplification of infrastructure management. “It has transformed infrastructure management from the complex, historical approach of designing custom infrastructure for each and every application, to creation of a standardized, simplified cloud computing environment that provides infrastructure as a service,” Lowden notes.

Initially, technology staff hoped for, and would have been content with, cost savings of up to two-thirds. But in practice, the project has exceeded expectations and achieved cost reductions approaching 90%. In converting the central ERP infrastructure, for example, simply replacing the old UNIX® systems would have cost approximately \$1.2 million over three years for hardware, O/S acquisition, maintenance and support. The actual cost of the new virtualized environment, however, is roughly \$150,000 over that same three-year period—or just 12.5% of the cost of traditional infrastructure.

“The financial savings for our ERP infrastructure alone were so compelling that even if we did not have a virtualization strategy in place, this project single-handedly would have been a catalyst for such a decision,” says Lowden.

Energy needs have been reduced both in terms of direct electricity to support the new infrastructure and in reduced cooling requirements. Overall, electrical needs are estimated to be 80-85% less than previously installed solutions.

Because the new environment supports higher equipment density as well as fewer physical servers, it has also enabled the university to reduce space requirements by roughly 90%.

The project is transforming the culture at Indiana University. “Our internal customers are realizing

that cloud computing will provide the flexible IT infrastructure they need, allowing them to refocus on their core missions,” Lowden explains. “This project goes beyond improving the IT function; it makes IU more efficient at fulfilling its academic, research, and public outreach missions.”

Getting the most from HP server technology

The technology behind this project is twofold: VMware ESX virtualization software technology, and the hardware that runs it at IU: HP ProLiant DL585 servers.

VMware ESX software improves utilization by pooling common resources to create a unified structure. Pooled resources are utilized by applications as needed, with much less waste. At IU, server utilization often runs between 85 to 90% of capacity.

“Obviously virtualization has cut our infrastructure costs by reducing the number of servers we need,” Lowden notes. “But it also enables administrators to manage the infrastructure more efficiently, so they spend less time on provisioning, configuration, monitoring and maintenance.”

HP ProLiant DL585 servers were chosen by IU to get the greatest utility out of the Intelligent Infrastructure. The DL585 server is the highest-performing server on the VMmark benchmark test among comparable (four-socket, 16-core) servers, offering up to a 20% performance advantage.

“The DL585 is not only well-matched to virtualization and consolidation applications, but its remote management functions help us reduce administration costs and respond quickly to changes,” Lowden explains. Simplifying the environment allows the university to manage more systems without increasing staff.

Throughout the Intelligent Infrastructure rollout, HP professionals have been beside Lowden and his team—from identifying the HP systems best suited to IU’s needs, to helping jump the technological hurdles along the way. “You don’t embark on an ambitious, transformative project without knowing you have the best available resources on your side,” Lowden says. “Our HP team has been invaluable in helping us match the technology to our needs and ensuring its success.”

Improving availability, outreach

In addition to the cost, space and energy savings outlined earlier, there are several functional benefits:

- High availability. IU’s virtualized environment enables rapid recovery from unplanned outages. Even if some components of the virtual environment fail, applications can

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be configured to quickly failover to back up infrastructure on other physical components in the environment. Planned downtime is also unnecessary, since applications can simply be moved to alternate processors or storage disks when equipment maintenance or upgrades are necessary.

- Faster speed to market. “In the past, when a user requested a new server, it might have taken us 10 business days to acquire, configure, test and deploy a new server. Now we can respond to multiple requests on a same-day basis,” Lowden says. A new server image can be cloned from the system at any time in a few minutes, and quickly deployed for use. Researchers can be equipped with new computing resources almost as soon as they acquire funding or are awarded research grants.
- More forgiving capacity planning. With traditional IT infrastructure, inaccurate capacity planning caused downtime, poor performance and increased costs. Now, if a particular application or function requires more resources, it can take advantage of real-time load balancing. And the system administrator can quickly deploy a new server as a more permanent solution. “The historical approach at IU was to purchase capital assets for peak loads that might represent only a small portion of the year,” Lowden notes. Now the school can handle peak needs from the pooled processing resource with far fewer servers.
- Outreach enhancements. Freeing up data center space and reducing incremental costs

for new application servers has enabled IU to provide a low-cost Disaster Recovery site to the Indiana Office of Technology (a part of state government); and to provide the IT infrastructure for Kual Foundation, a nonprofit organization responsible for sustaining and evolving a comprehensive suite of administrative software for colleges and universities.

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Elizabeth A. Van Gordon, CIO for two IU regional campuses, Indiana University Northwest and Indiana University-Kokomo, notes that “Indiana University Northwest’s IT center is located in a 40-year-old building. To upgrade this facility would severely strain campus financial resources. By utilizing IU’s Intelligent Infrastructure virtual environment, IU Northwest will save tens of thousands of dollars while offering the campus superior services. Not only have we eliminated the need for local hardware purchases, we have eliminated hardware service contracts, backup software licenses and some software service contracts.”

The university supports more than \$500 million in local, state, national and international research grants. For these and many other users, leveraging virtualization and cloud computing has been the key to making the most of scarce resources.

Sharing the benefits

Looking ahead, Lowden says virtualization is becoming ingrained in the IU culture. When the infrastructure team helps to launch a new application or service, the question immediately arises, "Does this run on VMware?"

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As users approach end of lifecycle on existing equipment, they must consider why they would want to extend the life of an existing independent infrastructure. Why not put their application in the virtualized environment? "Every quarter, it becomes a more and more challenging argument to choose anything other than the Intelligent Infrastructure," Lowden says.

The success of the Intelligent Infrastructure was recognized in 2009 when IU was named a Laureate in the annual Computerworld Honors Program recognizing IT professionals for their contributions to society.

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