Florida Atlantic University College of Engineering and Computer Science

PROFILE

Industry
Higher education

Corporate Headquarters
Boca Raton, Florida

Enrollment
28,000 students on seven campuses

Annual Budget
$609 million

Web Site
College: http://www.eng.fau.edu
Green Building: http://www.green.fau.edu
University: http://www.fau.edu

THE NUMBERS

- 300+ virtual desktops.
- Up to 250+ thin clients.
- Energy usage at the desktop reduced by more than 80 percent.

IN BRIEF

Objective
In designing its new LEED Platinum-certified building, the College of Engineering & Computer Science at Florida Atlantic University wanted to build an IT infrastructure that was powerful, flexible and highly energy-efficient.

Solution
The College chose to eschew traditional desktop PCs in its offices and labs and instead provide virtual desktops created with VMware View, accessed using energy-efficient thin clients.

Business Impact
- Significant energy savings.
- Desktop capability matched to the user's needs.
- Versatility to use labs for any academic discipline, depending on the virtual desktops being accessed.
- Flexibility to upgrade processing capabilities without requiring desktop hardware refresh.

Focus on Green IT Leads Innovative Engineering School to VMware Virtualized Desktop Environment

"Virtualization is the key to providing the most cost- and energy-efficient IT environments, and VMware is the leader in virtualization. That's why we chose it as a long-term partner for the College."

— Mahesh Neelakanta, Director, Technical Services Group, Florida Atlantic University

When the College of Engineering & Computer Science at Florida Atlantic University set out to plan its brand-new building, one of the primary directives was to create a building that would be a model for environmentally friendly design and engineering.

In general, green building design includes heating and cooling, electrical systems, passive energy-efficient design (such as using natural sunlight for daytime lighting), and much more.

"From an IT perspective, our general directive was to use the latest IT technology to provide students access to state-of-the-art infrastructure, both for education and research, in the most environmentally sustainable manner," explains Mahesh Neelakanta, Director of the Technical Services Group at Florida Atlantic University. "Our staff spent over eight months working to design a hardware and software environment that would provide a scalable infrastructure for students, faculty and staff.

"We chose VMware to provide a desktop infrastructure that would serve the day-to-day needs of students and faculty, as well as more demanding needs of our researchers, and to deliver significant energy savings and improved efficiency," says Neelakanta.

LEED Platinum Building Delivers on Old IT Challenge

The new College of Engineering & Computer Science building at Florida Atlantic University is expected to be the first academic building in Southeast Florida to be designed and built to LEED (Leadership in Energy and Environmental Design) Platinum level standards. The College hopes the facility will act as a catalyst for building sustainable infrastructure across Florida Atlantic University's campuses.

The College demonstrates the building's efficiency in real time, every day. Metrics on the College's energy use—from HVAC to power, water and network utilization—are available for viewing online (http://www.green.fau.edu).

The IT challenge within the College is in providing the tools needed both for routine student and faculty use, and for high-end simulations used in research. The latter includes applications that require large amounts of memory, storage and CPU.

"A student may log in to write a small program to draw a sine wave. That's a minor challenge," notes Neelakanta. "Engineering students run more demanding applications—MATLAB, SolidWorks, AutoCAD, FLUENT and others—to learn some aspect of engineering. Researchers are the most demanding. They run simulations that demand the most from our IT infrastructure."

Historically, the College provided distinct computers and labs to serve students, faculty and researchers. And although each group clearly had its own level of processing needs, the labs for students and researchers didn't always reflect this. It all depended on which

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machines had been replaced most recently. "Sometimes the research labs had the most powerful computers," Neelakanta recalls. "But not always. Sometimes the student labs had better computers. It was always a battle. Technology kept moving forward but the machines lagged behind."

Desktop Computing Moved to Virtual Infrastructure

Neelakanta set out to level the playing field in the College's new building. His strategy was to use VMware® software to build an environment serving students, faculty and researchers, with virtual desktops created using VMware View™ and hosted on virtualized servers. Users in the labs access the virtual desktop with either a thin client or a PC, but the capability of the user's desktop hardware is relatively unimportant, because the important processing takes place at the server level. Thin clients also can enhance information security, since no data is stored onboard.

In the new building, students access virtual desktops equipped with software based on their specific academic needs. So do faculty and researchers, though they require desktops with higher-end modeling software, along with greater CPU power and RAM to run sophisticated simulations.

"Users know there's a vast amount of computing power available to them," Neelakanta says.

Designing Infrastructure for Green IT

The green aspects of the virtual desktop solution are based on low energy usage. Perhaps the biggest power savings occur at the physical desktop, where traditional PCs have been replaced with HP and Wyse thin clients. "By deploying thin clients, we save a significant amount of power—15 watts for a thin client, vs. 100–200 watts for a traditional desktop PC," Neelakanta says. The College expects to deploy up to 250 thin clients in the building.

In the datacenter, the solution features HP blade servers because they are also highly energy efficient. Neelakanta notes that the blade servers not only draw less power than traditional rack-mounted servers but also require less cooling and have a smaller physical footprint.

A central storage array from HP virtualized with VMware vSphere® provides data storage much more efficiently than traditional desktops. "In the past, every desktop had its own hard drive. One PC might have hundreds of gigabytes, and an older model sitting nearby just a fraction of that amount. And regardless of how that PC was being used, the storage was stuck in that box," Neelakanta notes. "Centralizing storage using VMware means we use our storage system very efficiently. We carve out storage on an as-needed basis and allocate it to whoever needs it."

A research project might need 10TB of storage, whereas a student might need 1TB. In each case, the appropriate amount of storage is allocated for that user. When the research project concludes or the student leaves the university, the virtual storage can be re-integrated into the larger pool. "Being able to dynamically carve out space and provide it to specific users and groups, then reclaim that later, is a big advantage over desktops. And we can use power more efficiently based on the amount of storage that's actually being used," says Neelakanta.

Virtual Desktops Deliver Versatility

Another benefit of the virtual desktop model is versatility. In the past, use of a particular lab would be restricted by the software that was installed on the PCs there. A lab with computers equipped with AutoCAD was used by mechanical engineering students. Another lab, with Visual Studio, would be used by computer science students.

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"Now, because we're using virtual desktops, the students have the option of which virtual machine to connect to," explains Neelakanta. "So in a single lab, we might have a computer science student logged into one virtual desktop and right next to him, a mechanical engineering student logged into a different type of virtual desktop. The users' location, and the hardware in front of them, is essentially irrelevant. What matters is the capabilities of the virtual PC they access."

So a given lab might be used to teach engineering for an hour, then computer science for an hour and perhaps another discipline in the third hour.

Virtual Desktops Provide Model for the Larger University

Looking ahead, Neelakanta says he hopes the approach taken by the College of Engineering & Computer Science will become a model for the campus-wide IT environment. "We're hoping that virtual desktops will eventually be adopted by the rest of the university as an alternative to buying more desktop PCs," he explains. "We're satisfying the needs of students and faculty, often with the same hardware. And we're doing it much more efficiently than in the past."

Neelakanta says he expects the thin clients to last 4-5 years or more. Computer technology will certainly advance during that time, he acknowledges. Processing will continue to become faster and cheaper. So the College will augment its existing server infrastructure as technology improves, without ever having to touch the physical desktops.

"The beauty of a virtual desktop environment is that it's very easy to upgrade the technology that matters," he says. "We buy some newer, faster servers, attach them to our network, and dedicate them to the needs of the high-end virtual desktops. We repurpose the older servers for users who are not as compute-intensive—general office workers and undergraduates." Instead of taking weeks or months to refresh traditional desktops, the IT group can add a new server in a day and upgrade the capabilities of everyone on campus.

The key to that flexibility is virtualization that takes place throughout the College's new IT environment. "Virtualization is key to providing the most cost- and energy-efficient IT environments," Neelakanta says, "and VMware is the leader in virtualization. That's why we chose it as a long-term partner for the College."

IMPLEMENTATION OVERVIEW

VMware Products:
VMware vSphere 4.1
VMware View 4.6

VMware Services:
Training classes

Applications:
SolidWorks
Visual Studio
FLUENT
MATLAB
AutoCAD

Platform
HP ProLiant BL460c blade servers and c7000 chassis
HP Lefthand P4500 Series storage
HP and Wyse thin clients

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