Dell, Citrix, and Intel Help Nova Southeastern University

Using Cloud Client-Computing to Teach Dental Professionals

Innovations in end-user computing can have a transformative impact on learning, providing students with new capabilities, more convenient collaboration options, and enhanced flexibility to complete assignments.

According to Dr. Joel Slingbaum, Assistant Professor and IT Director at Nova Southeastern University College of Dental Medicine, adopting Wyse thin client endpoints and end-to-end desktop virtualization solutions designed by Dell and Citrix has enhanced the program's hands-on and experiential approach to teaching dentistry.

Dell cloud client-computing solutions are well-aligned for facilitating medical training at the graduate level because they enable flexible lab spaces. Of course, Wyse thin and zero client endpoints and Dell datacenter solutions are also ideal for other educational settings. In both general and specialty labs at K-12 and higher education institutions, they simplify management and allow students to access their work from anywhere, at any time.

"We're trying to keep up with the cutting edge of technology to provide education and proper training for our students," said Dr. Slingbaum, who has been associated with the Ft. Lauderdale-based school since July 2000. "Our biggest need was to update our Simulation Lab

which trains our dental students during their first two years and shows them all the procedures and techniques that are used and applied in patient care."

First opened in 1997, the NSU Simulation Lab was due for an update. Dr. Slingbaum and his team wanted to use the Lab for both training and simulation scenarios, and the technology they had in place could not keep up. So, they worked with Dell and Citrix to adopt a cloud client-computing solution. The resulting configuration — which includes a contingent of Wyse all-in-one endpoints — allows Dell monitors to be used as computer terminals *and* as video displays to present live or pre-recorded video content.

"Part of the upgrade project was that we would incorporate new technology such as desktop virtualization and new Dell products, and eliminate the old presenting VGA screens where you were just getting information," said Dr. Slingbaum. "The goal was that in this lab, students would each have a chair and they would have an LCD monitor in front of them connected to a distribution system at the front of the room."

To achieve this, the IT department at NSU needed technology that would serve a 130-seat facility and would allow professors to present information in a lecture setting. It also had to maintain a limited hardware profile to allow the room to also be used to complete student projects and conduct testing
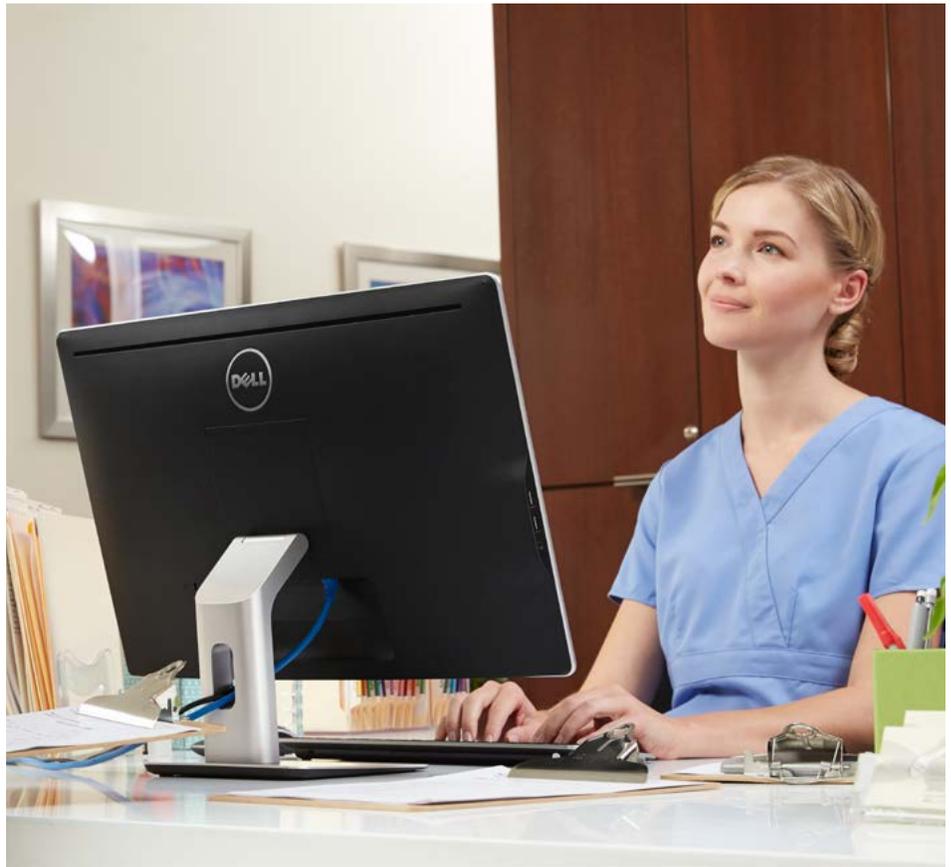
and dental surgery simulation exercises, Dr. Slingbaum explained. "We wanted a room where our students could do practice examinations, and also to have the ability to use a cutting-edge computer and a video distribution system on the same small classroom footprint."

This capability and others makes Dell's cloud client-computing solutions the perfect option for educational environments looking to consolidate lab facilities. The technology is flexible enough to present multiple pedagogical formats from the same platform while also delivering educational materials to varied audiences. Each student can have access to his or her specific curriculum, applications, and data.

"We brought in Wyse zero clients which gave us a solution that had the ability to switch back and forth between a video distribution system and the all-in-one units," recalled Dr. Slingbaum. "We expanded that to our clinics where we've added 118 units into our clinical setting. And we are going to be expanding those as well and rolling those out to more chairs and more clinics."

The solution delivers three crucial elements: Graphics capability, the ability for students to access their work on-the-go, and improved IT manageability of lab systems from a central datacenter. And because data is centralized, the solution improves the IT department's ability to

streamline data backups and maintain system reliability. Finally, it does all this in a way that also makes it easy for NSU to maintain HIPAA compliance.

"The capability of the Dell solution to handle sophisticated graphics makes it especially well-suited to the needs of the NSU professors, who are teaching a number concepts using very complex images of the human mandible that are often on par with CAD designs," said Sean Donahue, Senior Product Marketing Manager (Alliances DNA) at Citrix. "Don't forget, those images are huge and they take up a lot of CPU, but the Dell and Citrix solution has vGPU. Its graphics processing capabilities allow it to securely render the image in the datacenter and then send the pixels down to the endpoint device."

This helps accelerate learning and allows students to access even sophisticated 3D applications from their own personal devices. Students no longer have to come to the NSU lab to use advanced workstation-class devices — since the graphics capability is virtual, they can do their work anywhere and anytime

More specifically, this means students and facilitators have the flexibility to leverage resources they may not have on their individual devices, including the ability to do complex rendering or access graphics-intensive applications they may not personally own. "This is greatly improving our treatment planning and diagnoses by our students and our residents, who rely on 3D imaging software such as Invivo by Anatomage, Simplant, Kodak, iCat and XDR imaging viewers," said Dr. Slingbaum.

"Because it's becoming almost a standard of care in a lot of educational facilities, we are really pushing to have students get experience with 3D graphics and 3D imaging such as CT scans. We have specialized CT scans that we use in dentistry that allow us to improve the students' ability to see what's going on with a patient in three dimensions," he continued. "These 3D scans also help with treatment planning — specifically in determining what treatments are available for students to learn about and what treatments they can use in actual patient care."

Since NSU's School of Dentistry is both an educational facility and a working medical facility, there are unique data security concerns. Unlike most traditional medical facilities, NSU doesn't typically have much control over physical access to user devices and labs.

Specifically, most labs are open to students and potentially non-students as well, meaning that sensitive data stored

on a traditional PC might be vulnerable. Additionally, while students appreciate not being confined to a particular location, allowing them to be 100% mobile with patient data can be risky.

Schools such as NSU still have to comply with strict HIPAA regulations and treat all patient information as confidential. If data is lost or stolen on a student system, programs using actual patientdata are liable for the samefines as any other health care organization. While this can present tough challenges for medical and dental schools, desktop virtualization solutions from Dell go a long way toward solving it.

Data resides safely in the datacenter and is never stored on student or even lab endpoints. As a result, medical schools don't have to worry about who may be accessing a student lab or what remediation steps may be required should a student lose his or her own personal device.

NSU particularly appreciates the ease of management of Dell's cloud client-computing solution. "To update applications, our IT staff would previously have to go out and touch each system and maintain a wide range of devices," said Dr. Slingbaum. "With desktop virtualization, our IT staff can easily accommodate tablets, desktops, notebooks, Wyse thin or zero clients, even smartphones that students may bring in, because the image is maintained and controlled within the data center. Centralization gives our IT staff the ability

to deploy patches, updates, or changes on the fly, without having to go around and touch every individual system."

The inherent centralization of the Dell and Citrix solution also allows NSU professors to plan more dynamic lessons and to quickly update class materials as needed. Typically, in a traditional computing environment, it would take IT at least a month to incorporate a new application into a lab image, complicated by educators who may be submitting last-minute change requests.

Historically, the IT department's inability to accommodate every request created tension between the faculty and technicians. With desktop virtualization, IT can introduce new applications quickly and make their internal customers happy. And because images are flexible, multiple professors can share the same lab, further reducing the need for multiple small specialty lab spaces.

"Going to a zero client, you're able to control everything using the Citrix back end with XenApp and XenDesktop," said Dr. Slingbaum.

"We've been able to make changes on the fly, and we've been able to incorporate last minute changes. Say we have a specialized class covering a certain aspect of dentistry or dental surgery. We can accommodate that. So the Dell solution has been very flexible for us. For example, we just recently had our senior dental students doing board preparations for their licensing exams."

"So with very minor changes on the back end, we were able to tell our Citrix team on our end: 'Here's what we need, here's what programs we need to be available,'" Dr. Slingbaum continued. "And after minor changes with them, we had those lesson plans rolled out in a very short period of time. This allows us to really control our environment, to publish applications, and to allow our students to do any assigned work, testing, training, treatment planning, and diagnosis that they need to do."

"We can customize applications based on security level and need of use as we go. If we have a specific need, like when the dental boards are being given in our clinics, we can publish just those applications and control the data and security with very little manpower and virtually no downtime," he said. "Because the endpoints are so flexible, it allows us to accomplish our goals with very little IT resources, compared to the old days where you had to sit there and manually go from station to station modifying each legacy PC. If we can just update our software in one area — on our Citrix Farm — and then publish it to our

cluster, then we don't have to worry about maintaining it on the front end."

Phase II of NSU's rollout calls for installing more Wyse all-in-one endpoints and incorporating more 3D imaging and 3D scan technology into the students' diagnostic tool kits. "Going from a standard 19 to 20 inch monitor to the larger size AIOs with the higher resolution of their screens will provide our students with better image visibility, which should lead to better diagnoses and better treatment planning," Dr. Slingbaum explains.

"During the second phase, we're hoping to incorporate more 3D scans and the 3D imaging. We'd also like to incorporate 3D *printing* which is really starting to make its way into dentistry," Dr. Slingbaum added. "Using these units and the software and taking those extra little benefits that we have now — and applying them to current practices — will help us stay on the cutting edge of those technologies and make them available to our students and our faculty."

Of course, a painless transition to desktop virtualization was was once probably as likely as an easy root canal. However, Dell and Citrix working together were able to make NSU's deployment remarkably smooth. And while the solution doesn't come with a free toothbrush, the NSU

School of Dentistry's desktop virtualization deployment does provide an interesting case study, applicable to other education-related venues. It shows how even complex, specialized applications, peripherals, and media can be virtualized with an excellent user experience and HIPAA-compliant security.

Dell cloud client-computing gives students the ability to study on their own time and collaborate in new ways, while also enhancing the learning environment. At the same time, it alleviates a significant management burden from the IT team. This in turn allows for more focus on strategic projects such as bringing in new technologies — like 3D printing — that will help prepare the next generation of dental healthcare professionals for the future.

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Dell recommends Wyse All-in-One models for education and training environments

Cable Management
In a lab environment with many computers in a single room, cable management can rapidly become a nightmare, especially with students in and out of the lab, potentially moving equipment and cables around. An all-in-one thin client has a very simple cabling structure and provides a clean look and feel to even the most crowded computer training room.

Environmentally conscious for long-term value
Designed for cost-effective virtual desktop deployments, an AIO thin client delivers great value from day one with minimal initial investment and power-efficient operation. Additionally, Dell practices environmentally aware design with an ISO 14001-based environmental management system and WEEE recycling processes. All Wyse products meet stringent RoHS requirements and EPEAT compliance. This allows IT departments to be strong contributors to their organizations' green initiatives. Plus, with minimal moving parts and less need for fans, it significantly reduces noise and heat in the lab.

Security and virus resistance
Wyse has delivered the first all-in-one thin client to operate on the ultra-fast, virus-resistant ThinOS, with an unpublished API and encoded with AES disk encryption. In addition, Dell has recently launched Threat Defense / ESSE software, which can be installed on both thin clients and server-based virtual desktops, and uses machine learning to eliminate viruses and malware before they can become a problem. Together, this means Dell has the most secure thin client portfolio on the market.

Effortless management and scalability
Simple out-of-box automatic setup makes deployment effortless. Save valuable IT resources and increase ROI with a thin client that doesn't need any on-site management or configuration. The device can also be managed remotely with a simple file server, Wyse Device Manager (WDM), or Wyse Cloud Client Manager to help lower the total cost of ownership and offer enterprise-wide management that scales as you grow from just a few thin clients to tens of thousands.

Flexible multimedia connectivity
The Wyse AIO offers versatile connectivity options for use in a wide range of use cases. With four USB 2.0 ports, Gigabit Ethernet and integrated dual band WiFi options, users can link to their peripherals and quickly connect to the network while working with processing-intensive, graphics-rich applications. Unified Communication Lync 2010, Lync 2013 and the Skype for Business client for Lync 2015 (UI mode) via the Citrix HDX RealTime Optimization Pack, built-in speakers, a camera and a microphone make video conferencing and desktop communication simple and easy. It even supports a second attached display for those who need a dual monitor configuration.