

SUCCESS STORY | TOURO COLLEGE OF DENTAL MEDICINE

REVOLUTIONIZING DIGITAL DENTISTRY EDUCATION WITH NVIDIA QUADRO vDWS



Image courtesy of Touro College of Dental Medicine



TCDM DISCOVERS A NEW WAY TO DELIVER GRAPHICS-INTENSIVE 3D DENTAL SOFTWARE



Image courtesy of Touro College of Dental Medicine

SUMMARY

- > Touro College of Dental Medicine is a teaching and research institution focused on digital dentistry.
- > The organization needed a high-performance and cost-effective IT system capable of delivering graphics-intensive 3D dental software.
- > TCDM deployed a virtual desktop infrastructure (VDI) on hyperconverged infrastructure powered by NVIDIA Quadro® Virtual Data Center Workstation (Quadro vDWS).
- > Today, faculty and students can tap into virtualized desktops as they treat patients in the clinic or work in the simulation lab, X-ray rooms, or imaging facilities and can even migrate their VDI sessions to any thin client.
- > A two-person IT support team manages a school of 300–600 users with little to no issues.

INTRODUCTION

Touro College of Dental Medicine (TCDM) prepares dental students for the future of dentistry. Its facilities are equipped with state-of-the-art dental technologies, including 3D imaging, digital treatment planning, 3D printing, and computer-aided design and computer-aided manufacturing (CAD/CAM) milling machines. The school offers a four-year predoctoral program, while its 117-chair dental clinic provides affordable dental services to the public.

CHALLENGE STATEMENT

As the 66th dental school in the U.S. and the first dental school to open in New York State in nearly 50 years, TCDM is unique in that it's one of the first schools in the nation with a curriculum dedicated to digital dentistry. Although digital dental technology has been around for more than 25 years, high costs and complexity have meant slow adoption. However, recent advances in 3D scanning, modeling, and printing technologies have ushered in a new era for the industry.

Blazing new trails in any field comes with challenges. As TCDM set up its school, it needed expertise to design an IT system with state-of-the-art 3D digital dental technology that could handle the yearly influx of new students and faculty. In 2016, TCDM launched with nearly 100 faculty and staff, and it planned to add

CUSTOMER PROFILE



Organization
Touro College of
Dental Medicine
(TCDM)

Industry
Healthcare

Location
Hawthorne,
New York

Founded
2016

Website
dental.touro.edu



Image courtesy of Touro College of Dental Medicine

SOFTWARE

Hypervisor: Citrix XenDesktop
on VMware vSphere

Graphics Acceleration:
NVIDIA Quadro vDWS

HARDWARE

Server: Dell VxRail 4.0 V470F
(all-flash)

GPU: NVIDIA® Tesla® M10

REASONS FOR QUADRO VDWS

- > Workstation-like performance of graphics-intensive 3D dental applications
- > Uninterrupted workflows when tapping into thin clients from anywhere on campus
- > Reduced IT staffing requirements by deploying thin clients instead of graphics workstations
- > The ability to manage and secure the environment from a central location

a new cohort of 115 students annually to its four-year program. In the same year, the school hired Hudson River CIO Advisors to implement and manage every aspect of its IT, from engineering to deskside support.

“This school has complex IT infrastructure requirements,” said Behan Venter, co-founder at Hudson CIO. “The school has numerous facilities with 3D imaging requirements, including a simulation lab where students practice 3D modeling and computer-aided design and computer-aided manufacturing, a clinic where they digitally X-ray and scan patients’ teeth, and a research lab where they work on models, milling crowns, and 3D printing dentures, in addition to the administrative component. Our team needed to engineer a solution that would support faculty, staff, and large groups of students all concurrently using popular dental applications like Exan Software’s axiUm and 3D applications like 3Shape’s TRIOS software, as well as running the full Microsoft Office suite and streaming instructional videos.”

Understanding that TCDM had a limited IT staffing budget, the IT team didn’t opt for physical 3D workstations. Instead, it chose to implement a virtual desktop infrastructure with thin clients. Said Venter, “Besides the cost savings over time, VDI ensured we could manage and secure the environment from a central location.” TCDM welcomed its first group of students during its inaugural semester in 2016; however, IT performance was slower than expected. “Initially, the system had 200 faculty and students on four non-GPU-enabled servers,” said Venter. “When it went live on the first day, within 30 minutes, we knew performance should be better. For this deployment, VDI without GPU-enabled servers just wouldn’t cut it.” This led the team to a solution from NVIDIA.

“With NVIDIA Quadro vDWS, the system saw a dramatic improvement. We had doctors teaching at TCDM tell us that it worked better than the graphics workstations at their dental practice.”

Behan Venter
Co-Founder,
Hudson RiverCIO Advisors

SOLUTION STATEMENT

Performance issues weren't expected. "Our engineering team spent a lot of time getting these 3D dental programs to work in a virtual environment. Most are designed for small dental practices; they aren't designed for an enterprise scale. Today, dental education is an enterprise operation," said Venter. Before a faster solution could be implemented, the IT team worked on improving the environment. "It took us a few months to better understand the performance issues and run tests on a GPU-enabled platform. The success on the GPU-enabled platform drove the decision to implement GPU-enabled VDI environments by year two. In the meantime, we downgraded from Windows 10 to Windows 7 to reduce the system's graphic requirements and reclaim performance."

Research led the IT team to a hyperconverged infrastructure powered by NVIDIA Quadro vDWS. The team set up five Dell VxRail 4.0 V470F all-flash servers with two NVIDIA Tesla M10 GPUs per node, each supporting 64 users with 1 GB profiles. By the beginning of year two, the upgraded system was ready to go. At that point, the new setup enabled 115 students to run 3D modeling sessions concurrently. It also provided enough graphics processing to handle requirements at TCDM's clinic, where there are three monitors and two thin clients at each station . There are currently 117 live chairs in the clinic, with more sections of the clinic being rolled out over the next few months.

Designed around a proximity card login, users can work from anywhere on campus. All they need to do is tap their ID card and enter a 4-digit PIN to access their desktop. This means they can do a scan in one room and then walk to another station and tap in, carrying that same session with them.



Image courtesy of Touro College of Dental Medicine

RESULT STATEMENT

Today, TCDM's virtualized environment serves more than 450 faculty, staff, and students. "Ultimately, it plans to grow to 600 users. That includes the admin and academic side, as well as the clinic, which will serve more than 400 patients per day in its 117-chair facility. The VDI environment is scaling in a way that wasn't possible before. VDI on this scale needs high-availability IT, and it needs to deliver high-performance 3D graphics. Thanks to NVIDIA virtual GPU, the environment is fully capable of meeting these requirements," said Venter.

The system is incredibly easy to use with seamless session migration. Faculty and students can go to the clinic to treat patients, or they can work in the simulation lab, X-ray rooms, or imaging facilities. No matter where they are, they can work uninterrupted. As soon as they log in, work done at another station displays almost instantly. "Session-migration load time is six seconds. That's incredibly fast for VDI running graphics-intensive programs," said Venter. "It ensures an extremely fluid workflow for the users."

The school's faculty is thrilled to be working at a dental institution that embraces cutting-edge IT. "We're very excited with how its working and how it's going to be a major part of the future of digital dental school technology," said Dr. Alan Jurim, director of digital dentistry. They also enjoy how well the virtualized environment performs on a daily basis. "I was pleasantly surprised with how smooth the end user's experience is—even in lossless graphics model!" said Justin D. Steinberg DDS, director of oral radiology.

“The future of dental education lies in NVIDIA GRID and the ability to deliver it through a VDI. It would be significantly more complicated and expensive to do it any other way.”

Behan Venter
Co-Founder,
Hudson River CIO Advisors

Being in charge of such a groundbreaking project has also been a revelation for Hudson CIO’s IT team. “We learned a lot about the importance of GPU-accelerated VDI for digital dentistry. If a digital dental school tried to do what we’re doing without VDI powered by NVIDIA Quadro vDWS, they’d need more than 300 graphics workstations. They’d also need to hire additional IT staff to manage, update, and patch each individual workstation,” said Venter. “NVIDIA Quadro vDWS enables us to deliver high-performance workstations to thin clients so that we can centrally manage and secure the environment. This implementation would not be possible without NVIDIA virtual GPU technology.”

In terms of both hardware and staffing requirements, cost savings are substantial. Currently, Hudson CIO manages more than 450 users on TCDM’s VDI with two support staff—one working on the infrastructure and one on the help desk. “Our deskside person keeps users at the whole school happy. Our deployment demonstrates that one person can easily manage more than 500 users/devices. As the school adds more students, we won’t need to hire additional support staff,” said Venter. Moving forward, TCDM plans to upgrade to Windows 10 and is currently in the testing phase. “When we upgrade, we’ll add more servers with NVIDIA virtual GPUs to accommodate the additional graphics requirements for the clerical staff and administration users who are currently on non-GPU servers.”

Said Venter, “Dental schools are going to quickly realize that they need the performance that NVIDIA Quadro vDWS delivers, especially at this scale. The future of dental education lies in NVIDIA virtual GPU and the ability to deliver it through a VDI. It would be significantly more complicated and expensive to do it any other way.”

To learn more about NVIDIA virtual GPU solutions, visit: www.nvidia.com/virtualgpu
www.nvidia.com