

CUSTOMER SUCCESS STORY | NEBRASKA MEDICINE

# IMPROVING DIAGNOSTIC ACCURACY AND QUALITY OF CARE WITH NVIDIA QUADRO vDWS



Image Courtesy of Nebraska Medicine



# VIRTUAL GPU-ENABLED VDI BALANCES USER EXPERIENCE, COST, AND FLEXIBILITY



Image Courtesy of Nebraska Medicine

## SUMMARY

- > Nebraska Medicine is the state's largest healthcare organization with more than 8,000 employees and physicians.
- > Deploying hyperconverged infrastructure provided an opportunity to upgrade its VDI.
- > Intense IT workloads and maintenance needs made the radiology department an ideal internal test candidate for upgraded virtual GPU-enabled VDI.
- > Nebraska Medicine deployed Dell PowerEdge R740 servers with NVIDIA® Quadro® Virtual Data Center Workstation (Quadro vDWS) and Tesla® M10 cards.
- > 100+ radiology stations will be using vGPU-enabled VDI; the organization is well-positioned for widespread VDI rollout.

## INTRODUCTION

Nebraska Medicine is an academic health organization of hospitals, specialty medical clinics, and healthcare colleges. With facilities located in Omaha and surrounding areas, it is Nebraska's largest healthcare organization tracing its roots back to 1869 and the founding of Omaha's first hospital. The organization has earned an international reputation for developing breakthrough cancer care, organ transplantation and treatment of infectious diseases, and has been named one of America's best hospitals by *U.S. News & World Report*.

## CHALLENGE STATEMENT

Attracting patients from across the region and around the world, Nebraska Medicine is adept at rapid expansion. With demand for health services increasing, the organization has launched several IT initiatives in recent years to streamline organizational efficiency. In 2015 it deployed VDI for staff at its remote medical clinics, providing them with access to file shares and specialty applications. That project's success motivated the IT team to extend VDI to pharmacists, IT programmers and staff working from home. By the end of 2017 the organization was eager to take another step towards its digital transformation.

This process began with rolling out hyperconverged infrastructure using VMware vSAN Ready Nodes for all virtual desktops. According to Shane Limbach, Nebraska Medicine's technical systems senior engineer, "When our manager tasked us with deploying hyperconverged storage, we began thinking creatively about how the new infrastructure might be leveraged across the entire organization. We wanted to set up something that had the potential to handle 3,000+ staff members on VDI using Windows 10. We also wanted to deliver ultra high-end desktops."

## CUSTOMER PROFILE



**Organization**  
Nebraska Medicine

**Industry**  
Healthcare

**Location**  
Omaha, Nebraska

**Founded**  
1997

**Employees**  
8,000

**Website**  
[www.nebraskamed.com](http://www.nebraskamed.com)

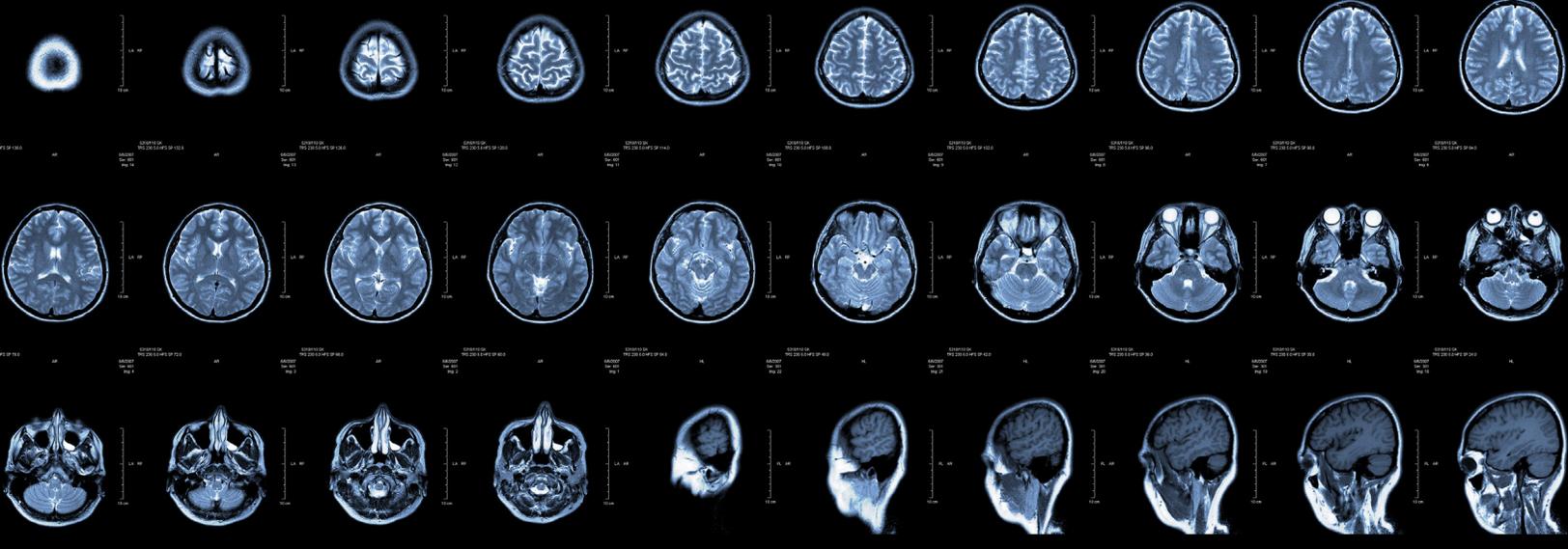


Image Courtesy of Nebraska Medicine

## SOFTWARE

**Hypervisor:** VMware vSphere on VMware Horizon

**Graphics Acceleration:** NVIDIA Quadro vDWS

## HARDWARE

**Server:** Dell PowerEdge R740

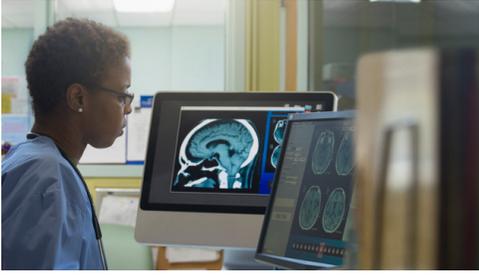
**GPU:** NVIDIA Tesla M10

## REASONS FOR QUADRO vDWS

- > Workstation-like performance for radiologic technologists mouse-wheeling through scans in a VDI environment
- > Ability to deploy VDI with Windows 10 with no performance issues
- > Lower cost per user as VDI system usage grows more widespread
- > Increased agility and reduced workload for IT team
- > Supplement remote diagnostic work while keeping patient information secured in the data center

The engineering team undertook a quick needs assessment, identifying departments with the highest desktop performance requirements that cost the most to maintain. The radiology department stood out with its Picture Archiving and Communication Systems (PACS) technology for displaying digital images from MRIs, CT scans, mammography, and x-rays. “When the IT team updates the radiology department software, they have to touch approximately 150 computers. We asked the IT team, ‘What if we could give you the ease-of-use of virtual desktops?’ They were ecstatic,” said Limbach. However, deploying PACS technology on VDI can be a challenge.

According to Limbach, smooth scrolling through scans is essential for diagnostic accuracy: “Take a CAT scan of a head as an example. Essentially, it’s multiple digital images taken from the top of a skull through the eye sockets to the base of the neck. When doctors are looking at these scans on a high performance PC, they’ll use a mouse wheel to scroll through the scans very quickly in succession, viewing every single slide. It’s imperative that nothing is missed. The motion between the slides has to be extremely fluid. Any hesitation or image stuttering means there’s a chance for error.” If the team could engineer a VDI solution that delivered high graphics quality and fluid image transition for the radiology department, the lessons learned would provide a reliable template for transforming Nebraska Medicine’s entire IT infrastructure.



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Shane Limbach  
Technical Systems  
Senior Engineer  
Nebraska Medicine

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**“NVIDIA vGPUs will definitely make deploying virtual desktops with Windows 10 easier because we’ll never need to worry about unforeseen performance issues.”**

Shane Limbach  
Technical Systems  
Senior Engineer  
Nebraska Medicine

## SOLUTION STATEMENT

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Nebraska Medicine’s engineering team began the project with a proof of concept. “We approached several OEM vendors to provide solutions, and then we used those servers for six months. Ultimately, we declared VMware vSAN and Dell the winners. We knew we’d be doing ourselves a disservice if we didn’t try out GPUs, so we started testing NVIDIA virtual GPU (vGPU) software with Tesla M10s and M60s,” said Limbach. Nebraska Medicine took advantage of the NVIDIA Quadro Virtual Data Center software for Education, a single SKU optimized for educational institutions providing all NVIDIA virtual GPU features, including the NVIDIA GRID Virtual PC/Virtual Applications and the Quadro Virtual Data Center Workstation features. In particular, the engineering team wanted to know how NVIDIA virtual GPUs helped with the day-to-day functionality of Windows 10 and Mckesson Radiology. “For Windows 10 desktops, we tested a 1GB versus a 2GB frame buffer. Mckesson requires a higher workload, so we tried both a 4GB and an 8GB,” said Limbach. “After testing, we got the IT folks’ buy-in. NVIDIA M10s performed surprisingly well. The experience was as good as a medical grade physical workstation”

During the summer, Nebraska Medicine purchased 21 Dell PowerEdge R740 servers and spent time determining vGPU resources. They discovered that NVIDIA’s plug-in for VMware vROps really helped to pinpoint profile size and optimize resources. “Thanks to NVIDIA’s vROps plug-in, we got a perfect balance. It told us exactly how the vGPUs were performing and which users needed more resources,” said Limbach. “For Windows 10, we learned that a 1GB or 2GB frame buffer worked well for clinicians or nurses. For radiologic technicians using Mckesson, we figured out that a 2GB profile provided great density, but 4GB delivered better performance.”

From there, it was easy to plan for Nebraska Medicine’s short-term and long-term infrastructure needs. They purchased an additional eight Dell PowerEdge R740 servers on top of the previous 21. “For our two vGPU profiles, we installed one M10 per host—we got the best cost-to-performance ratio by purchasing 30 M10s. We opted for the expandability option, which means we can install a second M10 in each host and almost double our vGPU power in the future if we need to. This ensures we have flexibility moving forward—both in how we work and what we provide to end-users.”

## RESULTS STATEMENT

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Radiology quality control (QC) staff and PACS administrators will be the first users of Nebraska Medicine's NVIDIA vGPU-powered VDI deployment. "On a typical desktop, QC staff experience a very rigid transition between each slice of a 3MM cut-through of a body. This makes it difficult to accurately see what's going on. A CPU can render those images, but not very well," said Limbach. "Now, virtual GPU acceleration ensures no image quality loss and smooth scrolling between cross-sections for faster QC diagnostic reviews, while ensuring adherence to strict healthcare security standards. With NVIDIA vGPUs, radiologic technologists will have increased accuracy of image interpretation—from detecting a broken bone to early detection of a cancerous tumor."

The IT team is looking forward to the reduced maintenance requirements. Said Limbach, "Instead of spending three weeks tracking down all those radiology PCs, the team will be able to do an update in two hours and be done. They'll update the golden image one time, not 150 times." They're also anticipating a time when Nebraska Medicine will reduce the number of mobile workstations or medical grade computers in place of thin clients. In the next year or so, the organization will deploy between 500 – 2500 virtual desktops with Windows 10. "Soon, we'll be upgrading from Windows 7. Unfortunately, Windows 10 can be a bear because it's so graphics intensive. NVIDIA vGPUs will definitely make deploying virtual desktops with Windows 10 easier because we'll never need to worry about unforeseen performance issues. We see virtual GPU technology as a way to future-proof our infrastructure. It is particularly important if we want users to experience the full functionality of Windows 10 for ultimate productivity

without having to compromise on user experience by optimizing and turning off certain features to improve server density."

The organization's long-term vision is to make remote work easy and to extend VDI's cost savings to other departments. "Our goal is to deliver vGPU-enabled desktops to every staff member and physician who travels or works from home. Giving them the option of working at different clinics or across the state will open up new ways for Nebraska Medicine to innovate faster," said Limbach. "Also, I can see NVIDIA vGPUs really benefiting other departments that require a significant IT investment. At the hospital, we have some CAD engineers working on our facilities. It would be a big cost savings if we could stop maintaining those high-end workstations and simply provide NVIDIA vGPU-powered thin clients."

Using NVIDIA vGPU technology with VMware vMotion is another benefit the IT team is anticipating. "We're a hospital, so radiology tasks are happening 24/7, which can be problematic for VDI users when you need to patch or update a host. What happens to a virtual desktop when a host goes into maintenance mode? Normally, if it's got a GPU attached, it doesn't work. Host maintenance is incredibly important. When we heard about VMware vMotion support for NVIDIA GPUs with VMware vSphere 6.7 update 1, we started thinking about the possibilities. With vMotion, you put a host into maintenance mode and move that radiology workload to a different host. The session moves uninterrupted, and users are none the wiser. You can do all your maintenance while still delivering the best user experience possible," said Limbach.

To learn more about NVIDIA virtual GPU solutions, visit: [www.nvidia.com/virtualgpu](http://www.nvidia.com/virtualgpu)

[www.nvidia.com](http://www.nvidia.com)



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