DIGITAL TRANSFORMATION IN HEALTHCARE

Delivering Cost-Effective, High-Value Healthcare with NVIDIA Virtual GPU Solutions

NVIDIA

Year after year, the healthcare industry is faced with challenges revolving around lowering costs while also improving quality of care. With the shift towards value-based care, initiatives such as mobility, virtualization, and new ways of delivering patient services like telemedicine and virtual care are gaining popularity. These initiatives are particularly important with today's emphasis on patient empowerment. Patients want to be in control of their healthcare, with better access to information and high-quality services. As such, healthcare providers must continually find ways to improve care delivery and scalability, while ensuring continued security and regulatory compliance.

- Doctors spend 2X more time working on patient records than with patients themselves[1]
- Inefficiencies across clinical workflows costs $1.75 million per US hospital per year[2]
- 2016 averaged at least one health data breach per day, affecting more than 27 million patient records [3]

NVIDIA VIRTUAL GPU OPENS NEW POSSIBILITIES IN OPTIMIZING PATIENT CARE

Digital Transformation for healthcare providers has resulted in deep VDI penetration within the industry to lower costs while also enabling improved security. However, many of these traditional VDI solutions didn't include GPU virtualization and are challenged to keep up with modern applications which are more graphics intensive. By adding NVIDIA virtual GPU solutions to their VDI environments, healthcare organizations are realizing significant benefits including improved performance and increased productivity. Consequently, they are able to realize broader adoption across use cases that were not previously possible to support with VDI, such as demanding picture archiving and communication systems (PACS). The impact of NVIDIA virtual GPU has been extensive:

- **Enhance Productivity and Mobility.** More healthcare professionals can now be untethered and access data from any location, at any time, and on a variety of devices with a native-like PC experience. This portability and rapid access to information results in faster decision-making and improved diagnostic accuracy. Furthermore, mobility improves the completeness and accuracy of patient records and speed of input, improving clinical workflows.
- **Reduce Infrastructure Costs.** Healthcare organizations can now virtualize electronic medial record (EMR) and PACS applications and deliver them cost effectively to all users. Even data from legacy and siloed IT systems are unified and easily accessible to all users. IT can replace thick clients with thin or zero clients without compromising on user experience, and support the BYOD movement. Total cost of ownership is further reduced by simplifying enterprise data management with visibility across your entire virtualized infrastructure, including end-to-end management of your virtual GPU infrastructure.

WHAT IS GPU VIRTUALIZATION?

GPU virtualization enables every virtual machine to get the benefits of a GPU just like a physical desktop has. Because work that was typically done by the CPU has been offloaded to the GPU, the user has a much better experience and more users can be supported.

[1] Ramsey, Linda (2016, Sept. 6). Doctors spend more time with patient records than patients themselves - and it signals a major problem. Retrieved from http://www.businessinsider.com/doctor-patient-time-ehr-2016-9

[2] The Imprivata Report on the Economic Impact of Inefficient Communications in Healthcare (July 2016). Retrieved from http://www.healthforum.com/connect/resources/imprivatac-2016-0107-w-pomemon.shtml?

[3] Landi, Heather (2017, January 13). Healthcare Data Breaches: A Year in Review. Retrieved from https://www.healthcare-informatics.com/news-item/cybersecurity/healthcare-data-breaches-year-review

- **Uncompromised Security.** The healthcare industry is faced with continued explosion of data coupled with the rising trend to support a more mobile workforce and BYOD programs. IT can now expand virtualization to more users with secure access to critical clinical applications on any device, and still adhere to federally-mandated Health Insurance Portability and Accountability Act of 1996 (HIPAA) and Health Information Technology for Economic and Clinical Health (HITECH) Act.
- **Improve Quality of Care.** Allowing healthcare professionals to access information anywhere, on any device enables better collaboration between doctors and specialists, as well as better information sharing with patients. Physicians no longer have to waste significant amounts of time during patient rounds accessing, retrieving, and recording data, as information is now readily available at their fingertips. This increased efficiency frees up more time for direct patient care.

NVIDIA virtual GPUs deployed in conjunction with virtualized EMR and PACS applications provides a way to lower the costs of delivering information anywhere and on any device with native-PC like performance, improving the efficiency of both clinicians and staff alike. In addition, security is improved as critical patient data is centralized in the data center, and no longer stored on endpoint devices.

NVIDIA VIRTUAL GPU SOLUTIONS

Virtualization with NVIDIA® Quadro® vDWS and Tesla® GPUs

The NVIDIA Quadro Virtual Data Center Workstation (Quadro vDWS) is ideal for virtualizing PACS images used by radiologists, physicians, and specialists.

BENEFITS

- Remote access for 3D volumetric viewing and editing of images
- Ability to support large and complex medical images with support for up to four 4K monitors and large frame buffer sizes
- Ability to remotely supplement diagnostic work (US) and perform diagnostic work (UK)
- Extended accessibility to images secured in the data center
- Increased doctor/specialist mobility
- Lower IT management costs

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Virtualization with NVIDIA GRID™ and Tesla GPUs

NVIDIA GRID vPC/vApps are positioned for general-purpose VDI in the healthcare setting for doctors, clinicians, nurses, and staff.

BENEFITS

- Virtualized EMR applications for accessing medical records remotely and for hospital inpatients to stay in touch with their care team
- Support for increasing graphical requirements of Windows 10 and modern productivity applications
- Support up to four HD monitors for increased productivity
- Cost-effective solution to scale VDI across your organization
- Extended accessibility to images and patient data secured in the data center
- Increased doctor/clinician/staff mobility
- Lower IT management costs

Allscripts McKESSON Cerner Epic

CUSTOMER EXAMPLES

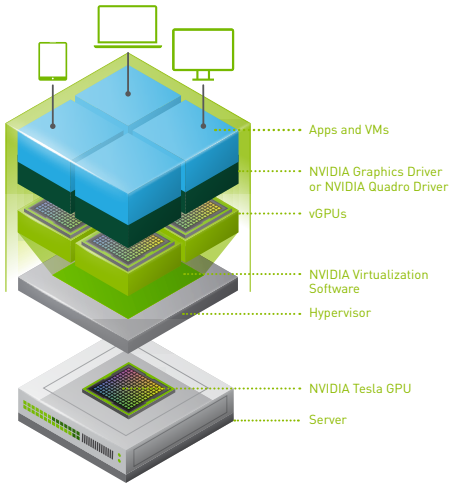
Metro Health Grand Rapids, MI, USA	The Polyclinic Seattle, WA, USA	ZGT Group Twente, Netherlands
Deployed a VDI powered by NVIDIA virtual GPUs to enable healthcare professionals to seamlessly access medical imaging and graphics intensive applications from any location. Fast access and better performance resulted in a time savings of 30 minutes per day to each doctor and 50 minutes per day to nurses and other professionals. Service call volume to the IT department has remained flat while the total number of endpoints has grown by 35%. "NVIDIA GRID technology marks a turning point in our evolution toward delivering a virtual desktop to every user at Metro Health."	The Polyclinic has rolled out several initiatives to improve organizational efficiency, including a centralized EMR system, as well as published resources and apps on VDI. However, increasingly slow system performance impacted the productivity of doctors and patient service representatives (PSRs), making them resistant to an upgraded thin client. By upgrading their legacy VDI to Windows 10 with NVIDIA Tesla GPUs and GRID Virtual PC software, The Polyclinic was able to double their user density at 2/3 the cost while delivering a consistently great experience and improving VDI adoption across departments.	Virtualizing their radiology desktop and applications with NVIDIA virtual GPU saved time and increased productivity. Radiologists can now work from other locations or from home, without suffering quality loss or imbalance of images. Without the addition of NVIDIA virtual GPU, the performance and quality of their virtual desktops would not have met the needs of the radiologist. NVIDIA virtual GPU extended the possibilities of VDI, enabling radiologists to operate much more flexibly, achieve just-in-time diagnostics, and expand the scope of work.

KEY HEALTHCARE USER GROUPS

			
TARGET PERSONA	Radiologists, Medical Imaging Specialists	Radiologists, Specialists, Clinician "Super Users"	Doctors, Clinicians, Nurses, Staff
USE CASES	For remotely viewing and editing very large and complex medical images (PACS)	For remotely viewing and editing medical images, and general purpose VDI with multi-monitor support on Windows 10	For general purpose VDI, using virtualized EMR apps and common office productivity apps
RECOMMEND	Quadro vDWS on Tesla P4 or P40, P100, V100 for high-end, and P6 for blades (supports up to four 4K displays)	GRID vPC on Tesla M10 and P6 (supports up to two 4K or four HD displays); GRID vApps on Tesla P4, M60, and P6 for blades	GRID vPC/vApps on Tesla M10 and P6 (supports up to four HD displays)

HOW NVIDIA VIRTUAL GPU WORKS

In a VDI environment powered by NVIDIA virtual GPU, the NVIDIA virtual GPU software is installed at the virtualization layer along with the hypervisor. The NVIDIA virtual GPU software creates virtual GPUs enabling every virtual machine (VM) to share the physical GPU installed on the server. The NVIDIA virtualization software includes a graphics driver for every VM. Quadro vDWS includes for example, the powerful Quadro driver. Because work that was typically done by the CPU is offloaded to the GPU, the user has a much better experience, and demanding engineering and creative applications can now be supported in a virtualized and cloud environment.



WHAT MAKES NVIDIA VIRTUAL GPU POWERFUL

EXCEPTIONAL USER EXPERIENCE

Ultimate user experience, with the ability to support both compute and graphics workloads for every vGPU.

PREDICTABLE PERFORMANCE

Consistent performance with guaranteed quality of service, whether on-premises or in the cloud.

BEST USER DENSITY

Industry's highest user density solution with support for up to 24 virtual desktops per physical GPU. Lower TCO with up to 8 vGPU profiles for the most flexibility to provision resources to match your users' needs.

OPTIMAL MANAGEMENT AND MONITORING

End-to-end management and monitoring deliver real-time insight into GPU performance. Broad partner integrations so you can use the tools you know and love.

CONTINUOUS INNOVATION

Regular cadence of new software releases ensures you stay on top of the latest features and enhancements.

BROADEST ECOSYSTEM SUPPORT

Support for all major hypervisors. Most extensive portfolio of professional apps certifications with Quadro drivers.

Supermicro SuperServer SYS-2029U-E1CRT

Supermicro High Performance VDI Solutions. Designed for NVIDIA® Virtual GPU Software.

- **Dual Intel® Xeon® Processor Scalable Family (Skylake-SP) with 2 UPI up to 10.4 GT/s**
- **Up to 3TB 3DS ECC RDIMM/LRDIMM; DDR4 up to 2666MT/s, in 24 DIMM slots**
- **1 PCI-E 3.0 x16(FH, 10.5"L); 5 PCI-E 3.0 x8(FH, 10.5"L); 1 PCI-E 3.0 x8(LP); 1 PCI-E 3.0 x8(internal LP)**
- **2x 10GBase-T ports with Intel® X540 Ethernet Controller; 3 USB 3.0 ports(2 rear, 1 Type A); 1 Serial Port**
- **24 Hot-swap 2.5" Drive Bays; 24 SAS3 ports support via Expander and AOC; Optional drive support: 20 SAS3 + 4 SAS3/NVMe; Optional 2 Rear Hot-swap 2.5" Drive Bays**
- **1000W Redundant Power Supplies with PMBus**

SUPERMICRO® NVIDIA SOLUTION PROVIDER

About Super Micro Computer, Inc. (SMCI)

Supermicro (SMCI), the leading innovator in high-performance, high-efficiency server technology is a premier provider of advanced server Building Block Solutions® for Data Center, Cloud Computing, Enterprise IT, Hadoop/Big Data, HPC and Embedded Systems worldwide. Supermicro is committed to protecting the environment through its "We Keep IT Green®" initiative and provides customers with the most energy-efficient, environmentally-friendly solutions available on the market.

www.supermicro.com

For more information, visit **www.nvidia.com/virtualgpu**