

# EMPOWERING EVERY STUDENT IN EDUCATION

Broaden Access and Support New Ways of Learning  
with NVIDIA Virtual GPU Solutions



**NVIDIA.**

Students entering colleges and universities these days are increasingly tech-savvy, armed with a growing number of mobile devices. They come with expectations that they'll have access to the same caliber of tools and graphics-intensive applications as they experience in their day-to-day lives. The ability to access any application—from Windows 10 and Office productivity applications to graphics-intensive engineering applications—on any device and seamlessly collaborate on team projects in real time is critical to learning.



But universities are struggling to keep up with these ever-changing technology needs. These educational institutions want to offer new ways of learning. For many courses, special software and hardware requirements mean that students must complete coursework in a specialized computer lab. This leads to space constraints, logistical challenges, and incurred maintenance costs. Colleges and universities are also beginning to recognize that online learning is critical to their long-term success. This style of learning provides scale without the need for more classrooms and caters to the way students want to learn today.

- > More than one in four students (28 percent) now take at least one distance education course<sup>1</sup>.
- > 63 percent of chief academic leaders say online learning is critical to their long-term strategy<sup>1</sup>.
- > 95 percent of college students use a laptop for at least one class; 66 percent use them for all classes<sup>2</sup>.

## NVIDIA VIRTUAL GPU<sub>s</sub> ENABLE A BORDERLESS CAMPUS, WITH COST-EFFECTIVE ACCESS TO ANY APPLICATION, ANYTIME, ON ANY DEVICE.

Colleges and universities are challenged to deliver graphics-intensive applications that meet the performance expectations of students on all their devices. Furthermore, the cost to manage a growing number of endpoints and a complex virtualized environment has been equally challenging.

### NVIDIA QUADRO VIRTUAL DATA CENTER WORKSTATION FOR EDUCATION

Get up to a 75 percent discount on NVIDIA Quadro® Virtual Data Center Workstation's commercial list price, with a single SKU optimized for educational institutions providing all NVIDIA virtual GPU features.

**\$99 PERPETUAL LICENSE  
LIST PRICE**

By adding NVIDIA virtual GPU (vGPU) solutions to their virtual desktop infrastructure (VDI) environments, educational institutions can cost-effectively deliver virtual workspaces that are equivalent to the physical PCs and workstations that students, faculty, and staff use today. Plus, with improved management, security, and productivity, the benefits of virtual GPUs are significant:

- > **Access educational resources anywhere on any device.** Students can have access to all their applications from any device, even on low-cost Chromebooks and tablets. Whether accessing software traditionally provided in on-campus labs, such as Autodesk AutoCAD, Dassault Systèmes SOLIDWORKS, and MathWorks MATLAB, or Windows 10 and modern productivity applications that are becoming more graphics intensive, students get a high-quality user experience. With GPU virtualization, they can work from dorm rooms, classrooms, the library, or even off campus, all while using industry-standard and specialized applications. With this kind of flexibility, they can complete work on their own schedules and preferred devices.
- > **Foster new ways of learning.** New ways of learning with a heavy use of multimedia are becoming more popular, from professors using online videos to supplement classroom lectures, to students creating video presentations to better articulate ideas. These methods were once too slow to be usable by the remote user. GPU virtualization technology offloads tasks from the CPU and, with hardware encode and decode, provides optimized video performance and scalability with a seamless user experience, regardless of device.
- > **Virtualize classrooms and labs.** Managing all the physical devices on campus is a big challenge for any IT department, not to mention supporting all the devices that students bring in themselves. Centralizing applications in the data center lets IT focus on maintaining virtual desktops that can be delivered to any device. Furthermore, IT can easily manage large-scale virtualization deployments with end-to-end visibility of their institution's infrastructure and proactive monitoring. Not only does this free up IT resources to work on other projects, but it also makes space in physical computer labs so that they can be repurposed as additional classrooms.
- > **Grow online and distance programs.** Amidst an increasingly competitive educational landscape, universities are expanding their programs to reach more remote students. One of the challenges in this model is providing them with the computing resources they need to complete their studies off campus. With virtual labs, universities can expand their reach with online and distance programs that allow students to work and study remotely. These new programs can reach more students in technical fields and, in turn, grow university revenue and reputation.

## WHAT IS GPU VIRTUALIZATION?

GPU virtualization enables every virtual machine to get the benefits of a GPU just like a physical desktop. 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.

# NVIDIA VIRTUAL GPU SOLUTIONS

## VIRTUALIZATION WITH NVIDIA QUADRO vDWS FOR EDUCATION

NVIDIA **Quadro® Virtual Data Center Workstation** (Quadro vDWS) for Education is optimized for educational institutions and includes all the NVIDIA virtual GPU features at reduced pricing. With Quadro® vDWS for Education, education customers get access to **NVIDIA GRID® Virtual PC** for virtual desktops delivering standard PC applications, browsers, and multimedia; **NVIDIA GRID® Virtual Apps** for use with Citrix XenApp or other remote-desktop-session-host (RDSH) solutions like VMware Horizon Apps; and the NVIDIA Quadro vDWS for professional graphics and engineering applications.

## BENEFITS

Greater student and faculty mobility and flexibility

Improved application performance, with a native PC experience on any device

Support for the increasing graphical requirements of Windows 10 and modern productivity applications

Support for graphics-intensive engineering applications traditionally only provided in physical labs

Improved security, as college curriculum and intellectual property are stored in the data center

IT agility, as new content can be loaded and offered in a fraction of the time

Increased student and staff productivity due to availability and speed of applications

Support for up to four HD or two 4K resolution monitors for enhanced multi-tasking

Space and real estate savings from virtualizing labs

Support for distance and online courses for new revenue opportunities

Lower IT management costs and zero downtime, even during maintenance with live migration

Centrally managed business continuity and disaster recovery




## COMMON APPLICATIONS

ANSYS, Autodesk 3DS Max, Autodesk AutoCAD, Autodesk Maya, Autodesk Revit, Dassault Systèmes SOLIDWORKS, ESRI ArcGIS, MATLAB, Adobe Photoshop, Adobe Creative Cloud, Google Earth, Microsoft Windows 10 and Office

# CUSTOMER EXAMPLES

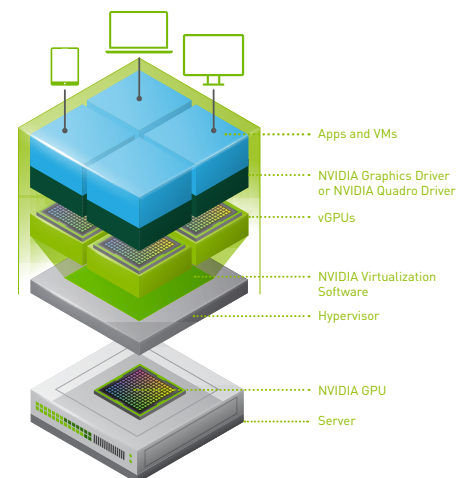
		
<p><b>UNIVERSITY OF ARKANSAS</b> Fayetteville, AR, USA</p>	<p><b>UNIVERSITY OF MASSACHUSETTS LOWELL</b> Lowell, MA, USA</p>	<p><b>GEORGIA INSTITUTE OF TECHNOLOGY</b> Atlanta, GA, USA</p>
<p>VDI powered by NVIDIA virtual GPUs enabled the university to support the graphics-intensive nature of Windows 10, as well as powerful CAD, design, and animation applications such as Autodesk, MATLAB, and Adobe Creative Suite, with native workstation-like performance. Students can now access resources from home as if they're on campus, no matter what device they're using. The university also lowered infrastructure costs by reducing physical lab space, with 90 percent of their labs now virtualized. IT can cost-effectively scale and support "bring your own device" (BYOD) with predictable performance and enhanced security. In seven months, with 27,000 students and over 600 clients, IT only had seven tickets related to lab issues.</p>	<p>The university delivered VDI powered by NVIDIA virtual GPUs to enable anywhere, anytime access to graphics-intensive 3D applications with an experience "almost as good as a \$10,000 workstation." Students that ran calculations in a lab for 11-20 hours at a time can now run the same work on their iPads and check their simulations from anywhere. Separate lab sessions no longer have to be booked far in advance. Labs can happen while the lecture happens, in real time with the students' own devices, increasing retention. IT has also benefited from a 20 to 30 percent performance improvement over the latest iteration of NVIDIA virtual GPU software alone, without any hardware changes.</p>	<p>VDI with NVIDIA virtual GPUs enabled students to access graphics-intensive engineering and mathematical software from their own personal devices, with exceptional performance. Significant cost savings was seen from streamlining resource consumption and simplifying management. During the summer semester when not as many machines are needed for general instruction, IT creates large virtual machines with a lot more memory and CPUs and assigns them to graduate students to support their research activities. IT is also a lot more agile. They can deliver the right tool at the right time, without the need for a change management process that requires two months' notice or two weeks' notice if users need software installed.</p>

# KEY EDUCATION USER GROUPS

			
<b>USE CASES</b>	<b>Architecture, Engineering and Design Students</b> <p>For accessing CAD or 3D animation software traditionally provided in on-campus labs, such as AutoCAD, SOLIDWORKS Maya, and MATLAB, anywhere, on any device. For enabling virtual labs to augment classroom learning</p>	<b>General Student Body, Faculty and Researchers</b> <p>For general purpose VDI running Windows 10 and modern productivity applications, streaming video and multimedia, and using interactive learning platforms</p>	<b>University Administration and Staff</b> <p>For general purpose VDI running Windows 10, accessing student information, and running productivity software</p>
<b>RECOMMEND</b>	<p>Quadro vDWS for Education on NVIDIA® T4 or P40, V100 for high-end, Quadro RTX 6000, RTX 8000 for rendering and design, and P6 for blades (supports up to four 4K displays)</p>	<p>GRID vPC on Tesla M10, T4 and P6 (supports up to two 4K or four HD displays), GRID vApps on Tesla T4, M60, and P6 for blades (NVIDIA GRID vPC/vApps is included in the Quadro vDWS for Education license)</p>	<p>GRID vPC (included in the Quadro vDWS for Education license) on Tesla M10, T4 and P6 for blades (supports up to two 4K or four HD displays)</p>

# HOW NVIDIA VIRTUAL GPU WORKS

In a VDI environment powered by NVIDIA virtual GPUs, the NVIDIA virtual GPU software is installed at the virtualization layer along with the hypervisor. This software creates virtual GPUs that enable 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 GPUS POWERFUL

## EXCEPTIONAL USER EXPERIENCE

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

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## PREDICTABLE PERFORMANCE

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

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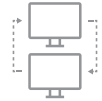


## BEST USER DENSITY

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Industry's highest user-density solution with support for up to 32 virtual desktops per physical GPU. Lower total cost of ownership (TCO) with more than eight vGPU profiles for the most flexibility to provision resources to match your users' needs.

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## OPTIMAL MANAGEMENT AND MONITORING

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

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## CONTINUOUS INNOVATION

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

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## BROADEST ECOSYSTEM SUPPORT

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

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<sup>1</sup> Chmura, Michael. (2016, February 8). Babson Study: Distance Education Enrollment Growth Continues. Retrieved from [www.babson.edu/news-events/babson-news/Pages/2016-babson-releases-2015-survey-of-online-learning.aspx](http://www.babson.edu/news-events/babson-news/Pages/2016-babson-releases-2015-survey-of-online-learning.aspx)

<sup>2</sup> Brooks, Christopher D, Educause Center for Analysis and Research. (2016, October). ECAR Study of Undergraduate Students and Information Technology, 2016. Retrieved from [er.educause.edu/~media/files/library/2016/10/ers1605.pdf?la=en](http://er.educause.edu/~media/files/library/2016/10/ers1605.pdf?la=en)

For more information, visit [www.nvidia.com/virtualgpu](http://www.nvidia.com/virtualgpu)

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