

# EMPOWERING EVERY STUDENT IN EDUCATION

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



Education is at a transformative point. A hasty transition to remote learning forced universities to invest in IT infrastructure to create a virtual versions of the learning environment, from classrooms, to labs and even study spaces. As campuses re-open, student expectations for accessibility of teaching content have evolved, and instructors have a new grasp on how to incorporate technology into pedagogy. New technology like VR and AI are becoming increasingly viable classroom tools across disciplines, from medicine, to architecture and engineering. Schools and universities have an opportunity to build an entirely new approach to learning with the new tools and skills their institutions now have.



To leverage their assets, and take advantage of the opportunity to transform education, educators must continue to invest in creating infrastructure to support an evolving EdTech landscape. This investment will ultimately help scale environments for learning and spread access to tools across time-frames, supporting schools and universities as they adapt to the way faculty wants to teach, and students want to learn today.

- > Post-pandemic, 46% of higher-education students want to retain the option of attending courses in person or online (2021)<sup>1</sup>.
- > 67% of students would like to see an increase in usage of digital materials and digital resources. (2021)<sup>2</sup>.
- > 10% of college students reported that their primary learning device was not equipped to perform a task (2021)<sup>3</sup>.

## NVIDIA VIRTUAL GPUS ENABLE COST-EFFECTIVE ACCESS TO APPLICATIONS, ANYWHERE, ANYTIME, ON ANY TYPE OF 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 RTX VIRTUAL WORKSTATION FOR EDUCATION

Get up to a 75 percent discount on NVIDIA RTX Virtual 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, while giving IT a bird's eye view and end-to-end visibility of the institution's infrastructure. Furthermore, IT can effectively increase the utilization of their data center resources by leveraging the single unified infrastructure to run both graphics and compute workloads. This efficient growth approach reduces TCO of compute infrastructure, while also creating more available space on-campus via re-purposed physical labs.
- > **Grow online and distance programs.** Now that the infrastructure and practices behind remote learning have been refined, scaled and legitimized, universities can offer programs in hybrid and online formats to more students than ever before. Enhancing computing resources with GPU-accelerated infrastructure will allow institutions to seamlessly scale services across learning formats and distributed student populations. This increase in access will expand university activities across the teaching and research life-cycle, growing the institutions' reputation as well as its revenue opportunities.

## WHAT IS GPU VIRTUALIZATION?

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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.

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**“We no longer have to restrict students to use our resources one hour per day. For example, if they are curious and motivated, they can visit the lab on the weekend and design robotics systems.”**

Sharon Hennessy,  
Manager of Technology  
Service Operations,  
Parkway School District, 2021

# KEY EDUCATION USER GROUPS

	Remote Labs for Architecture, Engineering, and Design Students	Remote Work for Administration, Staff, Faculty, Researchers and General Student Body	Remote Compute Infrastructure for Researchers and Data Science/ AI Labs
<b>USE CASES</b>	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	For general purpose VDI running Windows 10 and modern productivity applications, streaming video and multimedia, and using interactive learning platforms	For remote access and infrastructure management of data science, AI, and high-compute research and development workloads across university stakeholders
<b>RECOMMEND</b>	NVIDIA RTX vWS for Education on NVIDIA A40 (supports up to two 8K displays)	NVIDIA vPC or vApps on NVIDIA A16 (supports up to two 4K or one 5K display). NVIDIA vPC/vApps is included in the RTX vWS for Education license	NVIDIA vCS with A100 or A30 GPUs

# NVIDIA VIRTUAL GPU SOLUTIONS

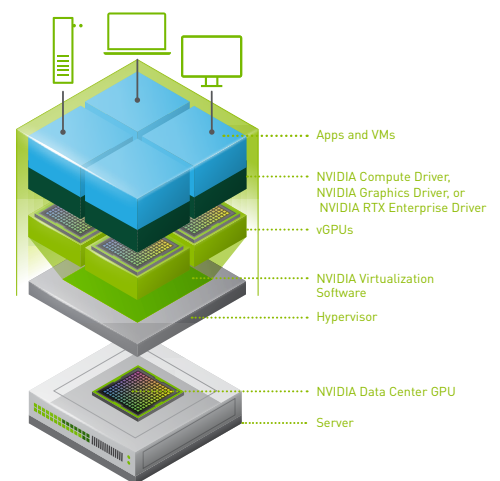
<h2>RTX vWS</h2> <p>NVIDIA <b>RTX Virtual Workstation (vWS)</b> (vWS) provides students remote lab access for their demanding applications with performance indistinguishable from physical workstations in labs.</p>	<h2>vPC/vApps</h2> <p>NVIDIA <b>Virtual PC (vPC) and Virtual Applications (vApps)</b> nable a high-quality virtual desktop experience for general purpose VDI and Windows 10 or Linux desktops for staff using office productivity applications and streaming video.</p>	<h2>vCS</h2> <p>NVIDIA <b>Virtual Compute Server (vCS)</b> is ideal for data scientists, researchers, and students running computationally intensive workloads – including artificial intelligence (AI), data science and High-Performance Computing (HPC) applications.</p>
<h3>BENEFITS</h3>	<h3>BENEFITS</h3>	<h3>BENEFITS</h3>
<h3>COMMON APPLICATIONS</h3>	<h3>COMMON APPLICATIONS</h3>	<h3>COMMON APPLICATIONS</h3>
<p>Supports multiple high resolution monitors, for example, up to four 5K or up to two 8K monitors, and large frame buffer sizes for increased productivity</p> <hr/> <p>Reduces downtime, even during maintenance, with Live Migration</p> <hr/> <p>Centralizes data for better version control and more consistency</p> <hr/> <p>Eliminates the need to move large data sets across the network from servers to client machines—enabling faster load times</p> <hr/> <p>Makes university resources remotely accessible anywhere, at any time, for any student</p> <hr/> <p>Increases employee mobility</p> <hr/> <p>Ensures operational resilience and disaster recovery</p>	<p>Provides virtualized access to online training, teleconferencing, Skype, and other graphics-intensive applications</p> <hr/> <p>Supports increasing graphics requirements of Windows 10 and modern productivity applications</p> <hr/> <p>Supports multiple high resolution monitors, for example, up to four HD, two 4K, or one 5K monitor, for increased productivity</p> <hr/> <p>Delivers a cost-effective solution to scale VDI across your organization</p> <hr/> <p>Enforces user security in the data center</p> <hr/> <p>Increases employee mobility</p> <hr/> <p>Lowers IT management costs; quickly cascades updates across the enterprise</p> <hr/> <p>Supports Linux or Windows applications</p>	<p>Run containerized applications for machine learning and deep learning in a virtualized environment to isolate workloads and securely support multiple users</p> <hr/> <p>Harness the power of multiple GPUs in a single VM to scale application performance, important for deep learning training workloads</p> <hr/> <p>Eliminate data center silos and leverage the same hypervisor management tools for both compute and graphics workloads</p> <hr/> <p>Maximize infrastructure utilization by running compute-intensive workflows during the night when utilization of VDI is lower</p>
<p>ANSYS, Autodesk AutoCAD, Dassault Systèmes SOLIDWORKS, ESRI ArcGIS, MATLAB, Siemens PLM NX</p>	<p>Adobe Creative Cloud, Skype, Microsoft Office and core business applications (including streaming video, online training, and teleconferencing)</p>	<p>NVIDIA RAPIDS™, TensorFlow, Caffe2, OmniSciDB, MXNet, Theano, Torch, Keras, Microsoft CNTK, Kinetica</p>

# CUSTOMER EXAMPLES

<b>Parkway Schools</b> Chesterfield, MO, USA	<b>University of Colorado, School of Dental Medicine</b> Aurora, CO, USA
<p>VDI powered by NVIDIA virtual GPUs helps the university support demanding, graphics intensive workloads like Autodesk applications and Adobe Creative suite, as well as enabling teaching, learning, and collaboration on assignments anywhere. It's also simplified IT management - now, when IT rolls out new software applications or updates, one team member deploys a single master image from a central console instead of a group of people touching every physical device, reducing deployment from two weeks to just one hour. The district expects hybrid learning to continue post-pandemic, and is already expanding the VDI environment to support more applications, like video editing software. "Without the NVIDIA GPUs, we could not run our demanding workloads or offer the classes for which they are crucial." Julian Erber, DevOps Manager, Parkway School District.</p>	<p>NVIDIA virtual GPUs power the sophisticated visualizations needed in dental instruction, while RTX vWS software virtualizes them and shares their capacity across multiple machines. IT set up two access points to keep professional applications like MiPAX radiology software and business applications like Zoom separate, making capacity more efficient. The VDI didn't require any adjustments during the pandemic. IT helped instructors and students adapt to all-virtual teaching and learning instead of the mix of hands-on and digital dental training they were used to. The "VDI enabled readiness for completely remote teaching and learning during COVID-19. We experienced no interruptions at all." Ernesto Jamison, Infrastructure Engineer, University of Colorado School of Dental Medicine.</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. RTX vWS software includes the powerful RTX Enterprise 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

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



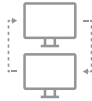
## PREDICTABLE PERFORMANCE

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 64 virtual desktops per physical GPU. Lower total cost of ownership (TCO) with more than ten vGPU profiles for the most flexibility to provision resources to match your users' needs.



## OPTIMAL MANAGEMENT AND MONITORING

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.



## CONTINUOUS INNOVATION

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



## BROADEST ECOSYSTEM SUPPORT

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



## SOURCES

<sup>1</sup> <https://www.insidehighered.com/news/2021/03/24/student-experiences-during-covid-and-campus-reopening-concerns>

<sup>2</sup> <https://www.insidehighered.com/news/2021/04/27/survey-reveals-positive-outlook-online-instruction-post-pandemic>

<sup>3</sup> <https://www.educause.edu/ecar/research-publications/ecar-study-of-community-college-students-and-information-technology/2019/device-access-ownership-and-importance>

[Learn more](#)

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

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