

GPU VIRTUALIZATION FOR AEC

Design Anywhere with Cloud-Based Solutions



NVIDIA.

In the architecture, engineering, and construction (AEC) industry, firms often have multiple global and field offices that need to routinely collaborate on individual projects. Widely dispersed engineers and architects, as well as external vendors and contractors, form teams that touch all parts of a project cycle, from design to construction.

The nature of AEC work makes collaboration and mobility essential, but the PC hardware required to run high-end design and AEC applications makes mobility complex and difficult. To meet the needs of today's distributed AEC teams, firms now turn to virtual workstations to run resource intensive applications for processing large amounts of data. Engineers in satellite offices and project trailers previously might wait up to an hour for models to load and open on their local workstations—impacting productivity and reducing billable hours. With virtual workstations, models can be accessed efficiently and securely.

Complicating matters is the issue of version control. Coordinating across locations and servers to make sure everyone has the latest version of a design is a slow and arduous process that increases potential for confusion and error. AEC firms struggle to transfer project files from local workstations to the data center to ensure version control and improve disaster recovery capabilities. Therefore, AEC firms must look to solutions that improve collaboration and mobility, while also providing robust support for version control, to enhance productivity and quality.

- > Integrated Project Delivery will bring about the need for greater collaboration in all phases of projects.¹
- > Travel and IT costs to support this distributed model can quickly add up, causing project delays and budget overruns.
- > AEC firms are trending towards more cloud-based solutions to enable better collaboration.²
- > Gaps in collaboration and data version control cause approximately 15% to 17% of additional construction rework costs.³

NVIDIA VIRTUALIZATION TECHNOLOGY ACCELERATES REAL-TIME COLLABORATION FOR WIDESPREAD AEC TEAMS

AEC firms are turning to virtualization solutions to enable distributed teams to collaborate on projects across the globe. However, graphics-intensive applications, combined with workstation performance and network limitations, mean that loading times can be excessive. This results in lost productivity and billable hours. By adding NVIDIA virtual GPU (vGPU) solutions to their virtual desktop infrastructure (VDI) environments, AEC firms are realizing significant benefits, including real-time collaboration with dispersed teams and external partners, improved productivity, and robust version control. The value of virtual GPUs has been extensive:

- > **Collaborate Anywhere on Any Device.** Shifting design models and moving data off physical workstations into the data center not only secures mission-critical designs, but also speeds the design process. Designers and engineers have the freedom to use the device of their choice to access fully capable 3D virtual workstations with no compromise in performance or user experience. Employees gain mobility and real-time collaboration capabilities through instant access to the applications and data they need from anywhere—at the office, on the road, on the construction site, or even at home.
- > **Increase Productivity with Real-Time Performance.** AEC firms can deliver superior graphics performance to architects and engineers on virtual desktops from the data center. Users get the same responsive experience in a virtualized environment as they would expect from a physical workstation, viewing and working with large

WHAT IS GPU VIRTUALIZATION?

GPU virtualization enables every virtual machine to get the same GPU benefits as 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.

2D and 3D models without lag or delay. Support for NVIDIA® Quadro® Virtual Data Center Workstation (vDWS) with NVIDIA RTX™ Server lets designers create on any device, anywhere—whenever inspiration strikes. Multi-vGPU support—the ability to assign up to four NVIDIA GPUs to a single virtual machine (VM)—makes it possible for designers to achieve exponentially faster rendering times and arrive at their best designs faster.⁴ This translates to increased efficiency and productivity, reducing the risk of project delays and lost billable hours.

- > **Ensure Version Control for Greater Consistency.** As design and engineering resources become more dispersed, maintaining version control of data and files becomes increasingly difficult. With NVIDIA vGPU solutions, AEC firms no longer need to worry about errors and rework caused by multiple copies of data residing on local workstations. Centralizing designs in the data center allows for greater consistency and control over design changes, resulting in improved quality and enhanced security.
- > **Improve Manageability and Scalability.** IT management is simplified because resources can be scaled up quickly to support new projects. New virtual workstations can be provisioned in minutes, and firms can hire the best talent from anywhere. Live migration enables live VMs to be migrated without end user disruption or data loss. This facilitates more efficient data center maintenance, and enables designers to work on models during the day and render at night using the same server infrastructure.






NVIDIA VIRTUAL GPU SOLUTIONS

<h3>NVIDIA Quadro Virtual Data Center Workstation</h3> <p>The NVIDIA Quadro Virtual Data Center Workstation (Quadro vDWS) enables access to 3D AEC applications in a virtualized environment.</p> <p>BENEFITS</p>	<h3>NVIDIA GRID Virtual PC and Virtual Apps</h3> <p>NVIDIA GRID® Virtual PC (vPC) and Virtual Apps (vApps) are positioned for general-purpose VDI in AEC firms for knowledge workers in finance, human resources, marketing and other users of office productivity applications.</p> <p>BENEFITS</p>	<h3>NVIDIA Virtual Compute Server</h3> <p>NVIDIA Virtual Compute Server (vCS) is ideal for running compute-intensive workloads, including AI, data science, and generative design.</p> <p>BENEFITS</p>
<ul style="list-style-type: none"> Data version control for more consistency Less rework due to improved collaboration More secure access for external suppliers and contractors Data and designs more secure Lower IT management costs Support the latest RTX-enabled applications for real-time ray tracing Extend accessibility to project files secured in the data center Increased employee mobility Business continuity and disaster recovery managed centrally Cloud ready Support for multiple NVIDIA Tensor Core GPUs in a single VM for exponentially faster rendering Reduced downtime, even during maintenance with live migration 	<ul style="list-style-type: none"> Virtualized graphics design applications for an increasingly mobile workforce Support for increasing graphical requirements of Windows 10 and modern productivity applications Support for up to four HD or two 4K resolution monitors for increased productivity Cost-effective solution to scale VDI across your organization Lower IT management costs Security enforced in the data center Increased employee and contractor mobility Business continuity and disaster recovery managed centrally Reduced downtime, even during maintenance with live migration 	<ul style="list-style-type: none"> Run applications in VMs and containers for improved manageability and security Harness the power of multiple GPUs in a single VM to scale application performance, or share a GPU across multiple VMs for improved efficiency Eliminate data center silos and leverage the same hypervisor management tools for both compute and graphics workloads Maximize infrastructure utilization by running compute-intensive workflows during the night when utilization of VDI is lower

<p>COMMON APPLICATIONS AECOsim Building Designer, Allplan, ANSYS Fluent, Autodesk 3ds Max, Autodesk AutoCAD, Autodesk Revit, Bentley MicroStation, NEMETSCHKE, SketchUp</p>	<p>COMMON APPLICATIONS Adobe® Creative Cloud®, Microsoft Office</p>	<p>COMMON APPLICATIONS / FRAMEWORKS NVIDIA RAPIDS™, TensorFlow, MXNet</p>
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CUSTOMER EXAMPLES

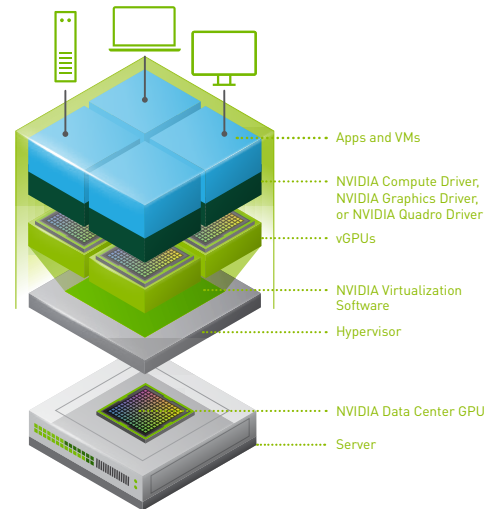
		
<p>CannonDesign Chicago, IL, USA</p>	<p>Browning Day Mullins Dierdorf (BDMD) Indianapolis, IN, USA</p>	<p>Whitney Bailey Cox & Magnani, LLC (WBCM) Baltimore, MD, USA</p>
<p>CannonDesign deployed state-of-the-art VDI powered by NVIDIA virtual GPUs to unify its global workforce and enable seamless collaboration. Leveraging GPU-enabled secure, digital workspaces that rival physical workstations, the company's VDI now meets the needs of knowledge workers, designers, and engineers while enabling higher density with twice the performance. The biggest payoff has been savings of 13.5 hours per week in employee time, equating to approximately \$2,500 per week in billable hours. The company has also seen an 85% reduction in server space.</p> <p>Learn more ></p>	<p>BDMD replaced aging, underpowered workstations with a VDI environment powered by NVIDIA Tesla P4 and Quadro vDWS to keep pace with the demands for collaboration and efficiency while ensuring the firm's engineers and designers had access to the tools they needed to be productive. Taking advantage of the management and monitoring tools provided with Quadro vDWS was a game changer for BDMD. Now, IT can immediately make simple updates during the workday without disrupting user VMs. Previously, this work would have to be scheduled in the late evenings when users were offline.</p> <p>Learn more ></p>	<p>WBCM deployed a VDI powered by NVIDIA vGPUs to deliver consistently great user experiences and improve collaboration for remote workforces. WBCM is able to deliver fully 3D-capable virtual workstations that follow employees, wherever they are. And, WBCM's VDI allows all employees, not just engineers and designers, to take advantage of graphics acceleration by enabling high quality, no-compromise Windows 10 user experiences. Plus, virtualization has helped WBCM keep projects on track and enhance productivity by letting remote workers access designs from the job site, while ensuring version control and added security through centralization of data.</p> <p>Learn more ></p>

KEY AEC USER GROUPS

	Architects, Engineers, Designers	Marketing, Creative, Design, Illustrators	Accounting, Finance, Human Resources
USE CASES	For professional 3D graphics, including RTX- and AI-enabled design applications	For general-purpose VDI, using virtualized design and creative apps such as Adobe Creative Cloud	For AI, high-performance computing (HPC), data science, and generative design
RECOMMEND	Quadro vDWS on T4, V100S, P6, or RTX 6000/8000 (supports up to two 8K displays)	GRID vPC/vApps on T4, M10, or P6 (supports up to four HD or two 4K or one 5K displays)	vCS on T4, V100S, or RTX 6000/8000

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. This software creates virtual GPUs that let every virtual machine (VM) share the physical GPU installed on the server. For more demanding workflows, a single VM can harness the power of up to four physical GPUs. The NVIDIA virtualization software includes a graphics driver for every VM. Quadro vDWS, for example, includes 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

Superior performance, with the ability to support both compute and graphics workloads for every vGPU



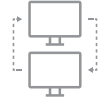
PREDICTABLE PERFORMANCE

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



BEST USER DENSITY

The industry's highest user density solution, with support for up to 32 virtual desktops per GPU, plus lower TCO with up to 9 vGPU profiles for the most flexibility to provision resources to match your users' needs



OPTIMAL MANAGEMENT AND MONITORING

End-to-end management and monitoring that delivers real-time insight into GPU performance, as well as broad partner integrations so you can use the tools you know and love



CONTINUOUS INNOVATION

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



BROADEST ECOSYSTEM SUPPORT

Support for all major hypervisors and the most extensive portfolio of professional apps certifications with Quadro drivers



SOURCES

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3. Construction Industry Institute. (1989, May 1). Retrieved from <https://www.construction-institute.org/resources/knowledgebase/best-practices/quality-management/topics/rt-010/pubs/rs10-2>
4. Multi-GPU capabilities supported with NVIDIA Quadro vDWS software October 2018 release (aka vGPU 7.0) and Red Hat Enterprise Linux 7.5 and Red Hat Virtualization 4.2 KVM hypervisors.

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

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