

Delivering Superior Application Performance—Anywhere, Anytime—Using Virtual Workstations



Custom Media



One of the most overlooked aspects of digital transformation is the accompanying increase in applications that are both compute- and data-intensive. The dramatic rise in remote work requires that organizations and IT deploy new technology infrastructure that can provide workstation-class performance to employees—and do so virtually. As virtual work continues to increase and the number of high-intensity applications grows, the need for a powerful remote work platform will accelerate.

In addition, employees who previously relied on a physical workstation at a corporate location need a new technology option to support a “work from anywhere, on any device” model. It is essential that employees who need this level of performance have a virtual option that provides performance equal to or better than physical workstations. The problem is not limited to users of design or engineering applications such as CATIA, AutoCAD, ArcGIS Pro, or Siemens NX. It also affects healthcare, manufacturing, secondary education, finance, media and entertainment, government, energy, and other industries where improved performance is essential.

Supporting work from home (WFH) for those who use demanding applications is essential. “Gartner analysis shows that 48% of employees will likely work remotely at least part of the time after the COVID-19 pandemic, compared to 30% pre-pandemic.”¹ However, Gartner notes, “54% of HR leaders in our snap poll indicated that poor technology and/or infrastructure for remote working is the biggest barrier to effective remote working.”² For workers with demanding applications or workloads, they need a WFH option with better performance.

In fact, workers who may not have had a physical workstation in the past will need workstation-class performance in the future, and they’ll need it anywhere, at any time. For example, healthcare solution providers such as Sectra and GE Healthcare require medical-grade imaging support for PACS applications. In manufacturing, tools such as Sisense and AutoCAD are being used by

more employees for design and plant operations, which require high-performance infrastructure. Virtual learning is now a major initiative for colleges and universities, and tools like Adobe Captivate or Docebo benefit from a solution that can deliver virtual interactive learning experiences in real time. More vertical industry segments are moving in this direction as well. Government, marketing teams, and building construction are segments where remote access to power-hungry applications is paramount.

A high-performance remote work environment addresses a wide range of needs for today’s performance-intensive demands, including the need to:

- Shorten design and evaluation cycles, accelerate time to decision, and reduce costs.
- Enable rapid innovation, faster market response, and support for expanding product or service offerings.
- Ensure faster data access for remote workers, suppliers, and partners, particularly for large files, drawings, and data sets. What used to take hours now takes minutes with the Cisco® and NVIDIA solution.
- Provide physical workstation-class performance and eliminate the problem of slow file loading for large 3D models, animation, digital twins, high-definition images and designs, and math-intensive processes. Allow users to edit and collaborate on large 3D models in real time.
- Protect intellectual property in these large or complex files, while at the same time making them readily accessible.

¹ [“Gartner Press Release, Gartner Identifies Nine Trends for HR Leaders That Will Impact the Future of Work After the Coronavirus Pandemic,”](#) May 6, 2020.

² [“Smarter With Gartner, With Coronavirus in Mind, Is Your Organization Ready for Remote Work?,”](#) March 3, 2020.

The changing demands on infrastructure necessitate a new approach to system design that eliminates silos, provides agility, ensures performance, and optimizes costs.

Virtual workstations enable demanding applications for an increasingly remote workforce

The traditional and reactive approach of waiting for workers to demand higher performance and then possibly giving them a high-cost physical workstation is no longer appropriate. That's because it is no longer true that increased demand for high-performance systems should take place slowly and in an orderly fashion.

A more efficient and effective solution is deploying virtual workstation technology. The virtual workstation is a high-performance version of on-premises virtual desktop infrastructure (VDI). The virtual workstation couples the compute resources of VDI with NVIDIA virtual GPU (vGPU) capabilities to provide a high-performance "desktop" that is accessible from the data center and can offer the same performance as a legacy physical workstation.

Industry leaders Cisco and NVIDIA have partnered to integrate Cisco's Unified Computing System™ (UCS) (Cisco UCS®) and Cisco HyperFlex™ platforms with NVIDIA vGPU technology. This enables designers and engineers to run performance-intensive applications on any device, anywhere and at any time. By sharing resources across users, this on-premises virtual workstation solution reduces costs while providing the capabilities employees need to be more productive and get projects done more quickly.

The best-in-class Cisco and NVIDIA virtual workstation solution

The changing demands on infrastructure necessitate a new approach to system design that eliminates silos, provides agility, ensures performance, and optimizes costs. Cisco and NVIDIA virtual workstations deliver these benefits and many more. The solution provides as much performance as many traditional physical workstations but can do so remotely and from a variety of devices.

Cisco's infrastructure advantage

At its core, Cisco UCS is a fabric-centric design. The system blends various I/O channels into a single high-performance fabric that can be easily provisioned and tuned to meet the unique demands of specific workloads and can be balanced for supporting individual workloads.

It is also 100-percent programmable to provide IT administrators with more precise control over both resources and workloads, enabling improved scaling and configuration flexibility. IT has fine-grained control over individual workloads that are running simultaneously on the system. IT administrators can tie configurations to specific business objectives and application



experiences. As a result, IT infrastructure is responsive to the needs of workers, particularly those running demanding applications that require virtual workstation performance.

Cisco UCS and Cisco HyperFlex act as a superior platform for industry-standard computing and provide the core data center infrastructure for VDI and virtual workstations. Cisco UCS integrates compute, networking, and storage resources to increase efficiency and deliver centralized management. UCS products are designed and configured to work together effectively. Additional Cisco UCS benefits include:

- A drastic reduction in the number of servers and their accompanying cable plant.
- Increased server memory, supporting up to 3 TB of memory.
- Rapid deployment or repurposing of servers through Cisco UCS service profiles, allowing the data center to deliver the same benefits as public cloud services.
- Consolidated workloads with improved CPU performance, NVIDIA vGPU support, and greater memory capacity.

- More control and cost certainty.
- Independent scaling of compute and storage to ensure optimization and utilization.
- The ability to scale up or out at speed, ensuring that remote work demands can be met as they arise.

It is simpler to deploy many virtual workstations quickly using Cisco HyperFlex and Cisco partners' storage-based cloning. This approach makes virtual workstations available quickly, improving productivity and business agility.

The Cisco solution for data center-based virtual workstation infrastructure supports higher virtual machine (VM) density. This is a key advantage, as it makes it possible to support more workers and workloads in the same footprint. Cisco UCS and HyperFlex servers offer industry-leading GPU density in blade form factors, a key capability for supporting demanding applications used remotely via VDI. Cisco servers support the broadest range of NVIDIA data center GPUs to provide customers with the widest choice to support their workloads.

NVIDIA's virtual GPU innovation

NVIDIA vGPU technology has fundamentally changed how businesses support the kind of demanding applications detailed above. The components of the NVIDIA vGPU solution include NVIDIA GPU and vGPU software. Having an NVIDIA physical GPU solution offload the server CPU enables a single infrastructure instance to support more workers with performance-intensive applications without large expenditures. And with vGPU technology, the physical GPU can be virtualized across VMs.

For high-powered virtual workstation use cases, this capability is enabled with the NVIDIA Quadro Virtual Data Center Workstation (vDWS) software license, which virtualizes the physical GPU. That allows it to be shared among multiple VMs or aggregated so that multiple physical GPUs can be allocated to a single VM to provide the most powerful virtual workstation to employees.

The NVIDIA T4 Tensor Core GPU or the NVIDIA Quadro RTX 6000 or RTX 8000 GPU are recommended for delivering the best price performance and the best performance for virtual-workstation workloads. Built on the NVIDIA Turing architecture, these GPUs bring new features and functionality to virtual workstations, including advanced programmable shading, Tensor Cores for artificial intelligence acceleration, and RT Cores for real-time ray tracing, photorealistic rendering, and virtual reality—providing unprecedented graphics and compute power. all delivered from the data center.

Figure1. Selecting the right GPU for virtual workstations

Type of user	Light users Small to medium models, scenes or assemblies with simple parts	Medium users Large assemblies with simple parts or small assemblies with complex parts	Heavy users Massive datasets, very large 3D models, complex designs, large assemblies
Recommended solution; models, scenes, or assemblies	NVIDIA T4 or P6 Quadro Virtual Data Center Workstation (Quadro vDWS)	NVIDIA T4 or P6 Quadro vDWS	NVIDIA Quadro RTX 8000, RTX 6000, or V1005, with Quadro vDWS
GPU Memory	16 GB	16 GB	48 GB/32 GB/24 GB
Equivalent performance	Multiple Quadro P1000	Up to Quadro P4000	Up to Quadro RTX 8000
Replaces	K2, M60, P4, M6	K2, M60, P4, M6	P40

Adding NVIDIA vGPUs to Cisco high-powered servers, Cisco UCS and HyperFlex, is a game changer for high-performance VDI applications. Support for video, high-resolution/multiple monitor support, interactive media including WebGL, large and complex designs, and digital simulations showcases the breadth of options possible. NVIDIA vGPU technology provides the capabilities workers demand, including:

- Support for mixed workloads, enabling VDI infrastructure to support more workers and different applications with ease.
- Faster task completion. Studies show that engineers spend about 66 percent of their time in the design, pre-processing, and post-processing phases, which are the most interactive phases and where NVIDIA vGPU technology provides key performance gains.

- Support for multiple physical GPUs for each VM to ensure the highest performance levels.
- Support for demanding graphics or visual applications on any device, not just on PCs.
- Support for multiple displays and up to 8K display resolutions to provide the detail necessary for any use case.
- Support for live migration of GPU-enabled VMs to reduce downtime, ease maintenance, and provide flexibility and agility while maintaining responsiveness.
- A more cost effective, less complex, and more immediate solution for workstation-class performance in remote and virtual work scenarios.

The advantages of Cisco and NVIDIA virtual workstations

Many of the most demanding virtual workstation applications use highly sensitive or confidential data. Whether it is personal student information, engineering drawings of new products, medical files, or business analytics that include highly confidential information, such data must be protected. The Cisco UCS portfolio with NVIDIA vGPU technology provides the benefits of public cloud while allowing the organization to keep its IP and sensitive files in its own data center. Security is greatly enhanced because data never leaves the data center, simplifying the process of securing it. Also, data is not stored on employees' devices, so there is no threat to the organization's IP if a device is stolen. As such, the organization can more easily meet legal and compliance demands, such as data sovereignty.

With Cisco UCS and HyperFlex solutions, organizations can scale up or out quickly—in some instances with automated tools—providing true on-demand performance. In addition, Cisco and NVIDIA have co-engineered several fully integrated solutions to meet specific user requirements or IT-defined sizing. For many organizations, the joint solution mitigates the differences between on-premises infrastructure and public cloud services, enabling the organization to gain the benefits of keeping things in-house with no cost penalties while simplifying data privacy, compliance, and other important issues.

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Benefits to the business and IT

The virtual workstation solution is a fundamentally better approach for delivering workstation-class performance for workers, particularly in scenarios where the user is not confined to a desk. It is now possible to reduce CapEx and OpEx by virtualizing graphics- and math-intensive applications. Professionals can work on their mobile device of choice to increase productivity. The solution also improves data quality and consistency by housing design files, video, and images in the data center for better version control.

The organizational benefits from rapid ROI and improved business processes include:

- **Improved productivity:** Speed drives productivity gains. Faster data loading, shorter computation and rendering times, and faster display of results are all sources of substantial time-savings. Internal NVIDIA data shows that engineers can lose up to 400 hours per year, or 10 person-weeks, due to slow data movement and model loading. Virtual workstations solve this problem.
- **Enhanced employee experience:** As the struggle to find and retain quality employees continues, top management has made improving the employee experience a strategic imperative. For most designers and engineers, digital tools have an outsized impact on their experience. Ensuring that they can complete their work without waiting for slow applications is central to improving the employee experience.
- **Improved collaboration:** Collaboration is the new style of work. The ability for teams to complete projects or tasks quickly and stay on schedule is the foundation of organizational success. Virtual workstations provide the performance necessary to do many critical team tasks in real time. Virtual workstations also reduce bottlenecks and delays in processes that support the entire team.
- **Better data protection and privacy:** Preventing and controlling cyber-risk has moved from a CIO and CISO focus to a board-level issue. Virtual workstation technology keeps sensitive data in the data center, ensuring that key information is protected and that all compliance and regulatory requirements are met.

The benefits to IT organizations are also highly compelling and meet the dynamic needs of a digital organization. The Cisco infrastructure provides an extensible platform that enables IT teams to meet worker needs with support for longer term strategic goals. Cisco UCS overcomes key IT challenges such as lack of visibility and control, rigid infrastructure, and security vulnerabilities. It offers a wide range of platforms designed to address the demands of workstation-class workloads. IT can allocate a pool of resources with NVIDIA GPU acceleration, on a just-in-time basis. In addition, the Cisco HyperFlex Platform delivers hyperconverged infrastructure anytime, anywhere.

Other IT benefits include:

- **Flexibility:** With virtual GPU-accelerated VDI, infrastructure resources can be used more flexibly and optimally. And organizations can provide different workers with this capability on an as-needed basis.
- **Mobility:** The VDI-based approach supports mobility and the ability to use a wide range of devices. Workers can use demanding applications effectively without having to own or have access to a mobile workstation. Remote work is greatly improved because file upload and download times are virtually eliminated. NVIDIA research shows that engineers working remotely can wait 20 minutes or longer for uploads and downloads.³
- **Collaboration:** With the flexibility to share resources in a virtual GPU-accelerated VDI environment, collaboration is improved because access to high-performance infrastructure for specific tasks ensures the ability to meet deadlines. Without delays and bottlenecks for key contributors, the team can work faster and more efficiently.
- **Improved utilization:** Using the pooled-resources approach inherent in VDI, utilization of centralized resources is considerably higher than with individual physical workstations. Sharing a physical workstation is nearly impossible, but sharing virtual GPU-accelerated VDI infrastructure is transparent. This optimizes budget spend.

³ ["Using NVIDIA Virtual GPUs to Power Mixed Workloads,"](#) NVIDIA, April 2019



For more
information,
please go to:

Cisco.com/go/vdi or
www.cisco.com/go/nvidia

Key takeaways

As organizations deploy an increasing number of demanding applications, they need a better way to run them. The days of using dedicated physical workstations are over. As these new applications are broadly used by more workers in more industries, the virtual workstation solution provides the best answer. Combining Cisco on-premises VDI infrastructure with NVIDIA vGPU technology delivers the performance users demand. This new approach is more cost efficient, supports rapid scaling, and can meet demands caused by irregular performance spikes.

Cisco and NVIDIA are delivering a best-in-class solution with key benefits that meet both current and future demands. It is a next-generation solution that utilizes the latest technologies and is built using the latest design criteria. This unique infrastructure empowers workers with the applications and tools they need for maximum productivity.

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