Cisco, NVIDIA, and VMware Deliver High-Performance Virtual Desktops with Rich User Experiences

Trusted

- Built on the industry's leading server solution and the most widely adopted graphics and virtualization platforms

Productive

- Supports the new generation of graphics-intensive applications
- Empowers workforce agility

Choice

- Delivered on blade and rack servers, and converged and hyperconverged infrastructure

Secure

- Protects critical assets
- Centralizes and simplifies desktop management

Cisco® desktop virtualization solutions with VMware Horizon and NVIDIA GRID Virtual GPU deliver a rich user experience on all your devices.

Your business is being forced into a digital transformation in order to create innovative new products and services and quickly get them to market. You also have to adjust to a digital workforce that is highly mobile and must have anytime, anywhere access to business tools and data. Your IT staff must find ways to support these users and mobile devices while maintaining corporate and personal data security. That's why many companies are shifting from a location-based work environment to a mobile one based on desktop virtualization.

Great user experience

Until now, IT organizations have struggled to realize the power of desktop virtualization, even though it has been available for over 10 years. The greatest challenge has been the inability to deliver a consistently great user experience. And operating systems such as Microsoft Windows 10 and productivity tools, browsers, and multimedia are now demanding levels of graphics performance and user experience traditionally not supported by desktop and application virtualization. With our solutions for VMware Horizon, running on Cisco Unified Computing System™ (Cisco UCS®) or Cisco HyperFlex™ systems with NVIDIA virtual graphics processing units (GPUs), these challenges are addressed, so that you can deliver a rich user experience anywhere and on any device. This centralized approach helps workers be more productive and improves the user experience while securing and simplifying desktop maintenance and management.

Today's applications and operating systems demand graphics acceleration

According to NVIDIA:

- There are twice as many user applications today that demand graphics acceleration as there were in 2011.
- Over half of enterprise users (56%) use at least one graphics-accelerated application.
- Over 400 million knowledge workers and power users need the power of GPU-accelerated desktops and applications to enable truly productive workplace mobility.

Demand for high-end graphics for all users

Your users need to be able to work from any location on any device to be most productive. That means your IT staff must deliver a rich experience for every type of tool, from enterprise applications and corporate services to powerful, special-purpose applications such as Autodesk Inventor and 3DS Max, Dassault CATIA, Adobe Premiere Pro and Illustrator, and advanced magnetic resonance imaging (MRI) and computed tomography (CT) software with high-end rendering requirements. If your organization uses a traditional approach to desktop virtualization, your users are likely frustrated by poor application responsiveness. Additionally, the lack of shared GPU solutions has probably negatively affected the economics of your virtual desktop deployments.

Graphics acceleration benefits everyone

With our solutions your workers can take advantage of their new, graphics-rich Microsoft Windows 10 environment, as well as other graphics-intensive applications, anywhere and at any time. And they can be assured of the same level of interactivity that they've come to expect when working at the office.

With these solutions you can centralize data and applications in the data center and extend the reach of desktop virtualization to the entire workforce. You can deliver virtual workspaces with improved manageability, security, and performance. This capability will increase user satisfaction and reduce support costs.

Flexible deployment options for optimized user experiences

Cisco UCS blade and rack servers and Cisco HyperFlex systems support one or two NVIDIA GPUs, maximizing the number of users supported per server (Table 1). Cisco UCS blade servers are the first (and currently only) blade servers to support two NVIDIA P6 GPUs on a blade. NVIDIA GRID enables true GPU hardware acceleration and sharing across multiple virtual desktops—without compromising the graphics experience. With NVIDIA GRID Virtual GPU (vGPU) technology, the graphics commands of each virtual machine are passed directly to the GPU, without translation by the hypervisor. This allows the GPU hardware to be time-sliced across multiple users simultaneously, to deliver excellent shared virtualized graphics performance (Figure 1).

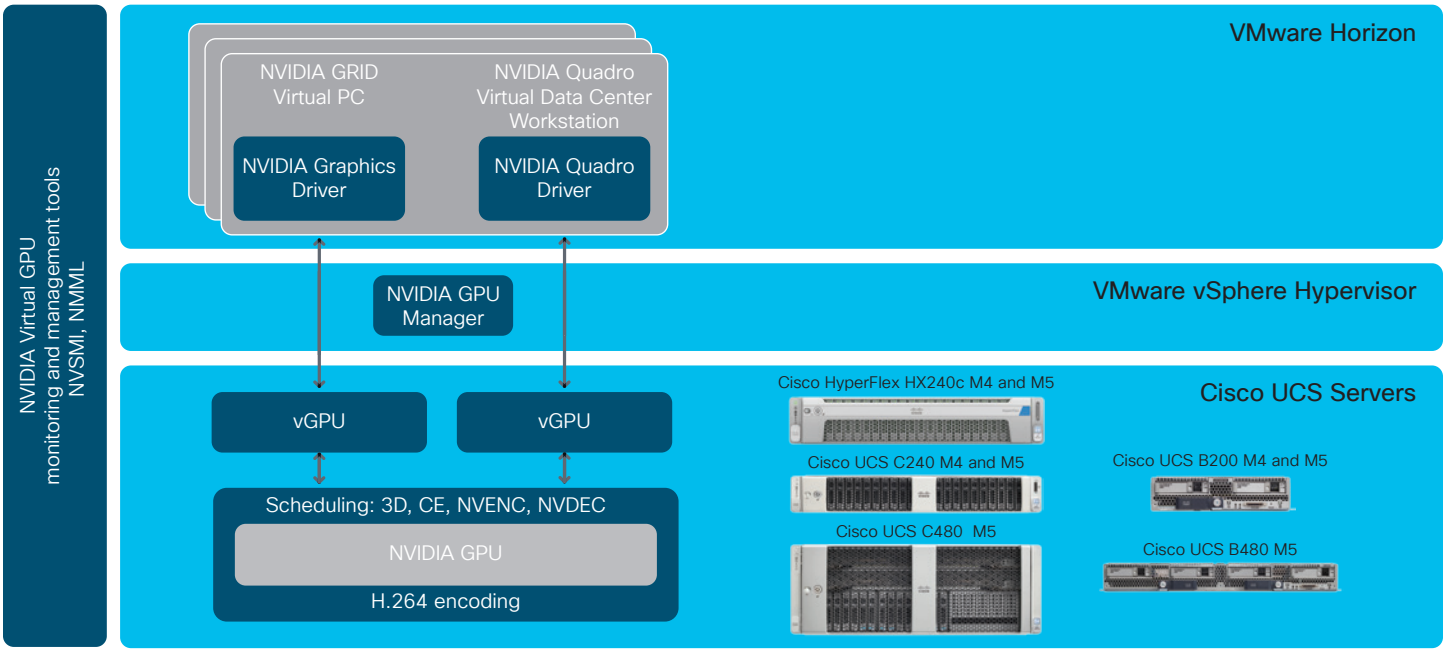

Figure 1 Several virtual desktops can share up to two GPUs or you can assign one GPU to a specific virtual workstation depending on your users' graphics needs

IT organizations also benefit

Your IT administrators benefit from the easy management, business continuity, and added security that virtualized desktops bring to your data center. In fact, your Cisco UCS C-Series Rack Servers and NVIDIA GRID graphics cards can be managed within a Cisco UCS Manager domain, significantly reducing total cost of ownership. Furthermore, the capability to virtualize all your desktops gives you the flexibility to hire third-party product development or engineering consultants who have the expertise necessary to complete a project but may be located in a different geographic area. In a healthcare setting, clinicians can access MRI and CT scans at patient bedsides, at home, or on the go while using the device of their choice, optimizing workflow and improving patient outcomes.

Expand your virtual desktop coverage

You can manage more desktops consistently and securely across your entire company while providing increased flexibility and a high-performance graphics experience to users. Cisco Desktop Virtualization with VMware Horizon and NVIDIA GRID gives you choice in deploying high-performance graphics-enabled virtual desktops to meet varying user requirements.

- **Graphics-enhanced virtual desktop:** This virtual desktop is for users who use office applications, email, video conferencing, and multimedia Internet applications, often called knowledge workers. It is excellent for financial services (retail, commercial and investment banking, insurance, etc.), manufacturing, life sciences, oil and gas, media and entertainment, telecommunications, government, and education applications.
- **Power-user virtual workstation:** This virtual workstation is for users of visual data (3D images and 2D graphs and line charts). Often using a specialized application beyond the typical Microsoft Office Suite and web tools, these users may have tried virtual

Help your organization

- Simplify: Accelerate time to productivity by simplifying data center infrastructure and deployment processes.
- Secure: Improve protection of data center infrastructure and assets with data that is not stored on the mobile device and consistent security settings that travel with the virtual desktop.
- Scale: Support more desktops per server with predictable performance.
- Save: Achieve accelerated return on investment, improved deployment speed, significantly reduced operating costs, and greater investment protection.

desktop infrastructure without GPU acceleration and were not satisfied. The workstation can be used in healthcare, educational institutions, government, and manufacturing applications.

- **Designer and engineer virtual workstation:** This virtual workstation, with a 1:1 user-to-GPU ratio, is for designers and engineers who need uncompromised graphics-rendering capabilities to create and work with complicated data sets using graphics-intensive applications (3D design, medical diagnostics, etc.). Users benefit from the enhanced experience of a GPU-powered desktop for everyday tasks and improved user density, with lower costs. The workstation can be used for oil and gas, manufacturing, media and entertainment, and medical imaging.

Table 1 We give you flexibility to choose the solution that delivers for your users and IT organization

	Platform	User type	Environment
NVIDIA P4	Blade form factor: • Cisco UCS B200 M5 • Cisco UCS B480 M5	• Virtual PCs for virtual desktops running PC operating systems, productivity applications, browsers, and multimedia • Knowledge workers • High-end graphics	• Bladed or converged infrastructure running CATIA, Premier Pro, and others
	Maximum potential users: 32 users per blade with 2 GPUs		
NVIDIA P10	Rack form factor: • Cisco UCS C240 M4 or M5 • Cisco HyperFlex HX240c M5	• Virtual applications for VMware Horizon hosted applications and desktops • Knowledge or task worker	• Optimized for user density • Ideal for Windows 10 migration
	Maximum potential users: 64 users per rack unit (RU) with 2 GPUs		
NVIDIA P40	Rack form factor: • Cisco UCS C240 M5 • Cisco HyperFlex HX240c M5	• Data center workstation for professional graphics applications • High-end graphics	• Performance optimized • CATIA, Premier Pro, and others
	Maximum potential users: 48 users per RU with 2 GPUs		

You choose NVIDIA software

- NVIDIA GRID Virtual Applications for VMware Horizon hosted applications.
- NVIDIA GRID Virtual PC for virtual desktops running personal computer operating systems, productivity applications, browsers, and multimedia.
- NVIDIA Quadro Virtual Data Center Workstation for professional graphics applications and includes the NDIVIA Quadro driver.

We give you choice

Cisco UCS is the foundation of Cisco Desktop Virtualization solutions. Cisco UCS provides an open, end-to-end, service- and application-optimized infrastructure for next-generation virtual workspaces (Table 2).

Cisco UCS

Cisco UCS is a single converged system with configuration automated through integrated, model-based management to simplify and accelerate deployment of virtual desktop applications and services running in virtualized and cloud-computing environments.

Cisco UCS converged infrastructure solutions

Cisco UCS converged infrastructure solutions are prevalidated data center platforms that combine Cisco UCS, the Cisco Nexus® family of switches, and industry-leading storage. Our converged infrastructure solutions include FlexPod, VersaStack, VxBlock, and FlashStack.

Cisco hyperconverged infrastructure

You can choose to go all Cisco with Cisco HyperFlex systems or use a prevalidated combined solution from Cisco and VMware—the Cisco UCS vSAN ReadyNode.

Table 2 We give you a choice of server and GPU combinations to best meet your needs

Cisco UCS server	GPU capabilities
Cisco UCS B200 M5	Up to 2 GPUs
Cisco UCS B480 M5	Up to 4 GPUs
Cisco UCS C220 M5	Up to 2 GPUs
Cisco UCS C240 M5	Up to 2 PCI GPUs, and with the OSS PCI expansion chassis: • Up to 9 NVIDIA P100 GPUs • Up to 9 NVIDIA P40 GPUs
Cisco UCS C480 M5	Up to 6 GPUs
Cisco HypeFlex HX240c M5	Up to 2 GPUs

You choose Cisco infrastructure

- Cisco UCS blade and rack servers
- Cisco UCS converged infrastructure
- Cisco HyperFlex systems (with compute-only nodes if needed)
- Cisco vSAN ReadyNodes with VMware vSAN

Management

- Cisco Intersight cloud-based management
- Cisco UCS Manager
- VMware vCenter

- **Cisco HyperFlex sytems:** With Cisco HyperFlex systems we deliver complete hyperconvergence. We combine the software-defined networking and computing power of Cisco UCS with the Cisco HyperFlex HX Data Platform to give you a solution with radical simplicity.
- **Cisco UCS vSAN ReadyNode:** We have prevalidated hyperconverged solutions that combine the flexibility of Cisco UCS B-Series blade servers, Cisco UCS S-Series storage nodes, and Cisco UCS E-Series edge servers with VMware Virtual SAN (vSAN) software-defined storage.

Unified management

With all components managed as a single system, Cisco UCS Manager provides unified, embedded management of all software and hardware components of Cisco UCS through an intuitive graphical user interface (GUI), a command-line interface (CLI), and an XML API. The manager provides a management domain with centralized management capabilities and can control multiple chassis and thousands of virtual machines. Tight integration of Cisco UCS Manager and NVIDIA GPU cards enables better management of firmware and graphics card configuration. Firmware management for NVIDIA GPU cards is no different than firmware management for Cisco UCS server components. You can use the same Cisco UCS Manager policy-based configuration to manage the firmware versions of NVIDIA cards.

Cisco Intersight™ leverages the Cisco UCS Manager XML API to give you management as a service. It extends the unified management domain for virtual desktop administrators, spanning thousands of servers across the data center and around the world.

Tight integration with VMware vCenter simplifies the deployment and ongoing management of the entire virtual desktop infrastructure to reduce operating costs and call-center incidents.

NVIDIA GRID

NVIDIA GRID technology offers the capability to offload graphics processing from the CPU to the GPU in virtualized environments. This capability gives your desktop managers the freedom to deliver true PC graphics-intensive experiences to more virtual users for the first time. Your IT staff and data center managers can use industry-leading virtualization solutions such as VMware vSphere together with high-performance Cisco UCS with NVIDIA GRID to offer a better experience for their most graphics-intensive users, including highly responsive multimedia and professional applications, from anywhere and on any device.

VMware Horizon

VMware Horizon delivers virtual desktops and applications through

You Choose VMware

- Industry-leading VMware vSphere hypervisor
- VMware Horizon, an industry-leading platform for delivering virtual desktops and applications
- VMware Blast Extreme display protocol
- VMware vSAN hyperconverged infrastructure with Cisco UCS

a single platform. You can transform static desktops into secure digital workspaces that may be delivered on demand. It enables you to streamline management and easily entitle end users through a single platform.

Secure data and simplified compliance

You can consolidate control, delivery, and protection of your end user compute resources with policies that dynamically adapt to the end user's computing environment. And leverage virtual networking to simply and dynamically protect data center infrastructure and workloads.

Rich, adaptive user experience

VMware Horizon lets you provide a consistently great end user experience for knowledge workers, mobile workers, and even 3D developers across devices, locations, media, and connections.

Simplified desktop and application management

Now you can take advantage of a modern desktop and application delivery architecture that delivers desktops in seconds, reduce storage and operational costs with truly stateless desktops, and help ensure painless application packaging and installation. Using a single platform based on the industry's leading hypervisor, VMware vSphere, VMware Horizon helps ensure that power users and designers have a graphics experience that is equivalent to their experience when using dedicated hardware—delivered with the cost-effectiveness that only GPU virtualization can provide. With certification for a growing list of independent software vendors (ISVs), VMware Horizon lets organizations across the world easily support real-time collaboration with 3D applications at scale.

VMware Blast Extreme

VMware Blast Extreme is a display protocol used for HTML access. When used with an NVIDIA GRID GPU, it outperforms the PC over IP (PCoIP) protocol for 3D rendering in graphic-intensive applications. Blast Extreme has broad client support, including Windows, Linux, Mac, Android, IOS, ChromeOS, and web (HTML Access) clients. It also has:

- **H.264 compression** to deliver real-time response
- **Optimal battery consumption** on mobile devices
- **Advanced Encryption Standard** (AES) 256-bit encryption
- **3D application delivery**, USB redirection, and local or network printing

Blast Extreme is optimized for the mobile cloud, which is what you need for your digitally transformed business.

For more information

- Cisco Desktop Virtualization Solution with VMware Horizon http://cisco.com/go/vdivmware
- NVIDIA GRID http://www.nvidia.com/vdi
- Cisco UCS with NVIDIA Grid on VMware Horizon white paper
- Cisco Desktop Virtualization Solution at-a-glance
- Inquries about Cisco UCS vSAN ReadyNodes

Excellent solution for all virtual desktop needs

Cisco Desktop Virtualization with VMware Horizon, NVIDIA GRID, and Cisco UCS delivers truly scalable solutions for customers of all sizes across a wide range of industries, requiring high-quality desktop virtualization and 3D graphics. Workers, students, and clinicians are no longer tethered to physical workstations, but can gain the mobility and flexibility they need to be productive while accessing their virtual desktop environments and mission-critical and graphics-intensive applications anywhere, on any device.

This solution simplifies virtual desktop and application management, and reduces the time needed for desktop patching, provisioning, and updates from hours to minutes. End users benefit from an uncompromised experience that is consistent across devices and locations, delivered across a quality-of-service (QoS)–enabled infrastructure that is virtual machine and virtual desktop aware.

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