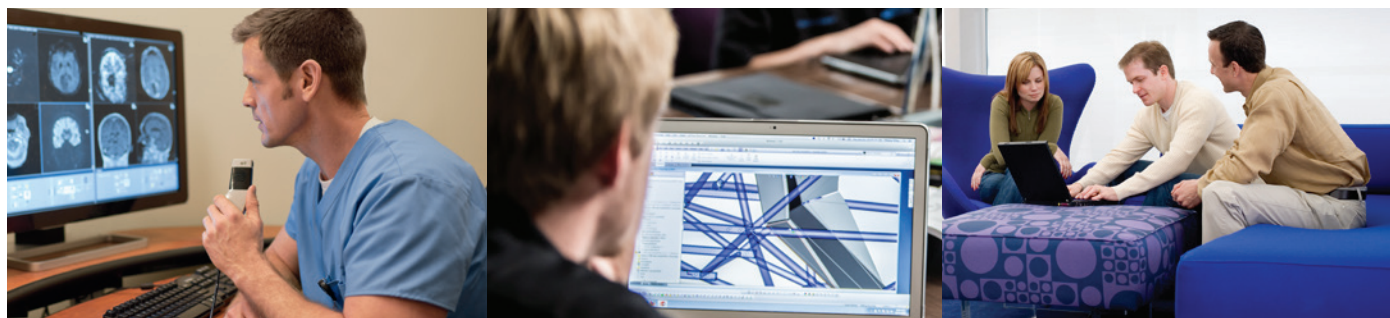# Cisco, NVIDIA, and VMware Deliver High-Performance Virtual Desktops with Rich User Experiences

In collaboration with:

NVIDIA **vmware**®

Highlights

- Built on the industry's fastest-growing server solution and the most widely adopted virtualization platform
- Offers improved productivity for an expanded user base, including graphics-intensive workstations demanding high-quality three-dimensional (3D) rendering
- Includes support for virtual graphics processing units (vGPUs), virtual shared graphics acceleration (vSGA), and virtual dedicated graphics acceleration (vDGA) with NVIDIA GRID GPUs
- Delivers an uncompromised user experience that scales easily
- Can be delivered within the Cisco Unified Computing System™ (Cisco UCS®) managed environment, expanding Cisco UCS differentiation to graphics-intensive environments and applications
- Provides an exceptional price-to-performance ratio that enables you to expand your deployments to match business demands

Cisco® Desktop Virtualization Solutions with VMware Horizon and NVIDIA GRID deliver a rich user experience on any device.

Your business is focused on creating innovative new products and services and quickly getting them to market. To be successful, your highly mobile workforce, customers, and supply chain must have anytime, anywhere access to business tools—and 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 desktop-based environment to a mobile one based on desktop virtualization.

Virtual desktops typically render graphics using the CPU power in data center servers, which can slow desktop workload performance. Although general-purpose CPUs are excellent for many types of processing, graphics processors with parallel-processing capabilities are best for graphical rendering. With Cisco Unified Computing System™ (Cisco UCS®), VMware Horizon, and NVIDIA GRID graphics processors, you can deliver a rich user experience to users anywhere and on any device. This centralized approach increases worker productivity and improves the user experience while simplifying desktop maintenance and management.

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 that 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) with high-end rendering requirements. If your organization uses a traditional approach to desktop virtualization, your users are likely frustrated by poor application responsiveness—and

CISCO

the lack of shared graphics processing unit (GPU) solutions has likely negatively affected the economics of your virtual desktop deployments.

Graphics Acceleration Benefits Everyone

When you deploy Cisco UCS, VMware Horizon, and NVIDIA GRID, your workers can access their traditional Microsoft Windows desktops and applications, complex and rich environments, and graphics-intensive applications and files remotely in a virtualized desktop environment—with the same level of interactivity that they've come to expect when working at the office.

With this solution, NVIDIA GRID graphics cards installed in Cisco UCS C-Series Rack Servers perform all the graphics processing. This approach lets users access their applications and files using VMware Horizon clients on any device that they choose and experience highly responsive graphics rendering. When you need to scale your solution, you can connect a multiple-slot PCI expansion chassis to provide access to additional graphics accelerator cards.

Flexible Deployment Options for Optimized User Experiences

Depending on the graphics-processing requirements of applications, your IT staff can assign each worker a virtual dedicated graphics acceleration (vDGA) graphics processor, a virtual shared graphics acceleration (vSGA) processor, or a virtual shared graphics processing unit (vGPU) across multiple virtual desktops (Figure 1).

With vDGA, the virtual machine has dedicated access to the GPU and provides full API support of OpenGL 4.3; Microsoft DirectX9, 10, and 11; and NVIDIA CUDA 5.0. With vSGA, users share a GPU across virtual machines with API support for up to DirectX9 or OpenGL 2.1. With vGPU, multiple virtual machines use physical GPUs installed locally in the VMware ESXi hosts, and the virtual machines or users share the GPU resources using a shared PCI-mode profile. This solution
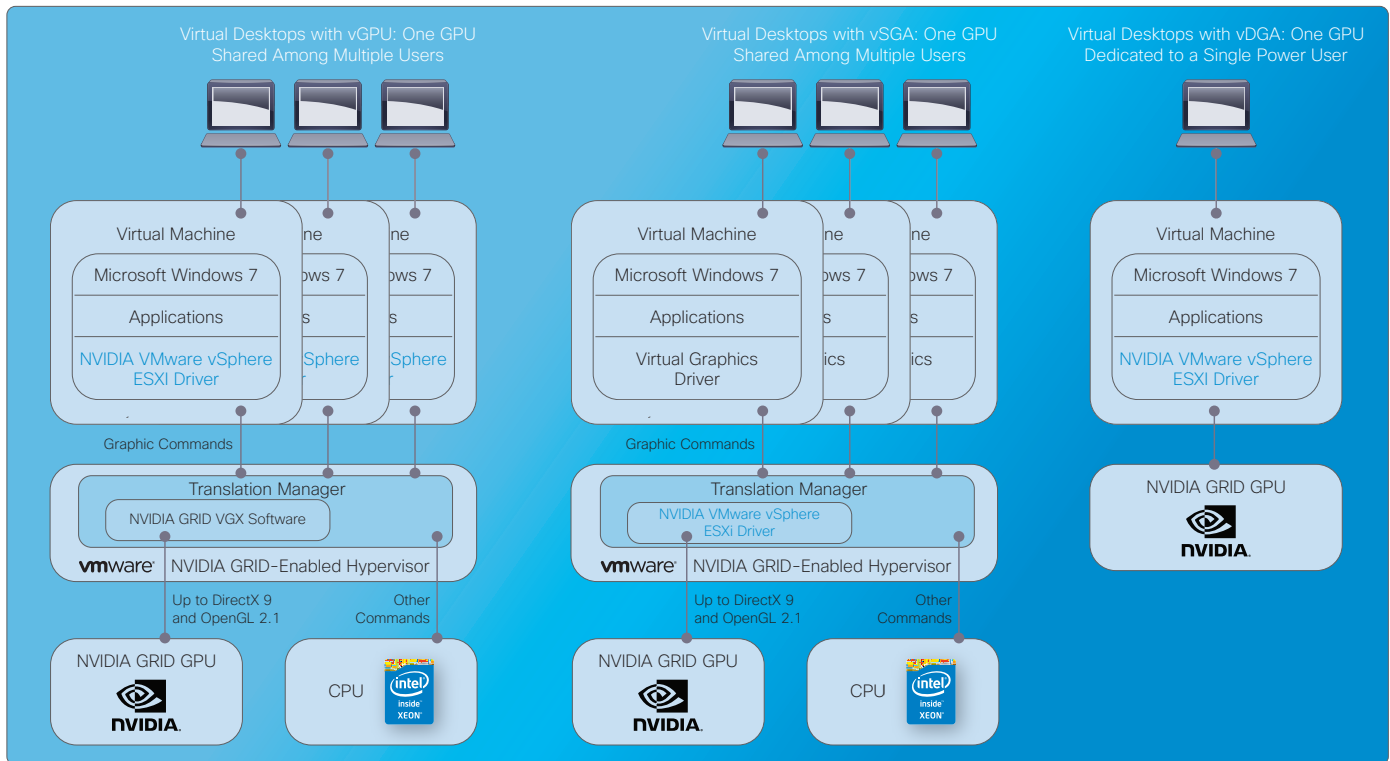

Figure 1. Several Virtual Desktops Can Share One GPU or You Can Assign One GPU per Virtual Desktop Depending on the User's Graphics Needs

extends the benefits of current Cisco Desktop Virtualization solutions to users with any type of graphics-accelerated workload.

IT Also Benefits

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 (TCO). Furthermore, the capability to virtualize all your desktops gives you the flexibility to outsource projects or send them offshore in a secure, centralized environment.

This flexibility is especially useful when outsourcing product development or engineering to third parties who have the expertise necessary to complete a project, but who 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.

VMware Horizon

VMware Horizon with NVIDIA GRID vGPU delivers rich three-dimensional (3D) graphics from the cloud that can be easily accessed across devices and locations at an affordable price. 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.

Cisco Unified Computing System

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. Jointly delivered with VMware and NVIDIA, the solution can 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 consistent security settings that travel with the virtual desktop.

- **Scale:** Support more desktops per server with predictable performance.

- **Save:** Achieve accelerated return on investment (ROI), improved deployment speed, significantly reduced operating costs, and greater investment protection.

Cisco UCS is a single converged system with configuration automated through integrated, model-based management to simplify and accelerate deployment of enterprise-class applications and services running in bare-metal, virtualized, and cloud-computing environments. With all components managed as a single system (Figure 2), integration with VMware vCenter simplifies the deployment and ongoing management of the entire virtual desktop infrastructure to reduce operating costs and call-center incidents. Whereas Cisco UCS Manager handles a single Cisco UCS management domain,

Cisco UCS Central Software extends the unified management domain for virtual desktop administrators, spanning thousands of servers across the data center and around the world.

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.

Expand Your Virtual Desktop Coverage

You can manage more desktops consistently and securely while providing increased flexibility and a high-performance graphics experience to users. Cisco Desktop Virtualization
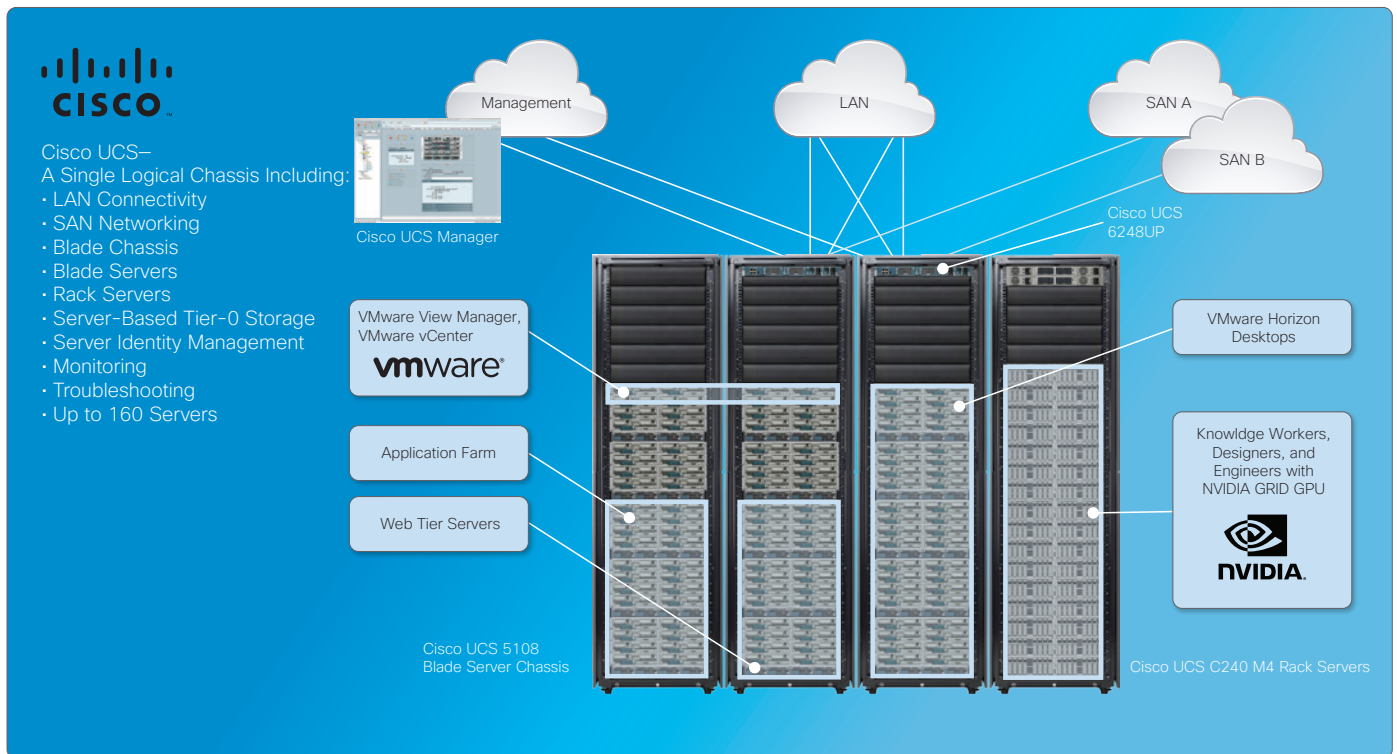

Figure 2. Up to 160 Cisco UCS Blade Servers and Rack Servers Can Be Managed as a Single Logical Chassis for VMware Horizon View Services

with VMware Horizon and NVIDIA GRID gives you choice in deploying high-performance graphics–enabled virtual desktops to meet varying user requirements.

- **Designer and Engineer Virtual Workstation:** This vDGA-based virtual workstation, with a 1:1 user-to-GPU ratio, is for designer 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. This workstation can be used for oil and gas, manufacturing, media and entertainment, and medical imaging.

- **Power-User Virtual Workstation:** This virtual workstation, with vSGA or vDGA, 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 desktop infrastructure (VDI) without GPU acceleration and

were not satisfied. This workstation can be used in healthcare (nurses' stations, doctors' offices, doctors' tablets, etc.), educational institutions (engineering and design schools, etc.), government (simulation and training, geospatial research, etc.), and manufacturing (product data management, product lifecycle management, manufacturing floor and job site workloads, support, etc.) applications.

- **Graphics-Enhanced Virtual Desktop:** This virtual desktop, with vGPU, is for users who use office applications, email, video conferencing, and multimedia Internet applications, often called knowledge workers. This virtual desktop 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.

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 VDI 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.

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