Accelerated and virtualized 3D graphics

Citrix XenDesktop with HDX 3D Pro on the HP ProLiant WS460c Graphics Server Blade
To compete and thrive in an increasingly competitive and global marketplace, design and manufacturing companies must adapt quickly and draw on innovative solutions to satisfy their most demanding users. Desktop virtualization with 3D graphics virtualization represents a compelling strategy, offering centralized operation and management for graphics servers and data with high-performance distribution of graphics resources to power-hungry graphics users. By collaborating and managing design lifecycles effectively across offshore, mobile, and remote employees, organizations can speed time to market for their products. At the same time, they maintain security and control over intellectual property, even as their workforce becomes more mobile and distributed and their computing environment becomes ever more diverse.

Citrix XenDesktop with HDX 3D Pro is the only app virtualization solution that can support both high-end designers and engineers as well as the broad range of viewers and editors of 3D data, while cost-effectively and securely delivering real-time remote collaboration. Coupled with the HP ProLiant WS460c Server Blade and NVIDIA GPUs, no other solution can offer the same performance, scale, and graphics compatibility.

Virtualizing 3D graphics
Companies that heavily utilize 3D graphics for design and engineering must overcome key challenges related to graphical collaboration. Product and design data residing on user’s physical workstations is difficult to secure and to share with other team members, partners, suppliers, and customers. Cumbersome asynchronous methods of exchanging design data, such as email and FTP, only impede time to market and present opportunities for competitors. With file sizes growing at faster rates than network capacity, data synchronization across global design centers is increasingly difficult. Moreover, factory floor productivity is often hampered because it is far too difficult to access designs to make simple edits or analyze a change in real time. Security has also become a problem as product and design data stored and shared among partners and suppliers increases the risk of intellectual property theft.
3D graphics virtualization using Citrix XenDesktop with HDX 3D Pro offers key advantages, including the ability to:

- **Secure intellectual property and customer information** by centralizing all data within the datacenter, where it can be safeguarded much more effectively than on workstations and other endpoints around the world.

- **Empower users anywhere in the world** to accelerate time to market with real-time access to professional 3D graphics and visualization apps and workstations, as well as real-time collaboration around centrally hosted data.

- **Provide full functionality of Windows-based 3D graphics apps on mobile devices** to extend their utility to the manufacturing floor, customer sites, and anywhere else design and manufacturing professionals work.

- **Reduce cost and improve IT efficiency** by hosting 3D apps and desktops in the datacenter, where hardware resources can be shared across non-overlapping time zones, bandwidth costs can be effectively controlled, and client hardware and driver stack dependencies can be reduced.

Designers and engineers alike can benefit from an effective 3D graphics virtualization strategy employing Citrix XenDesktop with HDX 3D Pro and HP ProLiant WS460c Graphics Server Blades. Users can work from home or remote locations instead of being tied to physical workstations in the office. Sales and support personnel can pull up real-time 3D data remotely from their tablets. Locating graphics resources next to the application database in the datacenter provides faster loading and editing of large data sets and “chatty” applications.

**The HP ProLiant WS460c Graphics Server Blade**

The HP ProLiant WS460c Graphics Server Blade has been at the cutting edge of virtualized high-performance graphics for years. Citrix software has likewise been innovative with early support for critical blade functionality, such as connecting a GPU directly to a virtual machine. The HP ProLiant WS460c Graphics Server Blade now delivers even more performance with new Intel® Xeon® Processor E5-2600 v2 processors and 1866 MHz DDR3 memory. It is also the industry’s first bladed technology to support up to eight GPUs per blade, lowering the cost per user while enabling remote users to easily complete large model visualizations.

As shown in Figure 1, the HP ProLiant WS460c Graphics Server Blade has two options for the base blade configuration.

- The base blade supports up to two MXM style graphics cards installed on the blade mezzanine slots.

- The expansion blade allows full size high-end graphics cards to be installed.
These options allow for considerable flexibility, scalability, and density. For example, the HP WS460c Multi-GPU Carrier card allows for up to eight MXM style GPUs to be installed on the blade, creating three to four times more GPU density than with previous generations. In addition, the system supports:

- Sharing advanced media-rich workstation or PC graphics remotely, with 2D and 3D multidisplay, and full-motion capabilities.
- Driving up to four displays per client device, and running multiple computing sessions from each.
- Accessing resources easily from thin clients, workstations, PCs, and notebooks, and most any mobile device.
- Meeting a full range of graphics users’ demands for flexible high-end graphics solutions on client and server OS, from bare-metal to virtualized environments.
- Benefiting from PCIe Gen3 technologies, which offer improved latency, and up to 400 percent more bandwidth per I/O expansion slot.
Support for NVIDIA GRID K1 and K2 boards
With this latest update, HP expands its comprehensive set of graphics offerings with support for NVIDIA GRID solutions, offering an optimized multi-GPU design that helps to maximize user density. For the first time, these cards support hardware GPU virtualization and multiple GPUs on a single adapter card.

- NVIDIA GRID K1 boards include four Kepler-based GPUs and 16 GB of memory, and are designed to host the maximum number of concurrent users.
- NVIDIA GRID K2 boards include two higher-end Kepler-based GPUs and 8 GB of memory to deliver maximum density for workstation-class graphics users.

Citrix XenDesktop with HDX 3D Pro
Citrix XenDesktop with HDX 3D Pro is uniquely suited for HP ProLiant WS460c Graphics Server Blades and NVIDIA GPUs. Using deep compression techniques, HDX 3D Pro provides a set of graphics acceleration techniques designed to optimize the delivery of graphics-intensive apps and desktops. This approach serves to dramatically reduce bandwidth overhead and exploit integrated GPU functionality, achieving stunning visual performance that was simply impossible before.

Citrix XenServer specifically integrates NVIDIA GRID vGPU technology, enabling the only shared GPU solution on the market that supports 3D professional workloads using VDI (Figure 2). Currently implemented by NVIDIA K1 and K2 graphics boards, the powerful GRID GPU can be shared between multiple VMs, with each having direct access to the GPU via dedicated channels managed by the NVIDIA GRID vGPU Manager. This approach guarantees that each VM has a dedicated amount of vRAM per user and direct access to the GPU. Administrators can assign one to eight users per physical GPU, depending on workload needs.

Figure 2. Citrix XenDesktop with HDX 3D Pro supports true GPU Virtualization with NVIDIA GRID GPUs.
Importantly, Citrix XenServer provides considerable flexibility as to how graphics resources are utilized on the HP ProLiant WS460c Graphics Server Blade, with support that includes:

- **Bare-metal.** Ideal for power users, this approach installs the OS directly on the blade hardware, without virtualization technology.

- **Pass-through GPU.** Ideal for high-end 3D and GPU Compute users, this method allows discrete PCI GPU devices to be directly mapped to a virtual machine for dedicated 1:1 use by the VM. The virtual machine has full and direct access to the GPU, including the native graphics driver, allowing for full workstation class graphics and GPU compute performance in a virtual machine.

- **True Virtual GPU.** As discussed True Virtual GPU provides a hardware virtualized GPU, offering the benefit of GPU scaling (similar to competing software GPU approaches) while providing the performance of a native NVIDIA graphics driver, similar to pass-through GPU models.

**Conclusion**

Centralized and virtualized server-based 3D graphics provides myriad advantages that help designers and engineers innovate and do their jobs, but selecting the right hardware and software combinations can be key to success. Citrix XenDesktop with HDX 3D Pro and the HP ProLiant WS460c Graphics Server Blade have long been an ideal combination. These advantages are made even more powerful and flexible with a choice of flexible models, greater GPU scalability and density, and the industry’s only support for True Virtual GPU on NVIDIA GRID GPUs.