Deliver Virtualized Graphics to Your Most Demanding Power Users

With hosted remote workstations, users can now access sharp, responsive 3D graphics applications from anywhere and on any device.

Design Changes in a Global World

Design and manufacturing companies face increasing challenges in today's global workplace. They must be able to securely collaborate and manage design lifecycles effectively with offshore, mobile, and remote employees. Yet sharing complex 3D and 2D data across a global environment is challenging.

E-mail, FTP, and physical media remain the most common methods for large-scale data sharing. However, these technologies are slow and cumbersome. They generate multiple versions of the data that must be managed and synchronized, and they increase the exposure of critical intellectual property (IP). As file sizes continue to grow and the need for global collaboration increases, faster and more secure strategies are needed.

Close the Gap with Hosted Remote Workstations

Intel and Citrix can help you address the global design challenge with a cost-effective desktop-virtualization and app-virtualization solution that delivers rich applications to any user on any device, including demanding 3D graphics applications. With this solution, applications are centralized at the secure data center near the 3D graphics data files, which helps deliver reliable high performance and strong protection for IP. Users around the world can work from the same data set, with no need for high-volume data transfers. They can also enjoy workstation-class visual performance using any device, with or without graphics-processing-unit (GPU) capabilities on the endpoint. 3D graphics apps can run equally well on a dedicated graphics workstation, a tablet, or a smart phone.

Citrix XenDesktop* and Citrix XenApp* create a flexible, unified platform that delivers Linux* and Windows* desktops and applications to remote users and that provides the high-definition performance of a local desktop or app. Combined with the power and scalability of servers based on the Intel® Xeon® processor E3 v5 family, XenDesktop and XenApp can deliver a high-quality user experience on a dense, energy-efficient, and cost-effective infrastructure. The Intel Xeon processor E3 v5 family includes integrated graphics hardware acceleration based on Intel® Iris™ Pro graphics technology, so there is no need for add-on graphics cards.
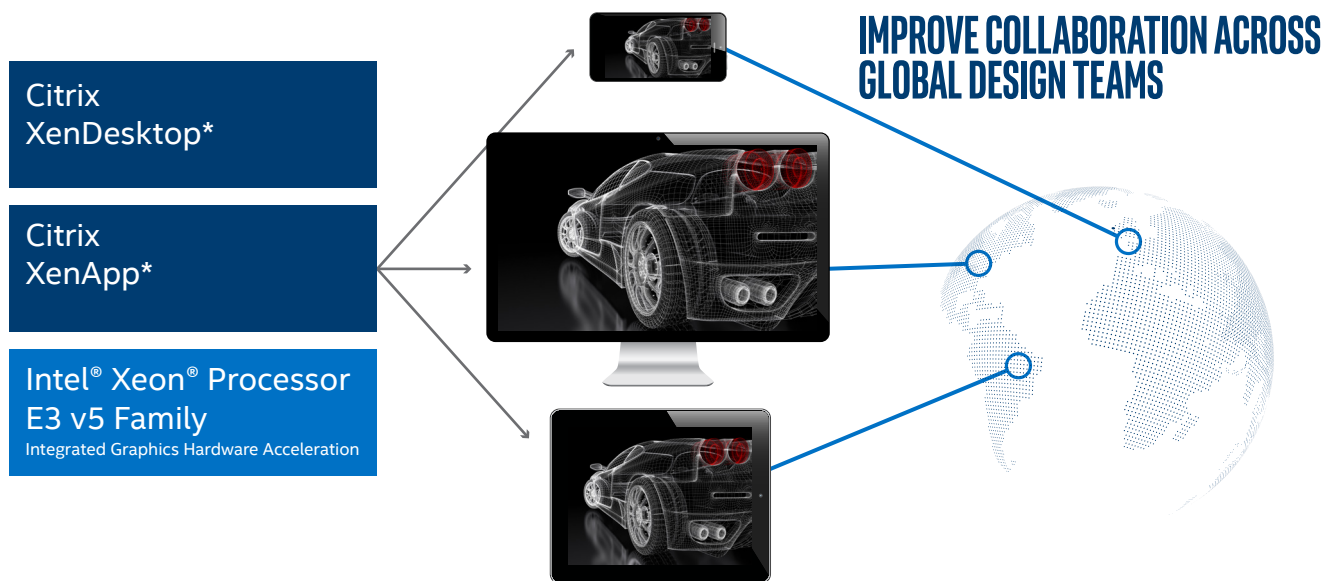
"Intel is pleased to partner with Citrix XenServer to be the first in the industry to enable Intel GVT-g support, allowing for Citrix XenDesktop to deliver remote virtual graphics and rich applications to a broad set of enterprise workers."

— Jim Blakley,
general manager of visual
cloud computing, Intel[1]

IMPROVE COLLABORATION ACROSS GLOBAL DESIGN TEAMS

Citrix XenDesktop*

Citrix XenApp*

Intel® Xeon® Processor E3 v5 Family
Integrated Graphics Hardware Acceleration

Figure 1. Deliver a workstation-class visual experience to any user on any device while protecting your data and applications behind your data-center firewalls

By running virtual machines (VM) on the Citrix XenServer 7* hypervisor, each app and desktop receives graphics-acceleration benefits from Intel's virtual GPU, Intel® Graphics Virtualization Technology (Intel® GVT-g). Based on Iris Pro graphics, this technology integrates a standard Intel GPU driver within the centralized VM, which enables the VM to render 3D apps and desktops. You can deliver graphics-rich applications with cost models that support broad delivery to hundreds or even thousands of users.

Improve End-to-End Collaboration while Reducing Risk

The performance and cost advantages provided by XenDesktop, XenApp, XenServer, and the Intel Xeon processor E3 v5 family open the door to broader and more effective collaboration. Detail engineers and designers, production teams on the factory floor, engineers collaborating with third-party design teams, business analysts, and sales and support staff at customer sites can all benefit from more responsive access to complex data and visualizations. Even users who have dedicated workstations can benefit from the ability to switch seamlessly to a tablet or smart phone and pull up the complex visualizations during meetings, travel, and consultations.

Centralizing data and applications in the data center delivers many additional advantages:

- **Stronger security and compliance.** Sensitive data remains in the data center, behind corporate firewalls. Citrix provides strong identity management, intelligent access control, and end-to-end encryption of all communications.

- **Higher reliability.** Data-center infrastructure can be architected for high availability and disaster recovery. If a client device fails, or if users can't make it to work due to weather conditions or other issues, the users can connect securely from home using their personal PCs, laptops, tablets, or smart phones.

- **Better resource utilization.** XenDesktop and XenApp dramatically simplify desktop provisioning and management, and they have been used successfully to support remote users across continents and oceans.[2] Depending on requirements, the same centralized infrastructure and staff can be used to support multiple teams in global, follow-the-sun work scenarios.

Delivering Reliable High Performance to Remote Users

WAN performance limitations have traditionally prevented IT organizations from hosting graphics-rich client applications in the data center. Citrix overcomes these limitations with Citrix HDX* technology, which includes a broad set of technologies integrated across the entire end-to-end delivery system. With Citrix HDX, only user commands and screen-display information must traverse the network, leaving the data files securely inside the data center. Deep compression, quality-of-service (QoS) controls, and network-level WAN-optimization technologies can reduce network-bandwidth requirements to optimize the end-user experience over narrow WAN links.

Today's office applications often require high-quality voice, rich video, and multimedia. Citrix HDX optimizations can detect and offload audio-video processing to capable remote client devices as needed to maintain the high performance levels often demanded by virtual apps and desktops—even across high-latency, low-bandwidth networks.

Hardware-level GPU acceleration with Iris Pro graphics provides fast frame rates and smooth visual performance for demanding 3D graphics applications. The HDX 3D Pro* optimization makes use of Intel's graphics acceleration to deliver a smooth, responsive experience to remote users. Consistent, high-quality user experiences can be provided with as little as 1.5 megabits per second (Mbps) of network bandwidth and with round-trip latency as high as 200 milliseconds (ms).[3] Even higher latencies can be sustained for short periods without impairing the user experience.[3]

HDX 3D Pro provides full support for OpenGL* and DirectX* applications, so it supports existing applications without modification.

Smooth, Accurate Visuals with Integrated Graphics Acceleration

To provide high performance at lower cost, Intel integrated Iris Pro graphics P580 directly into the server-class Intel Xeon processor E3 v5 family. By reducing the communications latency between the CPU and the GPU, on-die graphics acceleration can provide better performance and energy-efficiency than a comparable add-on card.

Intel Iris Pro graphics P580 is Intel's most advanced graphics-acceleration technology. It includes dedicated on-die graphics memory (eDRAM), so the GPUs do not have to compete with processor cores for memory. This helps to ensure exceptional, energy-efficient graphics performance, even in combination with compute-intensive workloads.

The Intel Xeon processor E3 v5 family is designed specifically for high value in multi-user, virtualized desktop environments. It provides the following benefits:

• **Workstation-class performance for multiple users.** Four server-class processor cores and integrated graphics acceleration support multiple, concurrent users for tasks such as 3D computer-aided design (CAD), animation apps, and streaming video. With Intel GVT-g, a single physical GPU can be shared by up to seven simultaneous users, depending on applications and usage models.[4]

• **High-performance video encoding and decoding.** Intel® Quick Sync Video dramatically reduces user wait times when storing, playing, and transferring video content. Intel® Media Server Studio, software designed to work with certain Intel® processors, like the Intel Xeon processor E3 v5 family, provides an extensive suite of development tools for Linux and Windows. The Intel® Visual Compute Accelerator enables ultra-high-definition (UHD) video.

• **Efficient energy use.** The Intel Gen9 graphics engine accelerates 3D graphics performance while rendering applications at low power. Other features such as workload consolidation and UHD 4K support help lower energy consumption.[5]

Fast, Low-Risk Implementation

Discrete GPUs might be appropriate for designers and engineers working on large models and simulations, but they are too expensive for delivering hosted remote workstations to hundreds of users. Citrix and Intel are working with multiple hardware vendors to produce complete desktop-virtualization solutions designed to deliver the best balance of performance, cost, and density for enterprise deployments.

One example is HP Moonshot* hosted desktop infrastructure, which is available today. This production-ready solution provides dedicated, multi-core hardware resources for up to 45 cartridges per chassis.[6] When sharing hardware resources

About Citrix

Citrix (NASDAQ:CTXS) aims to power a world where people, organizations, and things are securely connected and accessible to make the extraordinary possible. Its technology makes the world's apps and data secure and easy to access, empowering people to work anywhere and at any time. Citrix provides a complete and integrated portfolio of workspace-as-a-service, application delivery, virtualization, mobility, network delivery, and file sharing solutions that enables IT to ensure critical systems are securely available to users via the cloud or on-premises and across any device or platform. With annual revenue in 2015 of $3.28 billion, Citrix solutions are in use by more than 400,000 organizations and over 100 million users globally. Learn more at citrix.com.

using XenApp, that same chassis can provide a high-quality, rich application experience to more than 300 simultaneous users.[4,6] All hardware and software are preconfigured and optimized for remote desktop delivery, and HP provides full service and support to enable fast, reliable implementation in complex environments.

Increasing Value over Time

Citrix and Intel have been collaborating for years to help businesses deliver better and more cost-effective user experiences across a wide range of usage models. The two companies worked closely together to ensure optimized performance and reliability for XenDesktop and XenApp running on the Intel Xeon processor E3 v5 family with Iris Pro graphics.

Intel is focused on increasing the performance and efficiency of Iris Pro graphics in future processor generations, and Citrix is working to ensure these enhancements deliver maximum benefits to remote users across low-quality network connections. Citrix Framehawk* technology, for example, automatically adapts the graphics data stream to deliver the best possible experience based on user heuristics. An interruptible graphics layer works in combination with a QoS signal amplifier to prioritize the display updates that are most important to each user's real-time experience. Framehawk is best suited for use on single-display devices and mobile devices, such as working on centralized complex 3D graphics models using tablets and smart phones.

These and many other innovations will continue to deliver dramatic improvements in the quality and reliability of the end-user experience and the efficiency of data-center infrastructure.

Find Out More

Learn more about how Citrix XenDesktop*, Citrix XenApp*, Citrix XenServer*, and the Intel® Xeon® processor E3 v5 family with built-in Intel® Iris™ Pro graphics can transform the way that your business collaborates, while reducing costs and risks.

- **Citrix XenDesktop:** citrix.com/xendesktop
- **Citrix HDX 3D Pro*:** citrix.com/products/xenapp-xendesktop/hdx-3d-pro.html
- **Intel Xeon processor E3 v5 family:** intel.com/content/www/us/en/processors/xeon/xeon-processor-e3-family.html
- **Intel Iris Pro graphics:** intel.com/content/www/us/en/architecture-and-technology/visual-technology/graphics-overview.html

[1] Citrix. "Optimized Server Virtualization for All Your Workloads." citrix.com/products/xenserver.

[2] For an example of long-distance remote workstation delivery, see: Citrix. "ABB Schweiz AG." citrix.com/customers/abb_schweiz_en.html?solution=desktop_virtualization.

[3] Citrix. "HDX 3D for Professional Graphics." http://support.citrix.com/servlet/KbServlet/download/23011-102-642443/HDX_3D_Pro_Graphics_1.1_-_Administrator%E2%80%99s_Guide_0070.pdf.

[4] Jim Blakley. Intel IT Peer Network. "Enabling Anywhere, Anytime Design Collaboration with Intel Graphics Virtualization Technology." May 2016. http://itpeernetwork.intel.com/enabling-anywhere-anytime-design-collaboration-with-intel-graphics-virtualization-technology/.

[5] Intel. "The Intel® Xeon® Processor-Based Platforms for Internet of Things (IoT) Solutions." August 2015. intel.com/content/www/us/en/embedded/products/skylake/s-desktop/xeon-processor-e3-1200-v5-workstation-platform-brief.html.

[6] Hewlett Packard Enterprise. "HPE Moonshot System with HPE ProLiant m710x Server Cartridges." July 2016. hpe.com/h20195/v2/GetPDF.aspx/4AA6-6264ENN.pdf.