vGPU and VDI for an Efficient and Productive Remote Workforce

Enterprises all over the world have moved employees to virtual work — on desktops and laptops in home offices and other remote sites — and there's still uncertainty as to when anyone will transition back to their company offices. This historic shift comes at a time when more processing-intensive workloads are putting new pressures on client computing environments.

The confluence is creating a number of challenges, from poor performance to limited mobility. Fortunately, advances in virtual Graphics Processing Unit (vGPU) solutions can give users the computing experience they expect, without requiring substantial changes or adding exorbitant costs to the IT environment. All of this bodes well for a better user experience, whether logging in from home or working on-site, so everyone can be more efficient and productive.

## How virtualization helps meet client computing demands

Modern business applications, growth in video and multimedia, new web standards, and changing employee behaviors all add up to one thing: Today's business users are consuming more CPU resources and active memory than they ever have before, and it is affecting their computer performance and, ultimately, the user experience.

Specifically, CPU resources are impacted by:

- Increased use of graphics-intensive applications, video, and multimedia
- Increased graphics requirements of Windows® 10
- Interactive 2D and 3D features
- Higher-resolution monitors and/or the use of multiple monitors
- Web standards like WebGL
- Modern collaboration and office productivity software

What's more, the global health crisis has forced large numbers of employees to work off-site at home or in remote offices, making it even more challenging to deliver client computing resources equal to physically connected desktops. According to the Brookings Institution, up to half of American workers are currently working from home, more than double the fraction who worked from home (at least occasionally) in 2017–18.[1] And there is reason to believe it is likely that a fair portion of the workforce will continue to work remotely even after the public health crisis is over.[2]

In the early days of the global health crisis, enterprise IT responses were understandably reactive, and that often led to incomplete solutions. As organizations find their footing, they are reevaluating the choices they've made and are developing new strategies for what comes next.[3]
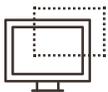
A number of organizations have turned to a Virtual Desktop Infrastructure (VDI) that lets users access applications running on the corporate network from anywhere.

In fact, in a recent Insight online survey of 200 IT professionals in the United States and Canada working at enterprise companies, 40% said they deployed VDIs as a result of or in response to COVID-19.[3] As a form of desktop virtualization, VDIs host desktop environments on a central server, running the images within Virtual Machines (VMs) and delivering them to end clients over a network.

While VDIs offer a fix for a suddenly virtual workforce, they require careful consideration. That's because virtual desktops do not necessarily overcome poor application performance, CPU overload, and complex user management. Moreover, existing VDIs might not be equipped to handle the large volumes of employees now working remotely. Some things to consider are whether existing designs are able to handle the much richer graphics experience in Windows 10. And then there are the network failures, VM monitoring, and resource overutilization that virtual desktop administrators have to contend with.

The good news is these constraints can be addressed. Enterprises can upgrade hardware encompassing compute, storage, network, and security. Or, they can migrate or expand to a cloud-based VDI solution such as Azure® Windows Virtual Desktop.

There's also the option of adding vGPUs to your client virtualization strategy, which can give existing infrastructure a turbo boost and minimize the amount of hardware upgrades needed. At its core, a vGPU accelerates graphics by offloading the processing to GPU on a server, thus improving application performance. The end result is a client computing environment that scales better and delivers a much richer user experience for all your employees, including knowledge workers who often rely on multimedia, multiple monitors, and multimodal, multidimensional applications to do their work.

What is a vGPU?

GPUs, of course, are not new and were designed so that PC CPUs wouldn't have to manage graphics and could instead focus on core operations. The market grew up in the graphics and gaming worlds, and really came of age in the mid-1990s, especially with NVIDIA's introduction of its first graphics chip, the first commercial graphics processor capable of 3D rendering, video acceleration, and integrated Graphical User Interface (GUI) acceleration. Sometime in the mid-2000s, more general-purpose GPUs began appearing but struggled to expand beyond niche markets.[4]

Today, GPUs have become much more powerful and enable PCs, laptops, and servers to effectively and more easily run 3D applications, stream videos, and perform other complex, compute-intensive processes. But they are tied to the physical device so aren't useful for anyone who needs to work remotely.

This is where vGPUs come in. The software can create virtual GPUs that can be shared between multiple VMs or aggregated so that a single VM can harness the power of more than one GPU to run the most demanding workloads.

vGPUs enable software-defined GPU acceleration for any workflow, whether running on a device in someone's home office or on-site. vGPUs are also giving VDI the boost it needs to help remote and mobile workers be more productive and connected. For some time, VDI was primarily used by workers who typically use only a few applications and spend their time on specific tasks, and didn't necessarily work well for "power users." vGPUs can deliver much higher levels of performance, so IT teams are able to help remote employees be more productive, whether they are using more graphics-intensive applications like Windows 10, 3D professional applications such as CAD, or even processor-intensive applications like those used in Artificial Intelligence (AI) applications.

If you accelerate VDI with vGPUs, you can use VDI to scale performance to all employees, remote or otherwise. Depending on how it's configured, a vGPU can accelerate graphics and other processor-intensive workloads on tens, hundreds, or thousands of machines.

Case study: Financial firms go virtual and stay productive

Financial services firms have unique demands that can challenge mobility. But with NVIDIA's virtualization solutions, they can still support the use of multiple monitors and larger frame buffers for better data visualization and pattern recognition. For one hedge fund based in New York, 50 traders can now work on the go if they need to and still get the level of performance and monitor resolution they need.

In another example, as core desktop applications became more graphics-intensive and performance degraded, Cornerstone Home Lending, Inc., based in Houston, Texas, implemented NVIDIA GRID®. Now the company is able to deliver a low-latency, high-quality user experience — especially for modern business applications like streaming video and social media, which are key to Cornerstone's marketing campaigns.

vGPU-enabled VDI: Virtual desktops that employees love

The advances in business applications, web standards, productivity and collaboration software, and monitors, and the growth in video and multimedia, all contribute to a much better user experience. That, in turn, helps business users be more productive and connected. It also raises the bar for user expectations. The challenge for businesses is to support the needs of a more savvy, modern, and mobile workforce with a virtual desktop that their employees love.

The advances, as important as they are, create a number of technical challenges that impact performance (end-user latency, frame rate, and image quality) and flexibility to support mobility. For example, updated versions of Windows 10 require twice the amount of storage as Windows 7 (32GB versus 16GB)[5] and include features best experienced with newer processors.[6] Some features in creative and design tools such as Adobe® Photoshop® will not work without a GPU.[7] In addition, the growing trend to use multiple, high-resolution monitors significantly increases the number of pixels required to code and render, and that increases CPU utilization. Finally, productivity tools that rely on video collaboration also drive up CPU utilization.

Windows 10 users are not the only ones who must deal with technical challenges. Multimedia designers and others in the entertainment industry rely on latency-sensitive applications. Healthcare organizations use processing-intensive applications like telemetry and Electronic Medical Record (EMR) systems featuring video. And then there are groups in education, government, military, manufacturing, and engineering that also use CAD/CAM, graphic imaging, and other resource-intensive applications.

The technical challenges are exacerbated when you add into the mix remote and mobile users who rely on VDI for their applications and workload needs. Without a GPU to offload and mitigate the increase in CPU utilizations, users will experience slower performance, reduced feature sets, and applications that simply may not launch.

With a vGPU-enabled VDI environment, IT teams can provide employees, whether remote or on-site, an improved user experience. They can have virtual desktops that are more reliable via better end-user latency, enabling faster response times, higher frame rates for more fluid rendering, and richer image quality. All that's needed is client software running on the user's device to connect to the VDI service. Everything can be securely managed from a single point because documents and data remain in the data center rather than on a user's physical computer.

How vGPU-enabled VDI improves the user experience

Challenge	Solution
Poor performance of applications	Tasks are offloaded from the CPU.
Poor video and multimedia streaming	Higher frame rates are supported.
Limited mobility	Any app can be virtualized and accessed from anywhere at any time, giving users a consistent, native PC experience.
Productivity decline	Multiple monitor use is supported, as well as richer integration into data center services with security in mind.

How to make the most of a move to vGPU-enabled VDI

Since a number of companies have already moved, or are planning to move, to VDI, now may be the right time to also consider investing in a vGPU solution. The first step should be to ask why you might need vGPU and determine how well vGPU will serve your organization's needs. Some questions to ask include:

Do a large number of your employees work at home or remotely, and is that policy expected to continue for some time?

Do a number of your employees require access to graphics-intensive applications or rely on video and multimedia functionality?

Have you adopted newer collaboration and productivity tools?

Have you migrated to Windows 10 or are you planning to?

Do your employees regularly use modern applications such as Adobe Photoshop or Google Maps that require GPUs to experience the full feature set?

Do your IT teams need a better way to scale VDI across the organization?

Are security and manageability concerns?

Can your budget support upgrades to hardware, including compute, storage, networking, and security, that will be required to meet the needs of more remote employees?

These questions should give you the basis to begin the investigation into vGPU. Your analysis should focus not only on workloads but also the value you'll obtain from accelerating those workloads with vGPU. A cost assessment is equally important. By adding vGPU, you'll likely discover that you can meet your users' requirements at a lower cost.

As you map your implementation plan and schedule, be sure to include skills from a cross-functional group of IT professionals. You should include network and systems administrators, security and storage experts, and application administration and development teams.

Today's business users are savvy and have high expectations. They want a quality user experience, no matter where they are. And they want access to rich graphics, video, and other applications without any performance degradation or inconsistencies.

Using a vGPU-enabled VDI will let you virtualize any workload, anywhere — from high-end applications with large, complex data sets to modern business applications — and deliver them to any user, whether working in their home, at a customer site, or in the corporate office. Such virtualization improves productivity by giving users a high-quality user experience that's rich and responsive. Mission-critical data is secure and protected since workloads and data are centralized within the data center and no documents reside on users' physical devices. Administration is easier and more cost-effective, too, since IT teams can utilize infrastructure more efficiently and manage devices and resolve issues end-to-end, all from a single point of control.

Case study: Improving healthcare services with vGPU

Healthcare institutions want to maximize the value of their data and expand care across clinics and hospitals and even into patients' homes. But in order to do that, healthcare institutions need secure virtual solutions that can support increasing compute from 3D data sets, complex processing algorithms, VDI, and other technologies.

As its staff grew, The Polyclinic, a multispecialty clinic in Washington's Puget Sound region with 1,200 employees at 15 locations, needed a higher-performing virtual desktop environment. The clinic now uses a VDI solution with NVIDIA® M10 GPUs and GRID vPC for secure, mobile access, Bring Your Own Device (BYOD), and remote work. An upgrade to NVIDIA GPUs has helped The Polyclinic achieve two times the user density at two-thirds the cost, as well as a consistently great virtual desktop experience.

Insight can be your resource partner

Creating the foundation for your employees to be their most effective is essential to your business success.

Insight can help you determine whether vGPUs and VDI could be used to your best advantage, given your unique business qualities, concerns, and objectives today. Our consultants bring decades of expertise in IT environment assessment and the selection, implementation, and management of IT infrastructure.

Contact us today to discuss possibilities with one of our experts.

Review the following related resources:

Visit the links below to learn more about how Insight CDCT can help you on your path to automation and business transformation.

- Solution brief: Insight's Research & Innovation Hubs
- Why Insight for NVIDIA
- Data Platform Modernization
- Modern data storage

[1] Guyot, K. and Sawhill, I. (2020, April 6). Telecommuting will likely continue long after pandemic. Brookings.edu.

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[5] Shaikh, R. (2019, April 25). Your PC Might Not Be Able to Run Windows 10 1903 as Microsoft Raises System Requirements After Years. Wccftech.com.

[6] Microsoft. Windows 10 Computer Specifications & Systems Requirements. https://www.microsoft.com/en-us/windows/windows-10-specifications

[7] Adobe. Photoshop graphics processor (GPU) card FAQ. https://helpx.adobe.com/photoshop/kb/photoshop-cc-gpu-card-faq.html

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Research & Innovation Hubs

See vGPUs perform at Insight Research & Innovation Hubs

Identify and assess technology solutions with our experts at Insight's Research & Innovation Hubs. At these centers, we currently have in place NVIDIA GPUs supporting vGPU deployments, as well as other GPU use cases. We can simulate workloads, do performance and scenario testing, and validate end-to-end solutions. We also offer training and educational sessions through the Hubs to help clients and our own teams get up to speed quickly and maintain a high level of product or solution proficiency as new updates are released and technology evolves.

Our teams have already completed testing of NVIDIA GPUs supporting vGPU, and we experienced virtual desktops that perform as quickly and responsively as if they were operating on location. At the Hubs, we continually identify, build out, and test innovative solutions so that we can provide fresh insights on how to effectively address the most complex business challenges.

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