Mastering the Art and Design of Remote Work

Remote work and study aren't going away; NVIDIA virtual GPU technology is essential to ensure a quality learning experience from any place and at any time.

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WHEN COVID-19 STRUCK and remote learning and work became the new norm at the **University of Colorado School of Dental Medicine**, IT, with the help of NVIDIA, was ready:

- Faculty and students could continue teaching and learning.
- Compute-intensive electronic health software, clinical orthodontics and radiology applications remained accessible.
- IT performed work remotely without having to touch end-user computers or visit clinic chairs.

This was all made possible by the University of Colorado's existing virtual desktop infrastructure (VDI) upgraded with NVIDIA virtual GPU technology (NVIDIA vGPU). As one member of the school's IT team put it, once VDI was deployed with NVIDIA vGPU, "the user experience improved significantly. The greatest change was excellent system performance and responsiveness."

While the benefits are clear, the role of NVIDIA vGPU in virtual environments isn't commonly understood. NVIDIA is famous for its graphics processing units (GPUs) that accelerate applications such as gaming, film production, graphics-intensive design and research. But in a world where remote rules, the vGPU technology is only recently becoming an essential component.

On a traditional physical computing device like a workstation, PC or laptop, a GPU typically performs all the capture, encode and rendering for power complex tasks, such as 3D apps and video. NVIDIA virtual GPU technology virtualizes GPUs installed in the data center to be shared across multiple virtual machines or users. The rendering and encoding are done on the virtual machines' host server rather than on a physical endpoint device.

The basic idea is to share the GPU functionality with multiple users and give them the same experience as they'd have if they were running applications on dedicated workstations. The advantage is this: Instead of having a one-to-one connection – one GPU per computer – you get one-to-many. The physical GPU runs in a server and the vGPU software dynamically slices it up to allow multiple users to access its power (up to as many as 64 users per GPU).

The Benefits of NVIDIA vGPU

To take advantage of the NVIDIA vGPU, education institutions need three elements: 1) a server with NVIDIA GPUs installed; 2) virtualization software from VMware, Citrix, Red Hat or another VDI company; and 3) NVIDIA vGPU software.

Once in place, the NVIDIA vGPU approach offers numerous benefits:

REMOTE ACCESS TO HIGH-POWERED SOFTWARE. Students can access the high-end programs their classes require no matter what kind of hardware they have at their fingertips. No going to a dedicated computer lab; no having to ship out workstations. With NVIDIA vGPU, even tablets and Chromebooks can take advantage of industrial-grade engineering design programs. They're delivered as a service.

IMPROVED USER EXPERIENCE. The NVIDIA vGPU handles three important GPU tasks: capturing, rendering and encoding. What's sent down the wire to the remote user is optimized and latency is dramatically improved. Even the transmission of video gets better.

A BOOST IN EXISTING VDI INFRASTRUCTURE. Up to now, IT may have to pick and choose what's run in VDI, which means users have to be able to get back to workstations to run anything not on the list. With vGPU, that isn't necessary. Any and all can run through the VDI setup.

EXTENDED MACHINE LIFE. Machines in computer labs typically have a three- to five-year lifecycle before everything needs to be upgraded. With the addition of NVIDIA vGPU to the VDI infrastructure that equipment gets a longer lease on life. The same is true on the software side too. The migration from Windows 7 to Windows 10 increased the number of graphics calls by 50% to 55%. The use of NVIDIA

vGPU ensured that users didn't take a performance hit; the virtualization software absorbed the extra burden.

Use Cases in Action

While the University of Colorado School of Dental Medicine offers one dramatic case for the value of NVIDIA vGPU, it's not the only success story.

The **University of Maryland's Terrapin Works** adopted NVIDIA vGPU for its digital manufacturing lab, a space available for students, staff and industry — companies that were university partners. In this scenario, the virtualized environment enhanced with NVIDIA vGPU made it possible for team members to collaborate no matter where they were located.

Georgia Tech has leveraged NVIDIA vGPU offerings on Amazon Web Services, as part of an engineering school program for training robots. Anytime there's a requirement to run an application that needs the power of an NVIDIA GPU, users can head to AWS, where it's ready and waiting for them.

The **University of Arkansas** decided to centralize desktop services for its many colleges. IT built a VDI infrastructure as a service available across the entire institution, allowing any student at any of the colleges to access applications and bring up a desktop to run whatever work was required. While this was a big payoff for students, the deployment also offered a major advantage to the IT staff too. Each of those colleges has its own smaller IT group that was spending a significant amount of time managing endpoints, whether they were a desktop, laptop or lab. Reducing the maintenance work freed up time and resources for the IT groups to engage in the higher value projects for their organizations. And by streamlining maintenance through a virtualized environment, IT delivered better service to faculty and staff across campus. Members of IT no longer had to return to their own desktops to get the job done; they could access their tools from anywhere.

The Power of Graphics Virtualization

While plenty of schools already have NVIDIA GPUs for graphics processing, not all are exploiting the power of the virtual GPU. What many are finding is that NVIDIA vGPU solutions are revolutionizing the way universities and colleges help students learn and work in a remote world.

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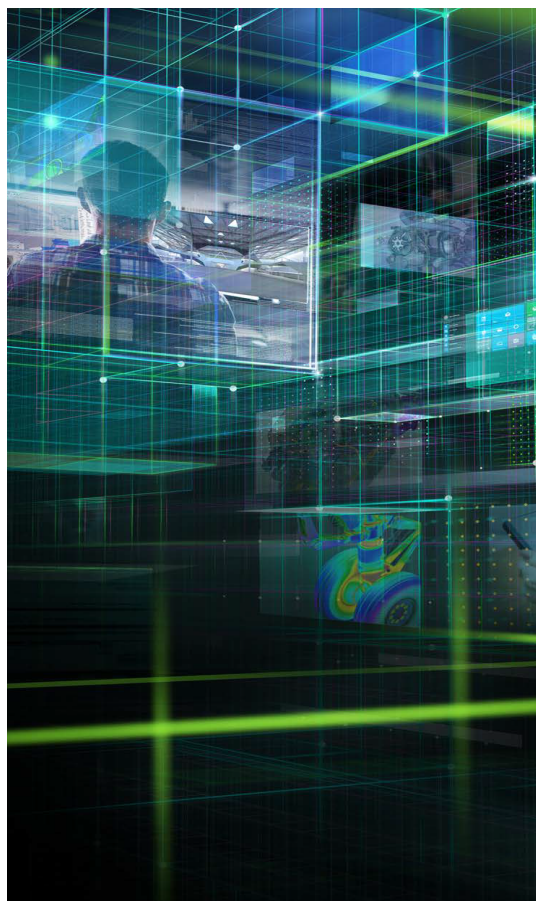
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