The changing technology landscape in higher education

Today’s college and university students are increasingly tech-savvy, bringing a growing number and variety of personal devices with them to campuses. They also bring expectations of using those devices to support their classwork, with access to the same caliber of tools and graphics-intensive applications as they experience personally, day to day.

Educational institutions struggle to keep up with the ever-changing technology needs. They want to offer new ways of learning. Special software and hardware requirements bring students into computer labs to complete their work, adding challenges of scheduling, capacity, and maintenance. These issues, plus the growing interest in remote access options, are causing educational institutions to look for technology solutions that are outside the traditional classroom and computer labs.
Virtual GPUs create a borderless campus

Cisco and NVIDIA present a virtual GPU (vGPU) solution for colleges and universities, enabling them to deliver graphics-intensive applications that meet the performance expectations of students, providing cost-effective access to any application, anytime, on any device. Adding vGPU to virtual desktop infrastructure (VDI) environments allows educational institutions to deliver virtual workspaces that are equivalent to the physical PCs and workstations that students, faculty, and staff use today.

With improved management, security, and productivity, vGPUs offer significant advantages:

- **High-quality performance**: Students get a high-quality user experience with any device, even low-cost Chromebooks and tablets. This applies to traditional computer-lab software as well as Windows 10 and other modern, graphics-intensive productivity software programs. With GPU virtualization, students can work from dorm rooms, classrooms, the library, or off campus, all while using industry-standard and specialized applications. With this kind of flexibility, they can complete work on their own schedules and preferred devices.

- **Foster new learning methods**: New ways of learning, with emphasis on multimedia use, are increasing, from professors using online videos to supplement classroom lectures, to students creating video presentations to better articulate ideas. These methods were once too slow for remote access. GPU virtualization technology offloads tasks from the CPU and, with hardware encode and decode, provides optimized video performance and scalability with a seamless user experience, regardless of device.

- **Virtualize classrooms and labs**: Managing all the physical devices on campus can challenge any IT department, not to mention supporting all the devices that students bring themselves. Centralizing applications in the data center lets IT focus on maintaining virtual desktops that can be delivered to any device. Furthermore, IT can easily manage large-scale virtualization deployments with end-to-end visibility of the institution’s infrastructure and proactive monitoring. Not only does this free up IT resources to work on their projects, but it also makes space in physical computer labs so that they can be repurposed as additional classrooms. Since campus classroom space is often in high demand, a virtual solution can help lessen the demand for more physical computer labs.

- **Grow online and distance programs**: Amidst an increasingly competitive educational landscape, universities are expanding programs to reach more remote students. One of the challenges in this model is providing students with the computing resources they need to complete their studies off campus. With virtual labs, universities can expand their reach with online and distance programs that allow students to work and study remotely. These new programs can reach more students in technical fields and, in turn, grow university revenue and reputation.
How NVIDIA virtual GPU works

In a VDI environment powered by NVIDIA virtual GPUs, the NVIDIA vGPU software is installed at the virtualization layer along with the hypervisor, as depicted in Figure 1. This software creates virtual GPUs that enable every virtual machine (VM) to share the physical GPU installed on the server. The NVIDIA virtualization software includes a graphics driver for every VM. Quadro Virtual Data Center Workstation (Quadro vDWS) includes the powerful Quadro driver. Work that was typically done by the CPU is offloaded to the GPU, so the user experiences improved performance. Demanding engineering and creative applications can now be supported in a virtualized and cloud environment.

Figure 1 The NVIDIA virtual GPU in the virtualization layer

Cisco and NVIDIA Virtual GPU Solution benefits

- Greater mobility, flexibility, and productivity for students, faculty, and staff
- Improved application performance, with a native PC experience on any device
- Support for increasing graphical requirements of modern productivity applications and operating systems
- Support for graphics-intensive applications traditionally only provided in physical computer labs
- Improved security by storing curriculum and intellectual property in the data center
- Increased IT agility, as new content can be loaded and offered in a fraction of the time
- Support for up to four HD or two 4K resolution monitors for enhanced multi-tasking
- Space and real estate savings from virtualizing labs
- Create new revenue opportunities through distance and online courses
- Lower IT management costs by eliminating the need to physically travel to each computer lab and update each machine individually
- Experience zero downtime, even during maintenance with live migration, as updates are pushed to machines automatically from a central location
- Streamlined, unified management for storage, network, and compute with Cisco UCS® Manager, Cisco HyperFlex™ Connect and Cisco Intersight™
- Virtualized desktops and applications, with ability to deploy and manage Cisco HyperFlex edge clusters on a global scale with Cisco Intersight

Cisco UCS and Cisco HyperFlex support improved performance

Cisco UCS further enhances NVIDIA’s graphics performance and the user experience. This powerful platform makes complex files rapidly available to off-campus locations, leveraging capabilities that are critical to distance learning and delivering the following benefits:

- Reduce CapEx and OpEx by virtualizing graphics solutions, offering better IT services, and repurposing expensive dedicated workstations
- Accelerate graphical and general-purpose application performance with NVIDIA GPUs and increase security by reducing data movement
• Take advantage of increased memory capacity with servers that offer up to 3 TB of memory
• Consolidate workloads with the improved CPU performance, increased GPU support, and greater memory capacity of the Cisco UCS M5 portfolio

Cisco HyperFlex can meet a broad range of education-focused IT needs in a hyperconverged environment:
• Achieve agility for distributed environments with centralized data management and ease of use
• Protect critical intellectual property, such as curricula, research projects, or student work, with role-based data security
• Scale to meet graphical and other application needs with NVIDIA GPUs and increased Cisco compute-only nodes, logical availability zones, and high-capacity large-form-factor disk drives

Cisco UCS and Cisco HyperFlex are positioned in the technology stack as shown in Figure 2.

Figure 2  Cisco UCS and Cisco HyperFlex in the technology stack

Virtual GPUs provide a powerful solution
A virtual GPU solution brings a consistent, exceptional user experience to any device, from any location. NVIDIA offers the industry’s highest user-density solution, with support for up to 32 virtual desktops per physical GPU. Cisco provides accelerated application performance, reduced costs, and increased management agility options.

Educational institutions can provide improved application performance, increase flexibility for students to access required program, and significantly lower ongoing IT costs, with exceptional quality of service and broad ecosystem support.

For more information
To learn more about how you can deploy the power of Cisco’s computing infrastructure and NVIDIA’s virtual GPUs to reduce hardware costs, secure intellectual property, increase productivity and improve graphics processing performance, please contact Todd Gambill at Cisco.
For more information about the Cisco-NVIDIA GPU solution for education, visit Cisco desktop virtualization or NVIDIA sites.

Customer focus: Butler County Community College
Budget constraints and the rising costs of maintaining on-site PC labs for graphics-heavy applications threatened the college’s ability to meet students’ needs. A VDI deployment with the Cisco and NVIDIA solution for education resolved access and performance issues, while significantly lowering costs.

For more information, please contact Todd Gambill at Cisco.

Learn more.