Experience Real-Time Collaboration in Architecture, Engineering, and Construction (AEC) with Cisco UCS, Cisco HyperFlex, and NVIDIA Virtual GPU Solutions

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In the architecture, engineering, and construction (AEC) industry, firms often have multiple global and field offices that must collaborate on individual projects. Widely dispersed engineers and architects, as well as external vendors and contractors, form teams that touch all parts of a project cycle from design to construction.

The nature of AEC work requires collaboration and mobility, but the PC hardware needed to run high-end design and AEC applications makes mobility complex and difficult. To meet the needs of today’s AEC teams, firms now turn to virtual workstations to run resource-intensive applications for processing large data models. Engineers in satellite offices can wait up to an hour or more for models to load onto their workstations—impacting productivity and reducing billable hours. With virtual workstations, models can be accessed efficiently and securely.

Complicating matters is version control. Coordinating across locations and servers to make sure everyone has the latest version of a design is a slow and arduous process that increases potential for confusion and error. AEC firms struggle to transfer project files from local workstations to the data center to help ensure version control and improve disaster recovery capabilities.

- Integrated project delivery creates the need for greater collaboration in all project phases
- Travel and IT costs to support this distributed model quickly add up, causing project delays and budget overruns
- Gaps in collaboration and data version control add approximately 15% to 17% in additional construction rework costs

What is GPU virtualization?

GPU virtualization offers every virtual machine similar GPU benefits as a physical desktop. Because work that was typically done by the CPU has been offloaded to the GPU, users have a much better experience. In fact, many professional graphics applications for AEC require a GPU/vGPU as a prerequisite.

NVIDIA virtualization technology accelerates real-time collaboration

Adding NVIDIA virtual GPU (vGPU) solutions—vGPUs and the vGPU software license—to their virtual desktop infrastructure (VDI) environments offers AEC firms significant benefits, including improved security of intellectual property, real-time collaboration for dispersed teams and external partners, improved productivity, predictable performance, and robust version control.

The value of virtual GPUs deliver is extensive:
- **Secure your intellectual property.** Using physical graphics workstations requires users to download project files from the central storage repository. This greatly increases the potential for loss or damage to the firm’s work product. By virtualizing the workstation, critical files never leave the data center. Using desktop broker policy, enterprises can help ensure that these files cannot be copied or downloaded.
- **Collaborate anywhere on any device.** Shifting design models and moving data off physical workstations into the data center secures mission-critical designs and also speeds the design process. Designers and engineers can use the device of their choice to access fully capable 3D virtual workstations with no compromise in performance or user experience. Employees gain mobility and real-time collaboration capabilities through instant access to the applications and data they need from the office, the road, the construction site, or even at home.

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• **Increase productivity with real-time performance.** AEC firms can deliver superior graphics performance to architects and engineers on virtual desktops from the data center as well as support high user density per physical GPU. Users get the same responsive experience in a virtualized environment as they would from a physical workstation, viewing and working with large 2D and 3D models without lag or delay. This translates to increased efficiency and productivity, reducing the risk of project delays and lost billable hours.

• **Help ensure version control for greater consistency.** As design and engineering resources become more dispersed, maintaining version control of data and files becomes increasingly difficult. With NVIDIA vGPU solutions, AEC firms no longer need to worry about errors and rework caused by multiple versions of data residing on local workstations. Centralizing designs in the data center allows greater consistency and control over design changes, resulting in improved quality and enhanced security.

**NVIDIA Quadro Virtual Data Center Workstation (Quadro vDWS) benefits**

- Access to popular design applications—such as Autodesk AutoCAD and Revit, Bentley MicroStation, and Nemetschek Allplan—in a virtualized environment
- Broad support for major hypervisors
- Support for major desktop brokers
- Greater consistency and accuracy through version control
- Reduced design rework through improved collaboration
- More secure access for external suppliers and contractors
- Greater security of data and designs
- Reduced IT management costs
- Faster application load times through reduced data movement
- Increased collaboration through the ability to work productively in satellite locations
- Real-time insight into GPU performance and partner integrations through end-to-end management and monitoring
- Central management of business continuity and disaster recovery through Cisco UCS® Manager
- Better collaboration support through cloud-readiness
- Powerful support for innovation through regular cloud-based software releases

**How NVIDIA virtual GPU works**

In a VDI environment powered by NVIDIA Tesla GPUs, a driver set is installed at the hypervisor layer to enable it to recognize the Tesla cards. During the creation of the virtual machine, a PCI device is added with a specific Quadro vDWS profile that allows the desktop operating system to use physical GPU device capabilities defined by that profile. Once the virtual machine is operational, an NVIDIA device driver is installed so that the operating system recognizes the virtual GPU as a Quadro-capable device. Many professional graphics applications are written to recognize Quadro capabilities.

**Virtualizing productivity applications with NVIDIA GRID and Tesla GPUs on Cisco UCS and HyperFlex**

In addition to engineering and design applications, finance, HR, marketing, and other functions at AEC firms can benefit by virtualizing productivity applications such as Microsoft Office, creative content production, line of business, and other GPU-enabled applications. And IT can benefit from a cost-effective solution that scales VDI across the organization, reduces management costs, and responds to the increasingly graphical requirements of modern productivity applications.

A typical GRID vPC/vApps configuration with GRID software and Tesla M10 or P6 vGPUs supports up to four HD or two 4K displays per user.

Figure 1  The NVIDIA virtual GPU in the virtualization layer
Cisco UCS and Cisco HyperFlex support improved performance

You will enhance NVIDIA’s graphics performance and the user experience with Cisco UCS. This powerful platform makes complex files rapidly available to satellite office and leverages capabilities that are critical to AEC to deliver 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 UCS M5 portfolio
- Virtualize desktops/applications and deploy and manage edge clusters on a global scale with Cisco Intersight™

If you choose Cisco HyperFlex™, you can meet a broad range of AEC-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 architectural designs, 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.