DELL Technologies

NVIDIA

eGuide

Selecting the Right Workstation for AEC Rendering

This eGuide provides key principles for choosing an ideal workstation for real-time ray traced rendering of architectural models.

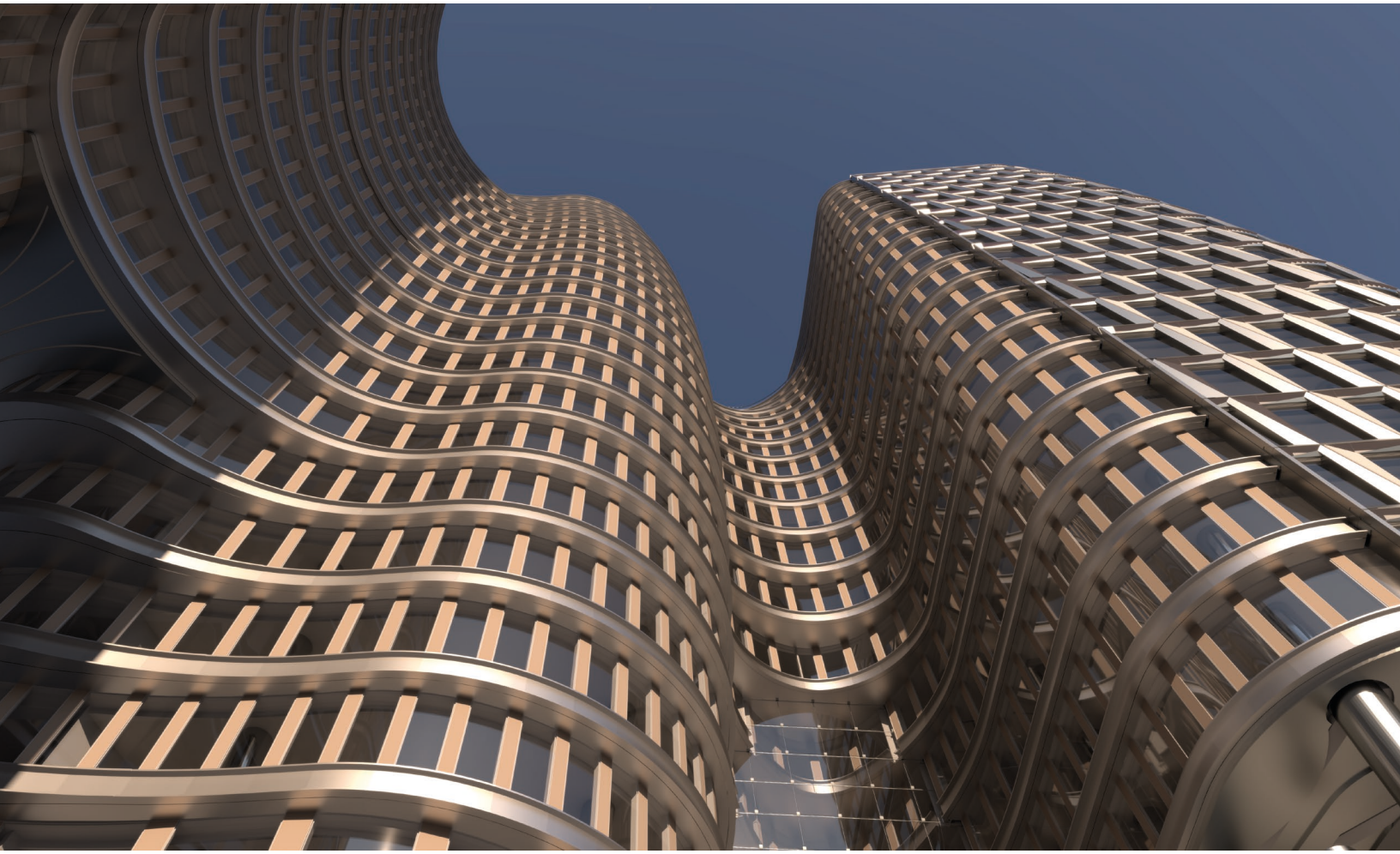

Image courtesy of KPF - Beijing Century City - 北京世纪城市

This eGuide provides key principles for choosing an ideal workstation for real-time ray traced rendering of architectural models. With proper configuration, workstations can help Architecture, Engineering and Construction (AEC) professionals drive faster and better design decision making, speed creation of compelling renders and animations and ultimately deliver competitive advantage.

Putting design visualization tools on the desktops of architects and engineers does come with its challenges. A workstation configured for CAD or BIM is very different to one used for design visualization.

Design visualization has historically been a task reserved for arch viz specialists, but with a new generation of software tools that focus on ease-of-use and task-optimized procedures visualization workflows are now within reach for architects, engineers and other construction professionals.

Design visualization is becoming an integral part of design process, and not just for creating polished stills and animations for planning applications, public consultations, architectural competitions or marketing.

Putting powerful visualization tools into the hands of architects and engineers supports much better decision-making throughout the design process. High-quality visualizations available early on can truly influence the direction a design takes. However, in order to benefit fully, users must ensure they have a correctly configured workstation to handle the workload. Not every computer can deliver the required performance for a satisfactory rendering workflow that allows all users to embrace visualization as an integral part of their role in the design process.

Rather than viewing a building design in Computer Aided Design (CAD) or Building Information Modeling (BIM) software, where the model is typically rendered with simple, shaded faces, design visualization can bring projects to life. Getting greater visibility into a project early on can help identify errors, encourage the exploration of bold ideas, and promote better communication to all stakeholders – technical and non-technical. Importantly, it can lead to

better designed buildings, happier clients and set your AEC firm ahead of the competition.

Putting design visualization tools on the desktops of architects and engineers does come with its challenges. A workstation configured for CAD or BIM is very different to one used for design visualization. In order for architects or engineers to get the most out of new generation visualization tools they may need to invest in new hardware. Dell Precision workstations, desktop and mobile, provide an ideal platform and can be matched to all workflows and budgets.

This eGuide aims to help those responsible for workstation purchases at AEC firms make better informed decisions. First it looks at the new wave of design visualization tools, focusing on real-time ray tracing with NVIDIA RTX™ technology. Then, it explores the workstation technology available in Dell Precision workstations that will support these new workflows, helping guide buying decisions and ensure the right workstation fit. Design visualization can provide incredible insight into a project as it develops, but to exert the greatest influence, the results need to be delivered in real time.

The path to real time

Design visualization has traditionally been done in one of two ways: in real time using rasterization or with much slower ray tracing using Physically Based Rendering (PBR).

Rasterization is a real-time rendering method that takes vector data and turns it into pixels (a raster image). It's this technique that renders models in the viewports of 3D software, traditionally using one of two graphics APIs - OpenGL or DirectX.

The rasterization is done on the Graphics Processing Unit (GPU) and is exceedingly fast – measured in frames per second, rather than seconds or minutes. Huge 3D models can be rendered instantly and manipulated smoothly, but to make the models look realistic it has to 'fake' real world effects. The quality can also vary dramatically from application to application. In CAD and BIM software, for example, the emphasis tends to be on the clear representation of geometry with simple flat shading and it's only in dedicated visualization tools and game engines that the models start to look 'realistic'.

Physically based rendering (PBR), on the other hand, delivers photorealistic results but is very computationally intensive. It traditionally needs the most powerful GPUs or Central Processing Units (CPUs) to do the ray-trace calculations, which can take minutes or hours. PBR precisely simulates light to deliver physically accurate results, calculating how rays bounce off some objects and refract through others, thousands of times. It mimics the way light behaves in the real world.

Real-time visualization and ray tracing have traditionally been supported by two distinct workflows, but now they have converged. NVIDIA RTX technology, which is embedded in NVIDIA RTX GPUs, has laid the foundations for the best of both worlds, real-time ray tracing.

Image courtesy of KPF - Beijing Century City - 北京世纪城市

Interior scene simply shaded inside a BIM environment using proxies for entourage (left) and rendered in Enscape using NVIDIA RTX (right)
Images courtesy of Enscape

Rather than waiting minutes or hours to get the results, ray-trace rendering can now happen in seconds. With high-end GPUs it can even happen in a fraction of second. It means physically accurate and photorealistic visualization can become an integral part of the design workflow and not just a tool for arch viz specialists creating polished stills and animations for client presentations, public consultations or for marketing.

By getting results in 'real time', ray tracing can now encourage more experimentation and more iterations without demanding the time and expertise of arch viz specialists, leading to better designs. In architecture it can be used to visualize intricate details or maximize the quality of light within the building, helping define the position of windows or skylights or the impact of interior colors and surface finish (see image above).

Rather than approximations, reflections off glass are precise and architects can interactively explore the implications of different designs at different times of the day or year. Subtle effects like ray-traced ambient occlusion and ray-traced shadows all combine to create a much more realistic and accurate representation of a building, significantly aiding communication. With new accelerated workflows, it's now possible to collaborate with clients in real time and instantly see the results of change.

The rise of GPU rendering

In years gone by, it was the workstation's CPU that was the only processor that could be used for ray-trace rendering. This is the reason that dual-CPU workstations such as the Dell Precision 7920 Tower have proved so popular with viz artists over the years. More recently, however, there has been a huge rise in GPU renderers.

The GPU was designed originally for computer graphics but its highly parallel architecture and recent advances in GPU technology with dedicated hardware for ray tracing have led to a rise in the use of GPU-based rendering.

Comprising thousands of cores, the GPU can handle thousands of simultaneous calculations. Ray-trace rendering is a massively parallel operation, and because the rays being traced have no dependencies between each other, every

For most AEC workflows, CPU frequency (GHz) should be prioritized over the number of cores. The higher the GHz, the more performance one can get out of the system and of the predominantly single-threaded applications.

core can be used. This also extends to multiple GPUs, so workstations that support more than one GPU, such as the Dell Precision 5820 Tower (up to two GPUs), Dell Precision 7820 Tower (up to two GPUs) or Dell Precision 7920 Tower (up to three GPUs), can dramatically cut render times. It means a firm's most scarce resource – good architectural designers – can get more done every day.

GPU rendering has now gone one step further with NVIDIA RTX GPUs that have been architected specifically for ray-trace rendering with the introduction of dedicated ray-tracing cores as an integral part of the hardware design. These new GPUs introduced to the market in 2018 have had a profound impact on how architects, engineers and other construction professionals interact with their designs.

In the past, some GPU rendering workflows may have been limited by the amount of memory on-board the GPU. But this is no longer an issue. The new NVIDIA RTX GPUs, which are available in Dell Precision workstations, start with 8GB of memory and go all the way up to 48GB. In some Dell Precision desktop workstations, two high-end NVIDIA RTX GPUs can be combined to double the GPU memory through NVIDIA® NVLink®. Now even the largest data sets can be worked with in real time.

One other benefit of GPU rendering is that, with some applications, the workstation's CPU can also help with the ray-trace calculations which can further drive down render times. In fact, some rendering software providers are specifically creating "hybrid" renderers which aim to optimize performance across both the CPU and GPU components in the workstation.

NVIDIA RTX A5000

What is NVIDIA RTX?

The latest NVIDIA RTX GPUs are based on the NVIDIA Ampere GPU micro-architecture and feature three types of cores: CUDA, RT and Tensor. CUDA cores are found in all NVIDIA GPUs and are used for graphics and other parallel processing tasks, but it's the RT Cores and Tensor cores that are unique to NVIDIA RTX.

RT Cores are designed specifically for ray-tracing operations and are much more efficient than traditional CPU-based ray tracing. The technology is advancing quickly: the RT Cores in the new 'Ampere' NVIDIA RTX GPUs are 2nd generation and offer significantly more performance than the RT Cores in the 'Turing' generation NVIDIA Quadro RTX GPUs.

Tensor cores are specialized cores designed specifically for deep learning. In the context of ray-trace rendering they are used for artificial intelligence (AI) denoising which can significantly reduce the time it takes to render, delivering results in real time. The Tensor Cores in the new 'Ampere' NVIDIA RTX GPUs are 3rd generation and also deliver significantly more performance than the previous generation Tensor Cores.

AI-accelerated denoising works by rendering a 'noisy' image with minimal light-ray bounces and then using a neural network to predict what the final image would look like if it were rendered with thousands of bounces. The neural network is trained with tens of thousands of image pairs, where one image has been rendered with one path per pixel and the 'reference image' has been rendered with 4,000 paths per pixel. The neural network learns how to map the different types of noise to the correct denoised pixels. The resulting image looks very similar to one that has been generated with thousands of light bounces, but it's delivered in a fraction of the time.

Image courtesy of HNTB

AI-accelerated denoising can have a massive impact on productivity. It helps keep the user in the creative flow. An architect, for example, can make changes to the design and instantly see the photoreal render in the viewport.

What RTX-enabled software tools are there?

Many leading software developers have already added NVIDIA RTX support to their rendering products and there are more to come.

There are two main types of applications: those that are traditional ray-trace renderers for stills and animations – that have always delivered photorealistic output – and those that started out as real-time viz tools (using rasterization) but are now offering push-button ray-trace rendering with RTX.

In the AEC space, Chaos is one of the leading providers of ray-trace rendering software. The company's core product, V-Ray, is available as a plug-in for a wide range of applications, including Autodesk 3ds Max, Autodesk Revit, Trimble SketchUp, McNeel & Associates Rhino and Maxon Cinema 4D.

The software has harnessed the power of GPU rendering for some time but now RTX support is included in the powerful V-Ray GPU software to give instant feedback on changes within the scene.

The company recently launched Chaos Vantage (formerly Project Lavina) that uses the power of NVIDIA RTX technology to allow users to explore and manipulate V-Ray scenes in real time within a 100% ray-traced environment. This promises to dramatically accelerate the review process, something that has traditionally taken a considerable amount of time because of the need to generate multiple photorealistic assets. Alternatively, it had to be done with a trade off in quality, at low resolution with lighting approximation.

Enscape is an architect-friendly real-time rendering tool that works with Autodesk Revit, Trimble SketchUp, McNeel & Associates Rhino and GRAPHISOFT Archicad. In contrast to many game engines, the software has long-used elements of ray tracing within its OpenGL render engine. But, to make it real-time, Enscape historically had to make compromises on quality, particularly when it comes to reflections on glass and other materials. Now with NVIDIA RTX technology, users of the software can experience physically-accurate reflections and diffuse, indirect lighting at the click of a button, leading to much more realistic visualization and better insight into the impact of design decisions.

RTX technology has also found its way into game engines, which are increasingly being used for real-time visualization in the AEC sector. Epic Games, the developer of Unreal Engine, and Unity both have RTX technology working inside their engines to bring ray tracing to their real time environments. Unity, and Unreal Engine in particular, are used more by arch viz specialists, but the game engines are becoming more architect friendly. For example, Twinmotion, which is based on Unreal Engine and works with many leading BIM tools, is set to support RTX soon.

NVIDIA Omniverse™ Enterprise

Visualization does not have to be a solo effort. NVIDIA Omniverse Enterprise is a new collaborative design platform that enables global 3D design teams working across multiple CAD, BIM and Viz-focused design tools to collaborate in real time in a shared virtual space.

Built around NVIDIA RTX technology, complex, multi-disciplinary AEC scenes can be visualized photorealistically in near real time. With Omniverse View, users can collaboratively build, modify, and enhance a scene with physically-accurate materials and simulation tools.

The Omniverse RTX Renderer used in Omniverse View has two modes: traditional ray tracing for fast performance and path tracing for the highest quality results.

But NVIDIA Omniverse Enterprise is much more than just a high-performance, high-quality renderer. The beauty of the platform is how it enables AEC teams to collaborate in real time while working in their native applications, including Autodesk 3ds Max, Autodesk Maya, Autodesk Revit, GRAPHISOFT Archicad, Trimble SketchUp and McNeel & Associates Rhino, including Grasshopper.

Based on Pixar's Universal Scene Description, the platform acts as a hub. Rather than exchanging and iterating on massive files, NVIDIA Omniverse Enterprise transfers only deltas between applications allowing for real-time interactions. Edit a building façade in Rhino with Grasshopper, for example, and everyone collaborating on the model using any other connected app will instantly see live updates in Omniverse View.

NVIDIA Omniverse

Image courtesy of KPF - Beijing Century City - 北京世纪城市

Choosing a workstation for AEC rendering

Dell offers a range of desktop and mobile workstations that are suitable for design visualization and real-time ray tracing and certified on a wide range of design and rendering software. Dell Precision desktop workstations generally offer more performance and scalability than the mobile workstations. In particular, the higher-end models are highly customizable and able to support more than one CPU with lots of cores, one or more GPUs, and expandable memory and storage.

Of course, mobile workstations have the huge benefit of being highly portable. The recently launched Dell Precision 5560, 5760, 7560, and 7760 mobile workstations offer GPU options ranging from the NVIDIA RTX™ A2000 up to the RTX A5000, making portable rendering work a practical possibility for an architect or visualization artist. While mobile workstations are not always as powerful as desktop workstations, they are still capable of handling very demanding visualization workflows.

Choosing a GPU for rendering

NVIDIA RTX and NVIDIA Quadro RTX GPUs are available in both desktop and mobile Dell Precision workstations. For AEC workflows, there are a range of models:

NVIDIA Turing Generation RTX GPUs	NVIDIA Ampere Generation RTX GPUs
	NVIDIA RTX™ A2000, 4GB (mobile only)
NVIDIA Quadro RTX™ 3000, 6GB	NVIDIA RTX™ A3000, 6GB
NVIDIA Quadro RTX™ 4000, 8GB	NVIDIA RTX™ A4000, 8GB mobile, 16GB desktop
NVIDIA Quadro RTX™ 5000, 16GB	NVIDIA RTX™ A5000, 16GB mobile, 24GB desktop
NVIDIA Quadro RTX™ 6000, 24GB	NVIDIA RTX™ A6000, 48GB (desktop only)
NVIDIA Quadro RTX™ 8000, 48GB (desktop only)	

It should be noted that the Quadro RTX 3000, RTX A2000 and RTX A3000 are primarily available in mobile workstations but there is the option for the Quadro RTX 3000 in the Dell Precision 3240 Compact desktop workstation.

In choosing the most appropriate GPU for a particular workflow one needs to consider both performance and memory.

Multiple GPUs can also be used in a single workstation with supporting software to cut render times further. Depending on the complexity of the scene, and the number of GPUs dedicated to a problem, rendering can even become instant, delivering true real-time ray tracing.

GPU memory also has a very important role. Assets including the model itself, High-Dynamic-Range Imaging (HDRI) environments and textures all have to fit into GPU memory. Memory demands also get bigger when rendering at high resolutions. Assets can be optimized to squeeze them into the available memory, but this can take considerable time and effort and reduce quality.

Some software supports out-of-core rendering, which makes it possible to render scenes too large to fit into GPU memory, but this can result in a performance hit. For the most demanding workflows, NVIDIA NVLink technology can double the amount of GPU memory when two NVIDIA RTX A5000/Quadro RTX 5000 or higher GPUs are used in the same workstation.

For architects and engineers, the Quadro RTX 4000 (8GB) is a good starting point, but those with more demanding workflows, including arch viz specialists, should consider the Quadro RTX 5000 (16GB) and above - or even two or more high-end NVIDIA RTX GPUs. Here, the choice of workstation is important as it will need to have sufficient power, cooling, PCIe slots and physical space to accommodate two GPUs.

GPU performance matters

GPU rendering is an exciting development, but one must not forget that the GPU is a multi-purpose processor and is used for other tasks. For AEC workflows, interactive 3D graphics and virtual reality (VR) are the most important. In these applications performance or frames per second (FPS) is critical.

While an architect might be happy to wait a little longer for a render, if the GPU doesn't have enough power for interactive 3D visualization, especially at 4K and above resolution, then it can dramatically impact the user experience. Rather than having a smooth viewport, it can become choppy, making it hard to navigate or manipulate models. More importantly, if the GPU is underpowered for VR, the end user experience can become unacceptable.

Dell UltraSharp UP3221Q monitor (left) and Dell Precision 5760 mobile workstation (right)

The Dell Optimizer for Precision uses AI routines to help optimize performance for any user-specified app or workflow.

Any GPU that is fast enough for rendering will almost certainly be fast enough for interactive 3D graphics in CAD and BIM software. These applications tend to be predominantly single-threaded in CPU functions, which means a bottleneck can occur in the workstation's CPU and the GPU is left performing at a fraction of its true potential.

NVIDIA RTX GPUs are adept at multitasking. It means they can be used for interactive graphics and ray-trace rendering at the same time. To give an example, an architect could be designing in Autodesk Revit, repositioning the 3D model in the viewport, and batch rendering in the background with V-Ray GPU. If an architect does plan to use multiple GPU memory-hungry applications at the same time – such as Enscape and V-Ray – then they may need a GPU with more memory.

What about the CPU?

When it comes to ray-trace rendering, NVIDIA RTX and Quadro RTX GPUs can now do much of the heavy lifting, but the CPU continues to be the heart of the workstation.

For most AEC workflows, CPU frequency (GHz) should be prioritized over the number of cores. The higher the GHz, the more performance one can get out of the system and of the predominantly single-threaded applications. A high GHz CPU can also help boost 3D graphics performance.

When choosing a CPU, consider the base frequency and the Max Turbo frequency. All the CPU cores are able to run at the base frequency but when fewer cores are busy, the Turbo can be automatically enabled, and select cores may run at a higher frequency to improve performance.

Six cores is now a baseline for workstations and because, in most operations, a lot of CAD, BIM and viz software is single threaded (i.e. it only makes use of a single core) or lightly threaded (i.e. uses a few cores) there is little reason to consider a CPU with more than eight.

There are two caveats to this generalization. First, CPUs with more cores have a bigger cache which can have an impact on performance in some workflows. CPU caches are small pools of memory built into the CPU, which allow the CPU to retrieve frequently used data much quicker than it can from system memory. In Autodesk Revit, for example, a larger cache can provide a performance benefit for computationally-intensive operations such as model regeneration. Second is CPU rendering which is able to scale linearly across all available cores but given the proficiency and performance of ray-trace GPU rendering it is better to balance the system with a more powerful GPU than more CPU cores.

What about memory?

A workstation should always be configured with plenty of memory, so it never fills up completely. If it does, performance can significantly slow down, as the machine then has to page data to its Solid State Drive (SSD) or Hard Disk Drive (HDD).

32GB is a good starting point for an architect using Revit alongside a tool like Enscape. 64GB or more is recommended for those with more intensive workflows, larger datasets and more complex models. Many AEC workflows now require multiple applications to run at the same time and, when run concurrently, these applications can quickly eat into memory. Even an email client, browser and office applications will have an impact.

It's also important to acknowledge that memory requirements will almost certainly change over time. Datasets will get bigger and more complex, and the memory footprint of applications will increase with new releases. With this in mind, it's good practice to invest in a workstation with an excess of memory or with spare DIMM slots for future upgrades.

For best performance, memory should be installed in pairs, quads or sixes, matched to the number of memory channels in the CPU. Having more memory channels means higher memory bandwidth, so the CPU can be fed data much quicker.

Dell Precision workstations are protected from potential crashes thanks to Dell's exclusive patented Reliable Memory Technology (RMT) Pro. Designed to work with Error Correcting Code (ECC) memory, which only works with Intel Xeon CPUs, RMT Pro can automatically detect and isolate memory errors by mapping out bad memory locations after the system reboots. RMT Pro also monitors the health of the memory and alerts the user should the memory ever reach a critical level and need to be replaced.

What about storage?

M.2 PCIe NVMe Solid State Drives (SSDs) are now fairly standard in all Dell Precision workstations. Unlike a rotational Hard Disk Drive (HDD) they have no moving parts so can quickly access data from different parts of the drive, making them very well suited to multi-tasking. The read/write performance of M.2 PCIe NVMe SSDs is also excellent and superior to SATA SSDs. There are significant benefits for viz workflows which tend to use large files, including materials, textures and HDRi environments. The M.2 form factor is also smaller than a 2.5-inch SATA SSD, which has helped reduce the physical size of workstations, particularly mobile workstations.

In the Dell Precision 5820 Tower and other tower workstations, the M.2 NVMe SSDs can be hot swappable, for easy access from the front of the workstation. The Intel Optane SSD, an NVMe drive designed to excel in heavy, concurrent workloads, and the Dell Ultra Speed Drive, an add-in board that can host two or four M.2 SSDs, are also available in some Dell Precision workstations.

M.2 NVMe SSDs used to be expensive but have come down in price considerably. Even so, rotational HDDs continue to offer the best price per GB. HDDs are significantly slower, so should not be used as a primary drive. However, they are good for secondary storage, especially when there is a need to store very large viz assets. Materials, for example, can sometimes be hundreds of MB in size and HDRIs can even be several GB.

RAID arrays enable the creation of a large virtual drive that spans one or more physical drives. RAID comes in many different forms; RAID 0, 1, 5 or 10 are the most common. Depending on the type, the user can get greater performance or redundancy or a combination of the two. Redundancy means that should a drive fail then data is not lost. The user can simply plug in a new drive and it will rebuild the RAID array.

Finally, consider Self Encrypting Drives (SEDs) if data needs to be kept very secure. Some Dell Precision desktop workstations also offer lockable hard drive carriers.

What about expandability?

The Dell Precision 5820 Tower workstation (pictured right) is highly expandable and features a tool-free chassis for easy servicing and upgrades. The FlexBay design supports a range of modules from scalable storage to security options and there's also an externally accessible tool-less (lockable) power supply to minimize downtime in the rare event of a PSU failure.

The Dell Precision 5820 Tower features multiple PCIe slots so it can support one or two GPUs, up to two NVIDIA Quadro RTX 6000s. As it's so easy to upgrade, users can start off with one GPU, then add a second GPU if workflows change. With eight memory slots in a 4-channel architecture with a capacity for 256GB, there is also plenty of scope to add more memory in the future should application footprints or viz models / assets increase in size.

Understanding your system

Dell Precision workstations come with a free software tool called Dell Optimizer for Precision that supports users in three different ways.

First, the Dell Optimizer for Precision uses AI routines to help optimize performance for any user-specified app or workflow. Machine Learning in the Dell Optimizer app evaluates how each identified program consumes resources and identifies opportunities for optimization. It works to improve the performance of storage-heavy applications architectural design and visualization. It also identifies and removes bottlenecks with workload and system analytics, as well as diagnostics to improve utilization.

Second, it monitors how workstation components - GPU, CPU, storage, and memory - are being utilized, in real time or over a set period. Simplified analytics make it easy to identify bottlenecks within the workstation.

Third, it automatically keeps the workstation up to date with the latest BIOS, certified drivers, firmware, and other software. Certified NVIDIA Quadro graphics drivers are particularly important as they can offer more performance and better stability in some pro applications.

Recommended Dell Precision workstations

There are four main Dell Precision workstations that are well matched to GPU-accelerated real-time visualization workflows – two desktop and two mobile workstations.

The Dell Precision 5820 Tower workstation hits the sweet spot for ray tracing on the GPU, supporting one or two NVIDIA Quadro RTX or NVIDIA RTX GPUs – from the Quadro RTX 4000 up to the NVIDIA RTX A6000.

The Dell Precision 3650 Tower workstation is more for entry-level GPU-accelerated viz workflows. It supports a single NVIDIA RTX A4000 or RTX A5000.

For those that need to take design viz on the road, there are two main options.

The Dell Precision 7560 is Dell's most powerful 15-inch mobile workstation but, with a premium and lightweight design, it's still highly portable. It comes with a choice of NVIDIA RTX GPUs from the RTX A3000 up to the RTX A5000. Engineered with Dell's innovative cooling solution the GPUs can be clocked higher, drawing up to 90 watts. It has a 15-inch 4K+ screen with 100% Adobe RGB color coverage which is great for visualization.

The Dell Precision 7760 mobile workstation is designed for the most demanding viz workflows with a choice of NVIDIA RTX GPUs from the RTX A3000 up to the RTX A5000. The Precision 7760 also features superior cooling, which means the GPUs can be clocked higher - drawing up to 115 watts. It has a 17-inch 4K+ screen with 100% Adobe RGB color coverage which is great for visualization.

Matching machines to workflows

Workflow #1

An architect uses Autodesk Revit for design work and a live link to Enscape for real-time visualization, GPU rendering and to explore designs in VR.

Desktop

Entry-level option
Dell Precision 3650 Tower
NVIDIA RTX A4000 (16GB) GPU
Intel® Xeon W-1370P CPU - 8 Core, 3.6GHz, 5.2GHz Turbo
32GB (2x16GB) DDR4 2933MHz ECC Memory
M.2 256GB PCIe NVMe Class 40 Solid State Drive (SSD)
3.5-inch 2TB 7200rpm SATA Hard Disk Drive (HDD)
Windows 10 Pro for Workstations (4 Cores Plus)

High-end option
Dell Precision 5820 Tower
NVIDIA RTX A5000 (24GB) GPU
Intel® Xeon W-2235 CPU - 6 Core, 3.8GHz, 4.6GHz Turbo
64GB (4x16GB) DDR4 2933MHz RDIMM ECC Memory
M.2 1TB PCIe NVMe Class 50 Solid State Drive (SSD)
3.5" 4TB 7200rpm SATA Enterprise Hard Disk Drive (HDD)
Windows 10 Pro for Workstations (4 Cores Plus)

Dell Precision 3650 Tower

Mobile

Entry-level option
Dell Precision 7560
NVIDIA RTX A3000 (6GB) GPU
Intel® Xeon® W-11955M CPU - 8 Core, 2.60GHz, 5.00GHz Turbo
32GB (2x16GB) DDR4 3200MHz ECC Memory
M.2 2280, 1TB, Gen 3 PCIe x4 NVMe, Class 40 Solid State Drive (SSD)
15-inch, FHD, 1920 x 1080, 60 Hz, Anti-Glare, Non-Touch, 100% DCIP3, 500 Nits, WVA
Windows 10 Pro for Workstations (4 Cores Plus)

High-end option
Dell Precision 7760
NVIDIA RTX A5000 (16GB) GPU
Intel® Xeon® W-11955M CPU - 8 Core, 2.60GHz, 5.00GHz Turbo
64GB (4x16GB) DDR4 3200MHz ECC Memory
M.2 2280, 1 TB, Gen 3 PCIe x4 NVMe, Class 50 Solid State Drive (SSD)
17.3-inch, IPS UHD, 3840 x 2160, 60 Hz, Anti-Glare, NonTouchscreen, 100% Adobe, 500 Nits, HDR400
Windows 10 Pro for Workstations (4 Cores Plus)

Workflow #2

An architectural visualization specialist using 3ds Max and V-Ray for producing high quality stills and animations and Unreal Engine for the development of fully interactive real-time experiences.

Desktop

Entry-level option
Dell Precision 5820 Tower
NVIDIA RTX A5000 (24GB) GPU
Intel® Xeon W-2235 CPU - 6 Core, 3.8GHz, 4.6GHz Turbo
64GB (4x16GB) DDR4 2933MHz RDIMM ECC Memory
M.2 1TB PCIe NVMe Class 50 Solid State Drive (SSD)
3.5” 4TB 7200rpm SATA Enterprise Hard Disk Drive (HDD)
Windows 10 Pro for Workstations (4 Cores Plus)

High-end option
Dell Precision 5820 Tower
Dual NVLink NVIDIA RTX A6000 (48GB) VirtualLink GPU
Intel® Xeon W-2245 CPU - 8 Core, 3.9GHz, 4.7GHz Turbo
256GB (8x32GB) DDR4 2933MHz RDIMM ECC Memory
U.2 Intel® Optane™ SSD 905P 960GB Solid State Drive (SSD)
Dual 2.5” 1.8TB 10K SAS 12Gbps Hard Drive (RAID 0)
Windows 10 Pro for Workstations (4 Cores Plus)

Dell Precision 5820 Tower

Mobile

Dell Precision 7760
NVIDIA RTX A5000 (16GB) GPU
Intel® Xeon® W-11955M CPU - 8 Core, 2.60GHz, 5.00GHz Turbo
128GB (4x32GB) DDR4 3200MHz ECC memory
M.2 2280, 1 TB, Gen 3 PCIe x4 NVMe, Class 50 Solid State Drive (SSD)
M.2 2280, 2 TB, Gen 3 PCIe x4 NVMe, Class 40 Solid State Drive (SSD)
17.3-inch, IPS UHD, 3840 x 2160, 60 Hz, Anti-Glare, NonTouchscreen, 100% Adobe, 500 Nits, HDR400
Windows 10 Pro for Workstations (4 Cores Plus)


Dell Precision 7760


Dell Precision 7560

Conclusion

The benefits of real-time ray tracing for Architecture, Engineering and Construction (AEC) cannot be overstated. Better visibility and enhanced communication at all stages of the project can help deliver superior buildings and infrastructure, eliminate costly errors, and keep everything on track.

But to benefit from new real-time workflows, it's essential to let application and workflow requirements, rather than budget considerations, define workstation configurations.

Real-time ray tracing is simply not viable on a workstation designed to run CAD or BIM software with an entry-level to mid-range GPU. Instead, architects and engineers need a machine that is up to the task. A Dell Precision workstation with a dedicated NVIDIA RTX or Quadro RTX GPU enables designers to iterate more and see the impact of accurate lighting, shadows and reflections in real time.

But it's not just about getting higher quality renders back quicker. Ultimately, architects and engineers are being given access to capabilities and optimized workflows that were not available before.

If there is any urgency in making well-aligned investments in new or upgraded workstations, it is to make them before the competition does. After all, a competitive advantage today usually proves to be a competitive imperative tomorrow.

Learn more about Dell Precision workstations with NVIDIA Professional graphics
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