ACCELERATING VIRTUALIZATION IN OIL & GAS
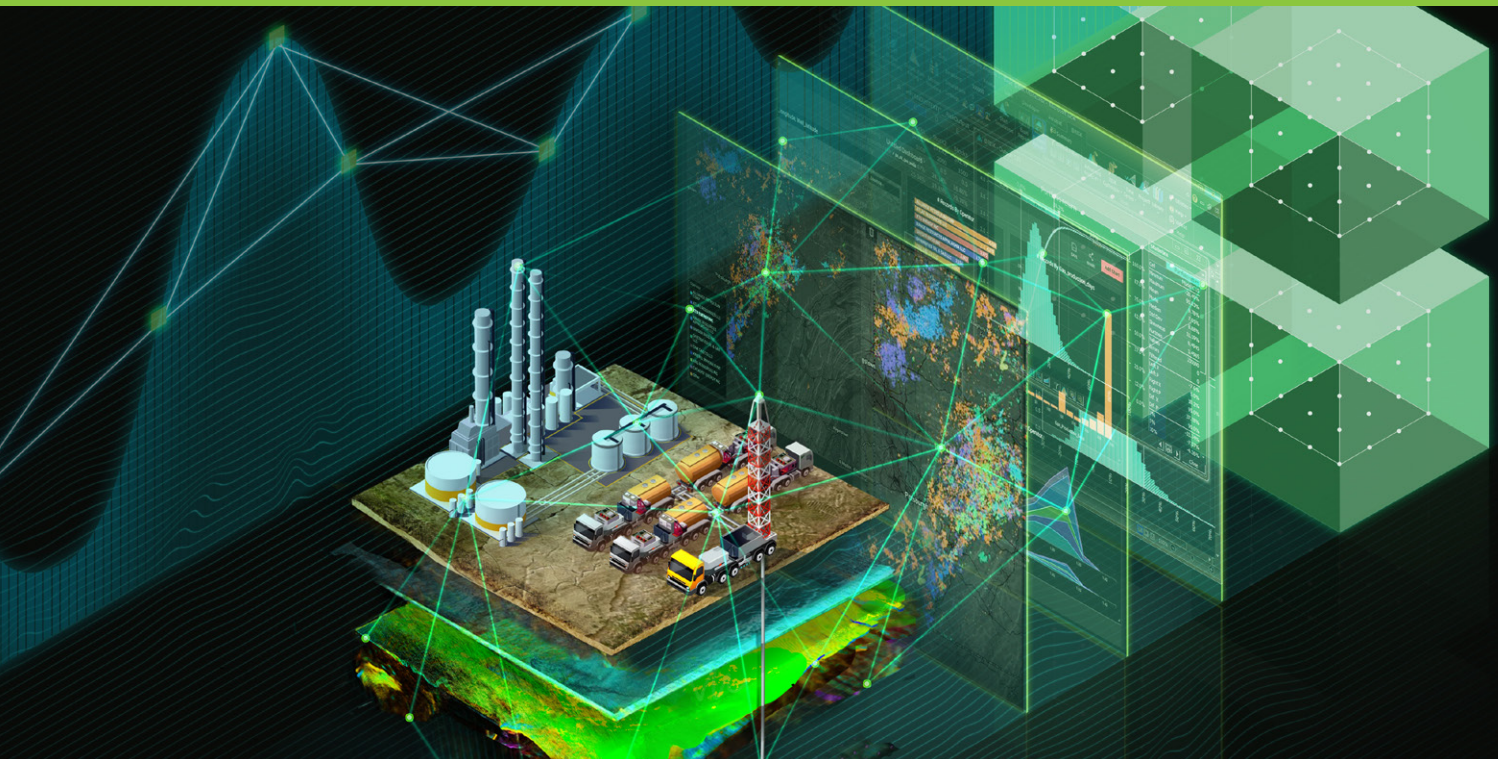
QUICKLY ACCESS MASSIVE COMPUTE RESOURCES, SECURE DATA, AND ENHANCE COLLABORATION

With new oil and gas projects costing tens of billions of dollars, decisions about where to drill and how to maximize reservoir performance must be based on expensive and sensitive data generated by the most sophisticated modeling and simulation technology available.

Understanding the importance of protecting these valuable datasets, oil and gas firms have increasingly focused on better management and security, typically relying on remote systems to keep data backed up in local data centers. This creates long project load- and save-times and tethers geoscientists to traditional workstations or one-to-one data center workstations. Moreover, simulating and analyzing petabytes of data can be slow when real-time access is critical to success.

NVIDIA virtual GPU (vGPU) solutions help oil and gas firms overcome the challenges of processing, analyzing, and securing large datasets, as well as enable the migration of traditional workstations to the data center. With NVIDIA, firms can transform their IT infrastructure, maximize compute resources, and increase user mobility to stay agile in an intrinsically volatile industry that demands efficiency.
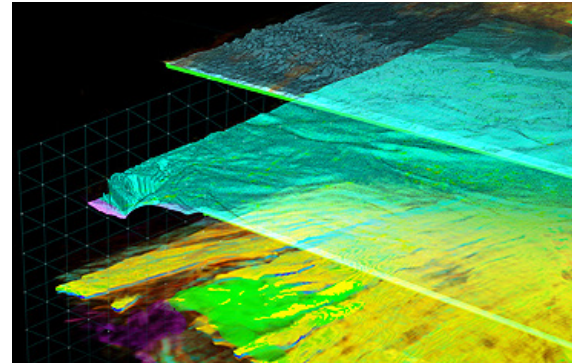
"NVIDIA virtual GPU technology is giving our people the performance they need to do their jobs more flexibly and effectively than ever before, and is also making it easier for us to maintain data security and overall control over our network. It's taken us three years to get to this point, and the wait has been well worth it."

—Corey Elliot, Director of Information Technology
 Legacy Reserves

VIRTUAL GPUs FOR GREATER PRECISION AND EFFICIENCY

With NVIDIA vGPU technology, end-user devices perform as well as traditional workstations and IT management is streamlined. Leading oil and gas firms around the globe trust NVIDIA® Quadro® Virtual Data Center Workstation (Quadro vDWS) software for seismic interpretation and reservoir modeling applications, while NVIDIA GRID® software accelerates their office productivity applications and provides access anywhere, on any device.

Provide Remote Access to Secured Data

NVIDIA virtual GPU technology allows for migration of the traditional workstation into the data center. Not only does this reduce project load- and save-times, it also safeguards expensive and sensitive data. Geoscientists can now access files from home, at the well site, or while traveling. And geographically dispersed teams can collaborate on files without any performance degradation, confident that data is protected and that they're working on a single master file.

Speed Time to Discovery

With multi-GPU support for NVIDIA Quadro vDWS, a single virtual machine can harness the power of up to four NVIDIA GPUs to boost scalability for applications requiring heavy computation resources for data visualization.[3] By speeding up and reducing model processing cycle times, NVIDIA helps images become clearer and sharper, faster. Calculations of seismic trace attributes and visual analysis of complex basins can now be done in real-time, which leads to more effective lease bidding, higher service revenues, and more efficient hydrocarbon discovery and recovery.

Minimize Downtime and Delays

In the oil and gas industry, every day of production represents millions of dollars in investment. NVIDIA's industry-proven stability for both Windows and Linux drivers provides continuous uptime to minimize delays. Plus, live migration of GPU-accelerated VMs means high system availability—IT can perform critical services like workload leveling, infrastructure resilience, and server software upgrades without end-user disruption or data loss.

Maximize Compute Resources

With NVIDIA, teams can utilize the same pool of virtual workstation resources in shifts, ensuring seismic interpretation, reservoir modeling, and engineering tasks can all be completed around the clock with no idle resources. When additional resources are needed to power compute-intensive processes like batch calculations, users can have instant access to additional compute and graphics resources with Quadro Virtual Workstation technology in the cloud.

Better Utilize the Data Center

With live migration, data center resources are always optimally distributed to improve performance and maximize ROI. During the workday, virtual desktops run workloads like seismic interpretation to streamline system functionality and provide faster data for decision-making. After hours, the same compute resources can be dedicated to completing compute-heavy tasks like seismic processing or flow simulation.

Increase Scalability and Manageability

IT administrators can set up virtual desktops for users in geographically dispersed locations in minutes. Rapid scaling of IT resources accelerates production schedules, ensuring productivity is enhanced from Day One and ongoing costs are avoided when projects are complete. Troubleshooting and upgrades can be handled remotely.

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[3] Multi-GPU capabilities supported with NVIDIA Quadro vDWS software October 2018 release (aka vGPU 7.0 or later) and Red Hat Enterprise Linux 7.5 and Red Hat Virtualization 4.2 or later KVM hypervisors.

TESTED AND CERTIFIED FOR ENTERPRISE CLASS RELIABILITY

NVIDIA virtual GPU solutions set the industry standard for virtualized creativity. To maximize performance—and to get the best possible experience from your IT investment—NVIDIA Quadro professional graphics solutions are tested and certified by all the leading workstation OEMs and have received ISV certifications for more than 100 professional applications and IT management tools. What's more, Quadro software drivers are designed for stability and long lifespans.

NVIDIA VIRTUAL GPU SOLUTIONS

Virtualization with NVIDIA QUADRO vDWS and NVIDIA GPUs

NVIDIA Quadro vDWS is ideally positioned for geoscientists and reservoir engineering teams in the oil and gas industry that work on extremely large datasets.

BENEFITS

Speeds up 3D model access, response, and loading for geologists, geophysicists, and reservoir engineers

Supports up to four 4K or two 8K monitors and large frame buffer sizes for increased productivity

Enforces data and intellectual property security in the data center

Consolidates PLM data to enhance consistency

Reduces downtime, even during maintenance, with GPU enabled live migration

Centrally manages business continuity and disaster recovery

Provides access to Quadro Virtual Workstation in the cloud, plus the option to increase resource consumption as needed

Supports multiple NVIDIA GPUs in a single VM to power the most demanding workflows

COMMON APPLICATIONS

Schlumberger Petrel E&P and INTERSECT; Emerson Paradigm18 Geo Suite and SKUA-GOCAD; Halliburton DecisionSpace and Nexus; IHS Markit KINGDOM Suite; CGG GeoSoftware; ANSYS Fluent; Autodesk AutoCAD; Dassault Systèmes SOLIDWORKS and CATIA; and ESRI ArcGIS

Virtualization with NVIDIA GRID and NVIDIA GPUs

NVIDIA GRID Virtual PC (GRID vPC) and Virtual Applications (GRID vApps) are positioned for general-purpose VDI used by knowledge workers and staff in departments like finance, human resources, and marketing to accelerate workflows and provide access to trusted tools anywhere, on any device.

BENEFITS

Supports increasing graphical requirements of Windows 10, modern office productivity applications, and Linux

Supports up to four HD or two 4K monitors for increased productivity

Enforces data and intellectual property security in the data center

Cost-effectively rollout virtualization across your organization for as little as $2 per user per month[4]

Increases employee and contractor mobility

Lowers IT management costs

Support for Linux or Windows

COMMON APPLICATIONS

Microsoft Office, Skype, Adobe Creative Cloud

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[4] Assumes cost of subscription, NVIDIA GRID software, and hardware, with three-year amortization of two Tesla M10 cards supporting 87 GRID vApps users. GRID vPC for VDI starts at $6 per user per month.

CUSTOMER EXAMPLES

Legacy Reserves LP Midland, Texas

After rolling out virtual desktop infrastructure (VDI), Legacy found that slow performance and rendering issues on applications like Spatial Energy Petra and ESRI ArcGIS prevented widespread user adoption. In response, Legacy's IT team migrated users to virtual desktops set up on servers equipped with NVIDIA's virtual GPU technology. When users tried the new implementation, they discovered that performance rivaled the firm's highest-end workstations. Legacy now experiences high user adoption, enhanced data security, and simplified IT management.

Equinor Stavanger, Norway

One of the largest oil and gas companies in the world, Equinor (formerly Statoil) deployed virtualized desktops to its exploration staff as part of an initiative to maximize efficiency across its business. NVIDIA graphics acceleration helped the firm migrate from blade servers to a fully virtualized infrastructure and run its most demanding subsurface and engineering applications from central server facilities. Today, exploration teams across 36 countries can collaborate on projects from anywhere, on any device, and the firm has realized a significant reduction in capital expenditures and operational costs.

Ouro Preto Óleo e Gás Rio de Janeiro, Brazil

With geologists, geophysicists, cartographers, and engineers in multiple locations, Ouro Preto needed to virtualize 2D and 3D applications like Schlumberger Petrel and Halliburton Landmark to increase mobility and lower IT costs. Using NVIDIA virtual GPU technology, the firm was able to deliver graphics-intensive applications from the cloud to professionals out in the field on their computers, tablets, and even their cellphones. Ouro Preto teams now enjoy local workstation-like performance in the palm of their hands.
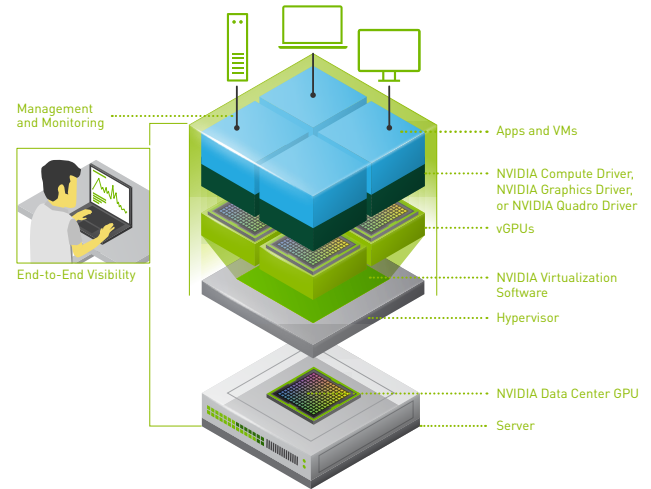
KEY OIL & GAS USER GROUPS

	GEOLOGISTS, GEOPHYSICISTS, RESERVOIR ENGINEERS	DRILLING ENGINEERS, CAD/CAE USERS	ACCOUNTING, MARKETING, HUMAN RESOURCES, STAFF
USE CASES	For remotely viewing and editing massive datasets and complex 2D/3D images	For remotely viewing and editing 2D and 3D mechanical images	For general purpose VDI, using virtualized Windows 10 or Linux desktops and common office productivity applications
RECOMMEND	Quadro vDWS with up to four NVIDIA V100S, Quadro RTX 6000, RTX 8000, or P6 for blade server form factors (supports up to four 4K or two 8K displays)	NVIDIA Quadro vDWS with up to four NVIDIA T4, P4, or P6 for blade server form factors (supports up to four 4K or two 8K displays)	NVIDIA GRID vPC/vApps on NVIDIA M10 or P6 for blade servers (supports up to four HD or two 4K displays)

HOW NVIDIA VIRTUAL GPUs WORK

In a VDI environment powered by NVIDIA virtual GPUs, NVIDIA virtual GPU software is installed at the virtualization layer, along with the hypervisor. This software creates virtual GPUs that let every virtual machine (VM) share the physical GPU installed on the server, or you can allocate multiple NVIDIA GPUs to a single VM to power more demanding workflows. The NVIDIA software includes a graphics driver for every VM. Quadro vDWS, for example, includes the powerful Quadro driver. Because work that was typically done by the CPU is offloaded to the GPU, the user has a much better experience, and demanding engineering and creative applications can now be supported in a virtualized and cloud environment.

Management and Monitoring

End-to-End Visibility

Apps and VMs

NVIDIA Compute Driver, NVIDIA Graphics Driver, or NVIDIA Quadro Driver

vGPUs

NVIDIA Virtualization Software

Hypervisor

NVIDIA Data Center GPU

Server

WHAT MAKES NVIDIA VIRTUAL GPUs POWERFUL

EXCEPTIONAL USER EXPERIENCE
Superior performance, with the ability to support both compute and graphics workloads for every vGPU

BEST USER DENSITY
The industry's highest user density solution, with support for up to 32 virtual desktops per GPU, plus lower total cost of ownership (TCO) with up to 9 vGPU profiles for the most flexibility to provision resources to match your users' needs

CONTINUOUS INNOVATION
Regular cadence of new software releases that ensures you stay on top of the latest features and enhancements

PREDICTABLE PERFORMANCE
Consistent performance with guaranteed quality of service, whether on-premises or in the cloud

OPTIMAL MANAGEMENT AND MONITORING
End-to-end management and monitoring that delivers real-time insight into GPU performance, as well as broad partner integrations so you can use the tools you know and love

BROADCAST ECOSYSTEM SUPPORT
Support for all major hypervisors and the most extensive portfolio of professional apps certifications with Quadro drivers

For more information, visit **www.nvidia.com/virtualgpu**