



LENOVO DELIVERS DRAMATIC ADVANCES

in Oil and Gas with HPC



For companies in the energy industry who need to find, extract, and market hydrocarbon products faster, safer, and more efficiently, HPC solutions dramatically advance the state of science and accelerate innovation with advanced data processing, analysis, and visualization capabilities. This rapid iteration of workflow execution to identify faults and failure scenarios sooner, delivers higher quality results, faster. Simulation, made possible only by the raw compute and graphics power of HPC, is a more efficient method of research and development, as well as safer than real-world testing for many disciplines.

Cuts in oil production, continued pressure to reduce costs, and changes in the marketplace and its laws continue to put pressure on the industry. However, **the digital revolution in the Oil and Gas industry** is helping to

drive new innovations that increase drilling efficiencies and create new opportunities to help companies who embrace it. It's often the complex data landscape that deters companies from achieving maturity in digital transformation. **According to Deloitte**, companies need a strategic road map that helps them assess the digital standing of every operation and identify digital leaps for achieving specific business objectives.

Accenture agrees that it's time for the energy industry to exploit technology advances around real-time sensor monitoring, data collection, automation and analytics. However, achieving the benefits of digital transformation in Oil and Gas requires the most advanced workload processing and storage systems available to make fast and accurate decisions.

Oil and Gas shift powered by HPC

Lenovo is helping energy companies deliver on the promises of advanced analytics, driving previously unattainable results in simulations and seismic processing through implementation of HPC solutions. Solutions include:

- Advanced surveying techniques to identify the location and character of gas and petroleum deposits.
- Accurate reservoir simulations.
- Seismic data processing.

industry safety requirements. Lenovo HPC and storage solutions support the data and analytics needs of these applications, making it possible to drive these advanced uses of technology in a cost-efficient deployment.

Improve processes to reduce out costs and increase profits

Lenovo HPC solutions offer an advantage with ultra-high-performance computing to reduce cycle times, helping you evaluate a wider range of choices in energy and perform deeper analysis on data compared with traditional IT. Growth in IoT adoption continues to drive digital transformation and uncover new business opportunities. Only HPC systems offer the capacity and low-latency processing needed to power real-time collection and analytics on large volumes of data. Lenovo HPC systems provide flexibility to handle the different types of workloads energy analytics require.

Advanced safety and security

Using advanced simulation and data analytics techniques are safer overall compared with real-world testing. Lenovo HPC systems are powered by Intel® Xeon® Scalable Processors and have fast data storage and interconnect fabric to deliver advanced visualization using remote display and virtual desktop infrastructure (VDI) technology. All of which helps you identify faults and failure scenarios sooner.

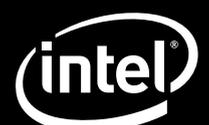
Additionally, the advanced end-to-end security built into Lenovo's on-premise HPC solutions is key to safe operations. It also helps by keeping critical data in house to reduce risk of breaches, further reducing operational risk. Overall, Lenovo HPC drives a safer, more secure, and more efficient method of exploration and development, helping to improve quality along the way.

Modernizing Oil and Gas infrastructures and systems

The operational demands and challenges, coupled with market pressure and the need for safety in the energy industry require innovative solutions based on the latest IT. Don't let out-of-date infrastructure prevent you from improving efficiency. Lenovo HPC solutions seamlessly integrate with your existing systems to increase workload capacity. Lenovo can provide complete infrastructure delivery at the rack level, with a single point of support for compute, storage, and interconnection fabric. Lenovo HPC will help modernize your IT and enable your business to deliver new services as needed.

The Oil and Gas industry has the potential to be transformed by the digital technologies driving these solutions. To remain profitable, however, companies must also consider how to gain operational efficiencies through improved use of this technology.

According to this [InfoQ report on digital transformation](#), deployment of Internet of Things (IoT), and sensor-based smart energy solutions results in improved field communication, reduced maintenance, real-time data collection and analysis, automation for improved safety and efficiency, and greater security overall. The energy industry is increasingly relying on new innovations such as augmented reality (AR) and 3D virtual planning, simulation and visualization technologies to improve operational procedures, visualize data collected in real-time, and meet



One of the advanced areas of innovation in Oil and Gas exploration today requiring modern high-performance infrastructure is virtual visualization. With the availability of advanced analytics processing capability in the hands of geophysicists, reams of data never before analyzed are being used to pinpoint where and when to drill, and for how long. Data needs to be visualized and used in all prospects for generation and at the well head in production. This requires collaboration from multiple groups across global regions, and the ability to view high definition displays, requiring high performance infrastructure. Lenovo has partnered with industry leaders **Mechdyne**, and **PCPC** to help build this solution with a Lenovo HPC infrastructure. Lenovo HPC system infrastructure, built on Intel® Xeon® Processors, is improving big data analysis and end-to-end processes with real results. Lenovo is particularly well positioned to offer integrated, best-in-class, compute, interconnect and storage solutions tailored for the workloads required to find, extract, and market hydrocarbon products.

ROI is quicker with HPC

Recent research by **Hyperion** has shown that, on average, for each \$1 invested in HPC in Oil and Gas, \$416 revenue is generated and \$54 of profit.

ROI with Lenovo HPC systems can be achieved through greater innovation, process optimization, and the creation of new solutions and research opportunities. The research above revealed that a larger number of innovation examples exist in general research, manufacturing, academia, finance, life sciences, and Oil and Gas than in other segments, and that overall profits increase when HPC systems are used in Oil and Gas.

With access to results sooner, reduced costs, with improved modelling and simulations, a scalable Lenovo HPC solution both increases collaboration across your organization and streamlines actual drilling activities. Additionally, the increased

systems integration Lenovo HPC offers allows you to focus on process optimization, not hardware assembly.

Lenovo HPC benefits and differentiators

Lenovo HPC delivers high-performance and large memory systems, software, and solutions to meet the demanding challenges of drilling, and energy research and generation applications. These include Intel® Xeon® Scalable Processors, fast data storage utilizing Intel SSDs, high speed Intel® Omni-Path® fabric interconnect and technology that can massively scale-out, while maintaining enterprise-class security standards to minimize risk. Combined with Lenovo ThinkSystem Servers to drive big data, analytics, innovation and efficiency in exploration and related fields.

Lenovo HPC solutions are designed with a building-block approach to simplify management and enable customized expandability. To achieve this, Lenovo has partnered with other leaders in the IT industry. For example, the converged infrastructure of the Lenovo HPC portfolio combines advanced data storage clusters with the maximum flexibility and workload processing of Intel® Select Solutions driven by Intel® Xeon® Scalable Processors. Additionally, Lenovo partners with **SUSE** to provide a fully supported set of the most in-demand tools and components used in HPC environments.





Case studies in success

Lenovo, the leading vendor on the TOP500 list of the world's fastest supercomputers, has been successful in the HPC workgroup segment and are seeing customers deploying systems into a variety of industries. Many of our customers are using Hadoop clusters to extract value out of their Big Data repositories. Oil and Gas is a good example of a vertical where customers can utilize Lenovo ThinkServer for the Hadoop portion of their data flow and implement Lenovo ThinkStation for the visualization portion. Specifically in the Oil and Gas vertical, much of the unstructured data in the ingestion phase comes from SCADA reports, production actuals, refinery output, truck logs, pump transactions, drilling reports, seismology reports, and so on. This portion of the data model is ideal for Lenovo servers, and many Lenovo customers have deployed our systems for this exact purpose.

Instead, there's a proven full-stack solution, with a straightforward user interface, that is uniquely specified to support your applications and research. Coupled with access to experts for your particular challenges and a single point of support; you're simply able to analyze faster, from a deeper store of data, and make more insightful decisions.

The Lenovo ThinkSystem range of servers provide a flexible, agile foundation for your HPC cluster. These include:

- The ThinkSystem SD530 for large, scale-out computational fluid dynamics, impact analysis, and 3D VDI. With Lenovo's innovative Shared-IO technology, this system allows for latency gains while reducing overall interconnect costs.
- Low-latency network solutions from Lenovo, including Intel® Omni-Path® Architecture and InfiniBand fabrics.
- Lenovo LeSI (Lenovo Scalable Infrastructure) for designing, integrating and delivering complex data center solutions.
- Lenovo LiCO (Intelligent Computing Orchestrator) software stack to simplify AI and ML-based deployments in an enterprise environment.

Lenovo HPC Solutions

Customers building clusters for AI training can benefit from a partner's guiding hand. To that end, Lenovo has developed a GUI for some of the most popular and powerful open source AI and HPC software and libraries.

Lenovo intelligent Computing Orchestration (LiCO) greatly reduces AI's complexity and improve a customer's turnaround time for both AI training and end results.

With Lenovo HPC, there's no barrier to interacting with sophisticated, award-winning computing capabilities.

Lenovo HPC is a proven solution that leads the way for faster, more thorough exploration. As risks and guesswork are left behind in favor of big data and intricate simulations, optimized HPC with support from a Lenovo specialist team will put you ahead. Lenovo delivers high levels of sophistication, with a simplified and streamlined HPC solution to help you quickly scale up when events occur without putting pressure on your internal teams.

The improved innovation supports you in finding new reserves and replace existing ones, at a much lower total cost than other options. In an increasingly uncertain market, Lenovo HPC lets you compete more effectively by responding quicker and exploiting opportunities with greater confidence.



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