



# AI & HPC for the Energy Sector

Reduce the time and cost of  
discovery with artificial intelligence  
and High Performance Computing



## ENERGIZE THE FUTURE

# Data is the key to meeting the increasing demand for energy

Oil and gas companies understand the competitive benefits of technology and are often the driving force behind groundbreaking innovations. The drive to extract value from multiple petabytes of raw data has put the oil and gas industry at the leading edge of advanced computing technologies, such as artificial intelligence (AI) and High Performance Computing (HPC). Together AI and HPC can accelerate seismic analysis, reservoir modeling, computational chemistry, natural resource management and more.

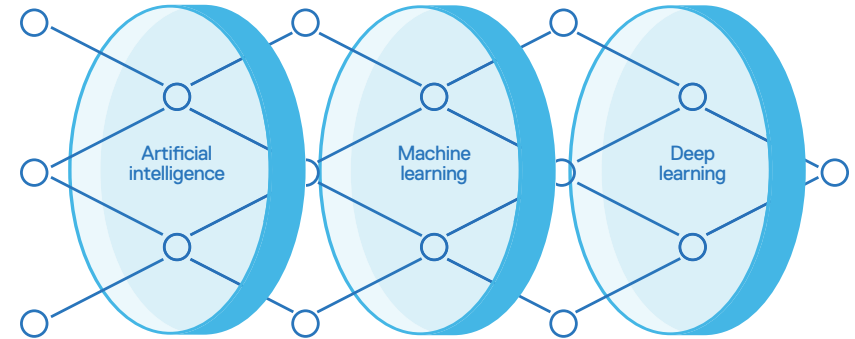
In fact, the sheer size of the computational challenges involved in discovery has made the oil and gas industry one of the largest users of HPC, using advanced computing technologies to fuel the algorithms that promise to precisely pinpoint elusive oil and gas reserves — and fuel the future more efficiently.

## USE DATA MORE EFFECTIVELY

AI is a complex set of technologies underpinned by machine learning (ML) and deep learning (DL) algorithms, typically run on powerful HPC systems. Together, they enable oil and gas companies to harness data to find energy reserves sooner and more cost-effectively.

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The capabilities of AI, ML and DL can unleash predictive and prescriptive analytics on a massive scale. Like lenses, AI, ML and DL can be used in combination or alone — depending on the use case — to focus in on answers to oil and gas exploration challenges.



**AI** is an umbrella term that describes a machine's ability to act autonomously and/or interact in a humanlike way.

**ML** refers to the ability of a machine to perform a programmed function with the data given to it, getting progressively better at the task over time as it analyzes more data and receives feedback from users or engineers.

**DL** uses artificial neural networks (ANNs), inspired by the human brain, to process huge volumes of data. ANNs allow the machine to determine on its own if a prediction is accurate so that it can train itself without human intervention.

Data scientists can use AI, ML and DL to gain deeper, more accurate and more cost-effective insights that can help answer some of the greatest challenges of searching for oil and gas reserves.



# How AI and HPC are being used by oil and gas companies

Advanced computing is changing how oil and gas companies find and produce energy sources. The following is just a small sample of ways oil and gas companies can leverage AI and HPC to improve the time and cost of production.

1

## Data processing

### **Process raw data more quickly and accurately**

AI and HPC can help speed the processing of raw data from well logs, seismic, gravity and magnetic surveys to remove various types of noise, leaving just the primary signal of interest.

2

## Reservoir modeling and simulation

### **Better predict the flow of oil, water and gas**

HPC speeds the creation of 3D models while making it possible to bring HPC closer to exploration sites, improving performance and reducing costs. ML models can be used to predict rock properties, improving reservoir model data quality for higher yield at lower cost.

3

## Seismic processing and interpretation

### **Make better informed drilling decisions**

HPC provides the intensive compute, storage and throughput required to convert hundreds of TB of raw data into useful subsurface models. AI and ML can be used to build, train and deploy models to improve the efficiency and speed of seismic interpretation using DL.



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4

## Computational chemistry

### Reduce and manage subsurface uncertainty

While HPC alone can speed computational chemistry workloads to improve time to discovery, integrating AI enables hyper-predictive models for identifying chemical compounds. This significantly impacts exploration costs and timelines.

5

## Production optimization

### Avoid wasted resources

AI and ML running on powerful HPC clusters can be trained to predict where and how to drill to maximize net present value. These models can be trained using geological, drilling, and seismic data to predict the production from a target well during its first months of operation.

## PROVEN EXPERTISE

# AI and HPC systems from an industry leader

While AI and HPC might seem like the latest IT trends, Dell Technologies has been a leader in HPC for over a decade.

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As an industry leader in AI and HPC, Dell Technologies offers proven products, solutions and expertise that reduce complexity and help you capitalize on the promise of using technology in the Energy market. Working closely with our partner ecosystem and industry providers, we deliver solutions inclusive of infrastructure, applications and services.

## Dell Technologies

**Dell Technologies** helps organizations and individuals build their digital future and transform how they work, live and play. We provide customers with the industry's broadest and most innovative technology and services portfolio for the data era. Together, we help you explore the possibilities of AI and HPC, introduce it into your organization, and use it to speed and improve results.

Dell Technologies is committed to a culture of integrating ethics and compliance into daily decision-making. We believe in acting ethically in everything we do. It's good business and important to our customers, suppliers and strategic partners. As a result, critical programs have been developed to address key risks across the enterprise, creating trust with our customers.

## DELIVERING VALUE

# The AI and HPC value chain

Wherever you are on your journey, Dell Technologies delivers AI and HPC systems that fulfill your needs.

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With an extensive portfolio, years of experience and an ecosystem of curated technology and service partners, Dell Technologies is ready to help you to capitalize on the promise of AI and HPC.

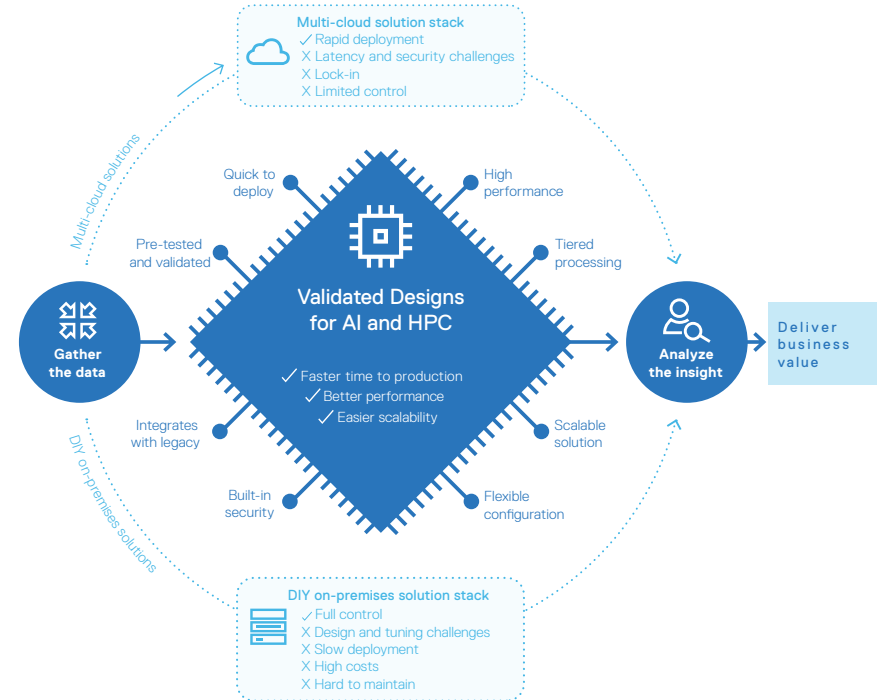
- **Extensive portfolio:** Dell Technologies uniquely provides a portfolio of technologies — spanning workstations, servers, networking, storage, software and services — to create successful AI and HPC implementations. What's more, Dell Technologies provides accelerated performance, efficiency and expertise to help you adapt as AI evolves.
- **Years of experience:** AI and HPC are evolving quickly and not many organizations have the skills to design, deploy and manage advanced computing systems. The Dell Technologies HPC & AI Innovation Lab team stays on the cutting edge of AI, testing new technologies, and tuning algorithms and applications to help you keep pace with this constantly evolving landscape.
- Our team of industry and technology experts can help you achieve faster time to results by shortening both design cycle and configuration times. These experts will work with you to create a configuration with the right features, at the right price. You can even take a test drive with a proof of concept in one of the Customer Solution Centers.
- **Curated partnerships:** Dell Technologies works closely with partners, such as Intel®, AMD®, NVIDIA®, Bright Computing® and others to optimize solutions, leveraging technological advancements and expertise.

## SIMPLIFYING THE COMPLEX

# Validated Designs for AI and HPC

Designing and deploying an HPC system for AI and other workloads with the performance and scalability required can be complex.

Dell Technologies has invested to create a portfolio of Validated Designs to speed time to results with the confidence of engineering validation, enabling business without boundaries. They provide proven solutions that have been optimized, tuned and tested for a variety of key use cases. They include the servers, storage, networking, software and services that have been proven in our labs and in customer deployments. Plus, the modular building-block approach provides a customizable yet validated method for deploying new clusters or upgrading existing systems.





## THE BENEFITS

# Validated Designs for AI and HPC

Dell Technologies Validated Designs simplify IT transformation, helping you solve challenges faster.

### OPTIMIZE INVESTMENTS

- Solutions tailored to speed deployment, help eliminate potential software and hardware issues, and optimize performance.
- Flexible, industry standard building blocks of compute, networking and storage are tested and tuned with your AI and HPC applications by Dell Technologies engineering teams.
- Available consulting, education, deployment, support and remote management services optimize solution productivity and efficiency.

### SCALE EASILY

- A flexible building block approach easily scales over time.
- Add resources such as memory or hard drives inside Dell EMC PowerEdge servers.
- Add external storage with Dell EMC PowerVault storage arrays or PowerScale scale-out network-attached storage (NAS).

### REDUCE RISK

- Dell Technologies engineers and industry experts work in collaboration with you and our partners to design, deploy and scale AI and HPC solutions for specific applications. This saves time and reduces the risk of potential hardware and software issues.
- Around the world, more than 35,000 Dell Technologies Services and Support experts are available every step of the way with consulting, education, deployment, management and support.<sup>1</sup>
- Dell Technologies is an industry leader in creating HPC solutions — regardless of size or complexity — that deliver fast setup with a wide range of optional services. With proven success in thousands of implementations worldwide, you can be confident growing with Dell Technologies.

## THE DELL TECHNOLOGIES DIFFERENCE

# Services and financing

Dell Technologies partners with you every step of the way, linking people, processes and technology to accelerate innovation and enable optimal outcomes.

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- [APEX](#) enables you to consume best of breed Dell Technologies innovation as-a-Service, unlocking the flexibility you need to adapt and thrive.
  - [Consulting services](#) are delivered by certified experts to help you get the business value of advanced computing. The services include an assessment, workshop, testing, proofs of concept and production implementation. These experts help determine where advanced computing is a good fit for your organization. They also help you build your own internal team of experts through knowledge transfer at each step.
  - [Education Services](#) offers courses and certifications in data science and advanced analytics through self-paced online labs and instructor-led workshops.
  - [Deployment](#) experts have the experience, expertise and best practices to enhance your success with AI and HPC solutions.
- With a proven track record of success in thousands of engagements worldwide, you can rely on Dell Technologies as your partner.
- [Support](#) experts can provide comprehensive hardware and collaborative software support 24x7 for optimal system performance and minimized downtime. ProSupport includes next-business-day on-site service with four- and eight-hour parts-and-labor response options, and escalation management with customer-defined severity levels. You can also opt for ProSupport Plus to get a Service Manager, who serves as a single point of contact for your support needs.
  - [Financial Services](#) offers a wealth of leasing and financing options to help you find opportunities when your organization faces decisions regarding capital expenditures, operating expenditures and cash flow.

## GET IN TOUCH

# Contact us

To learn more, visit [delltechnologies.com/hpc](https://delltechnologies.com/hpc) or [contact](#) your local representative or authorized reseller.

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[ai.assist@dell.com](mailto:ai.assist@dell.com)

# Online resources

[delltechnologies.com/ai](https://delltechnologies.com/ai)

[delltechnologies.com/hpc](https://delltechnologies.com/hpc)

<sup>1</sup>Dell Technologies, "[Dell Technologies Key Facts](#)," accessed November 2021.

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