

The Dell Technologies logo is positioned in the top left corner. It features the word "DELL" in a bold, white, sans-serif font, with a stylized "E" that has three diagonal lines. To the right of "DELL" is the word "Technologies" in a smaller, white, sans-serif font. The background of the entire slide is a space-themed image showing the curvature of the Earth from space, with a bright sun or star on the right side creating a lens flare effect, and several other stars scattered across the dark blue sky.

DELL Technologies

AI and HPC for Research

Make breakthroughs faster with artificial intelligence
powered by high performance computing systems

GET ANSWERS FASTER

Data is the key to unlocking the secrets of the universe.

To make discoveries faster, academic and research institutions must move quickly from raw data to actionable insights. Research projects often involve collecting and processing massive amounts of data to simulate complex systems.

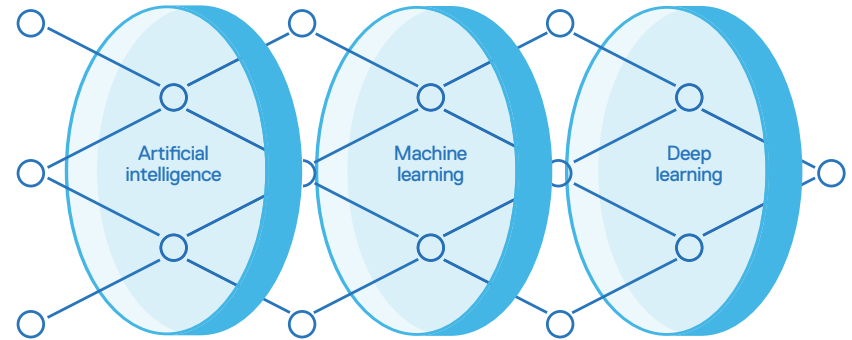
For decades, high performance computing (HPC) has been a powerful tool for scientific and academic research institutions, speeding workloads and improving time to results. Now, rapid advancements in processing power combined with massive amounts of real-time data are enabling the adoption of artificial intelligence (AI) for research institutions across a variety of use cases.

The convergence of HPC, AI and analytics is giving researchers the power to accelerate the pace of discovery, creating more opportunities to break new ground, make important discoveries and solve some of the most important challenges of our time.

THE INTELLIGENCE BEHIND FASTER BREAKTHROUGHS

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 researchers to harness data to help them find answers, faster.

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 research challenges.



AI is an umbrella term that describes a machine's ability to act autonomously and/or interact in a human-like 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.

Researchers can use AI, ML and DL to gain deeper, more accurate and more cost-effective insights that can help solve some of the world's greatest challenges.

How AI and HPC are being used for research

Advanced computing is changing how researchers approach grand challenges. The following is just a small sample of how researchers are leveraging AI and HPC to realize their visions of a better world.

**1**

Genomics

Solve the mystery of the human genome

HPC enables researchers to sequence DNA much faster than ever before, and AI can be trained to identify patterns and make predictions about an individual's odds of developing a disease or responding to interventions.

2

Instrumentation

Aid medical breakthroughs

In the field of cryo-electron microscopy (cryo-EM), for example, HPC enables the 3D visualization of proteins at a near-atomic level to help AI deliver significant insights in areas like immunology and cancer research, as well as other diseases.

3

Molecular dynamics and quantum physics

Simulate the behavior of atoms and molecules

AI and HPC can now be harnessed to predict molecular wave functions and the electronic properties of molecules, enhancing researchers' understanding of the quantum behavior of nature.

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**4**

Astronomy

Unlock the secrets
of the universe

Powerful HPC systems can be used to process and analyze data from large telescopes such as the Large Synoptic Survey Telescope (LSST), the Cherenkov Telescope Array (CTA) and the Square Kilometre Array (SKA).

5

Climate and weather modeling

Improve the accuracy
of predictions

AI and HPC can be used to model the oceans, atmosphere, sea-ice, land surface, global carbon cycle and chemistry, and aerosols to simulate weather and climate changes and predict the formation, intensity and movement of weather systems.

6

Geosciences

Understand our planet

HPC-enabled AI algorithms enable geoscientists to identify patterns and trends in geological data to predict and model vast systems with very high accuracy. AI models can be used to enhance the prediction of disasters such as earthquakes, volcanic eruptions and landslides.

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.

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 faster research breakthroughs. Working closely with our partner ecosystem and industry providers, we deliver solutions that include infrastructure, applications and services.

Dell Technologies

Dell Technologies helps organizations and individuals build their digital future and transform how they work, live and play. The company provides 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 research outcomes.

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 value chain

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

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 promises of AI and HPC.

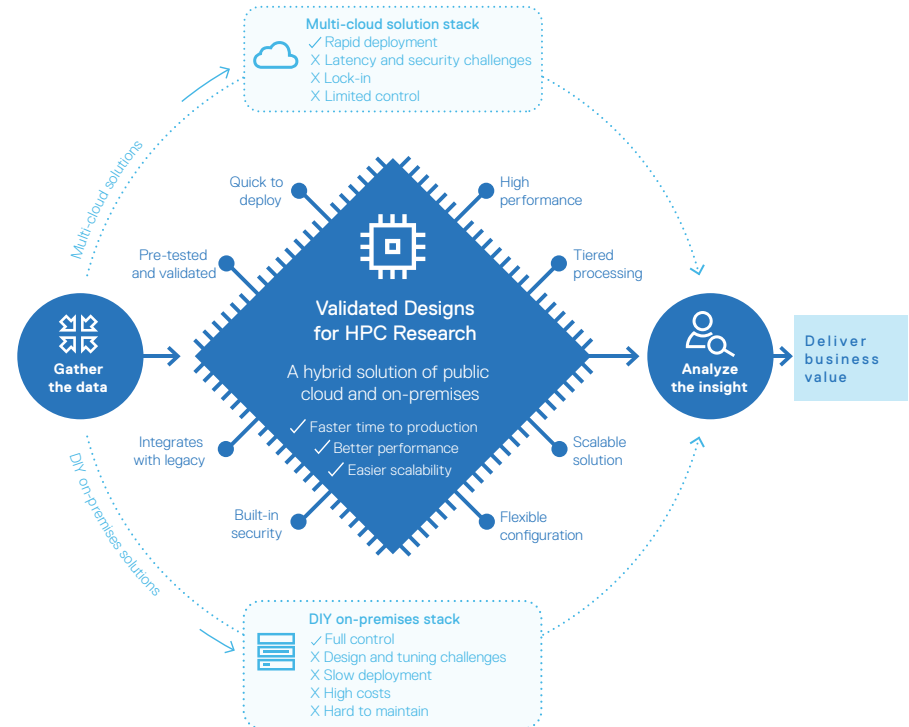
- **Extensive portfolio.** Dell Technologies uniquely provides a portfolio of technologies — spanning workstations, servers, networking, storage, solutions, software and services — to create successful AI and HPC implementations. What's more, Dell Technologies provides accelerated performance, efficiency 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 time. 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 worldwide **Customer Solution Centers**.
- **Curated partnerships.** Dell Technologies works closely with partners, such as Intel®, AMD®, NVIDIA® and Bright Computing® to optimize hardware to leverage processing, accelerator and GPU advancements, and to access their expertise around software algorithms and their implementation on Dell EMC infrastructure.

SIMPLIFYING THE COMPLEX

Validated Designs for HPC Research

Designing and deploying an HPC system for AI and other research 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, while 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 blocks provide a customizable yet validated approach for deploying new clusters or upgrading existing systems.



THE BENEFITS

Validated Designs for HPC Research

Dell Technologies Validated Designs simplify your IT transformation, helping you make discoveries faster.

OPTIMIZE INVESTMENTS

- Purpose built HPC building blocks are 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 HPC and AI applications by Dell Technologies engineering.
- Available consulting, education, deployment, support and remote management services optimize solution productivity and efficiency.

¹ Dell Technologies, "[Dell Technologies Key Facts](#)," November 2021.

SCALE EASILY

- A flexible building block approach easily scales over time.
- Scale by adding resources such as memory or hard drives inside Dell EMC PowerEdge servers.
- Add external Dell EMC storage such as 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 HPC solutions for research 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.¹
- 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 business outcomes.

- [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 analytics, HPC and AI 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.

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