DELLTechnologies

AI and HPC for Life Sciences

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

A HEALTHIER FUTURE

Unleashing the power of AI will transform health outcomes.

Increasing population density and skyrocketing healthcare costs are putting pressure on the life sciences industry to treat more patients, more cost-effectively and with better results.

At the same time, advances in genomics, bioinformatics, microscopy, medical imaging and many more areas have created an avalanche of data that can be used to improve patient outcomes.

Advanced computing technologies, such as artificial intelligence (AI) algorithms running on high performance computing (HPC) systems, are the key to using medical data to save lives and protect health — better, faster and with lower costs.

ANSWER LIFE-SAVING QUESTIONS

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 life sciences organizations to gain deeper insights from data.

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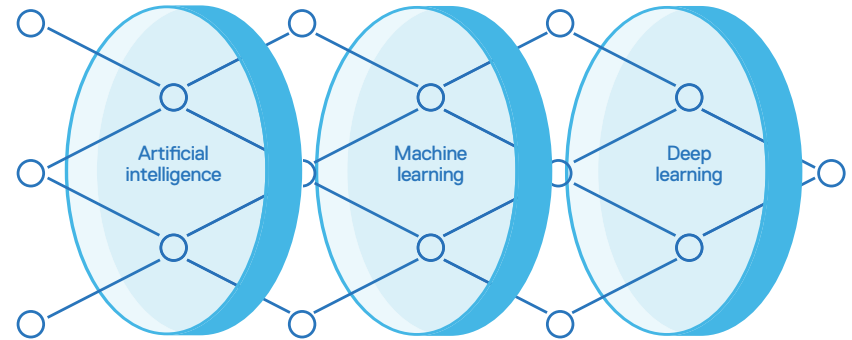
AI is an umbrella term that describes a machine's ability to act autonomously and/or interact in a humanlike way.

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.

Life sciences organizations can use AI, ML and DL to gain deeper, more accurate and more cost-effective insights across the healthcare lifecycle, from initial research and drug development to individual patient treatments and population health planning.

How AI and HPC are being used in life sciences

Advanced computing is changing how life sciences organizations approach healthcare research and delivery, offering new opportunities for improving outcomes while reducing costs and risks.

HEALTHCARE RESEARCH

Gain insights that enable better health outcomes.

1 Genomics

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 Proteomics

AI and HPC can be used to study genes and the proteins they express, guiding decisions about care, revealing disease susceptibilities or flagging existing pathogenic variations.

3 Bioinformatics

AI and HPC can be used to catalog vast biological data stores and extract hidden knowledge in existing data.

4 Cryo-electron microscopy (cryo-EM)

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 cardiovascular and neurodegenerative diseases.

5 Neuroscience

HPC provides the horsepower to map neural pathways, while AI can help analyze brain activity to discover new ways to address brain trauma and disease.

How AI and HPC are being used in life sciences

Advanced computing is changing how life sciences organizations approach healthcare research and delivery, offering new opportunities for improving outcomes while reducing costs and risks.

HEALTHCARE PROVIDERS

Identify disease sooner and treat it more effectively.

1

Oncology

Gathering data and processing it in novel ways using HPC and AI leads to more effective treatments.

2

Alerts and diagnostics

AI can perform analysis on real-time streaming data from health monitoring devices to predict health events and advise patients on interventions.

3

Medical imaging

Automated imagery analysis enabled by AI and HPC increases diagnostic speed and accuracy.

4

Hospital workflows

AI can bring new efficiencies to planning, scheduling and selecting exams and treatments.

5

Clinical decision support

Integrating electronic health records and medical images enhances care delivery; HPC provides the processing power to work with very large files while AI can find significant patterns in the data.

6

Personalized medicine

AI can be used to tailor treatments to individuals using health data paired with predictive analytics.

How AI and HPC are being used in life sciences

Advanced computing is changing how life sciences organizations approach healthcare research and delivery, offering new opportunities for improving outcomes while reducing costs and risks.

PHARMACEUTICAL COMPANIES

Transform the process of drug development.

1

Drug discovery

AI can reduce the expensive and lengthy process of drug discovery using bioinformatics, algorithmic techniques and natural language processing (NLP) with visual analytics.

2

Computational chemistry and molecular dynamics

HPC can speed these workloads to improve time to discovery; integrating AI enables the creation of hyper-predictive models for identifying chemical compounds that will make better drug candidates, reducing both cost and time to market.

3

Precision medicine

AI enables the manipulation of genetic materials for drug discovery based on individual health data paired with predictive analytics. This aids in the development of effective, safe medications and doses that can be tailored to variations in a person's individual genes.

4

Clinical trials

AI can be used to train models and build inclusion/exclusion criteria that speed up clinical trial prep.

How AI and HPC are being used in life sciences

Advanced computing is changing how life sciences organizations approach healthcare research and delivery, offering new opportunities for improving outcomes while reducing costs and risks.

GOVERNMENT

Protect the nation's health.

1

Population health

HPC and AI enable analysis of vast amounts of health data to identify trends and aid the creation of prevention and treatment protocols for large groups of people.

2

Epidemiology

AI can help create complex models to plan for, identify and address pandemics and biological weapons.

3

Fraud detection

AI can be used to detect fraudulent claims and assess risk by visually mapping patients, providers, pharmacies and claims to groups of claims that indicate unusual behavior. This is growing in importance as state and local governments seek to hold drug companies accountable for drug abuses.

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 real-time health insights. Working closely with our partner ecosystem and industry providers, we deliver solutions inclusive of infrastructure, applications and services. Plus, Dell Technologies solutions are based on open-source architecture, offering access to a wide range of software applicatoins, tools, frameworks and libraries.

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 save lives and protect health.

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 promise of AI and HPC.
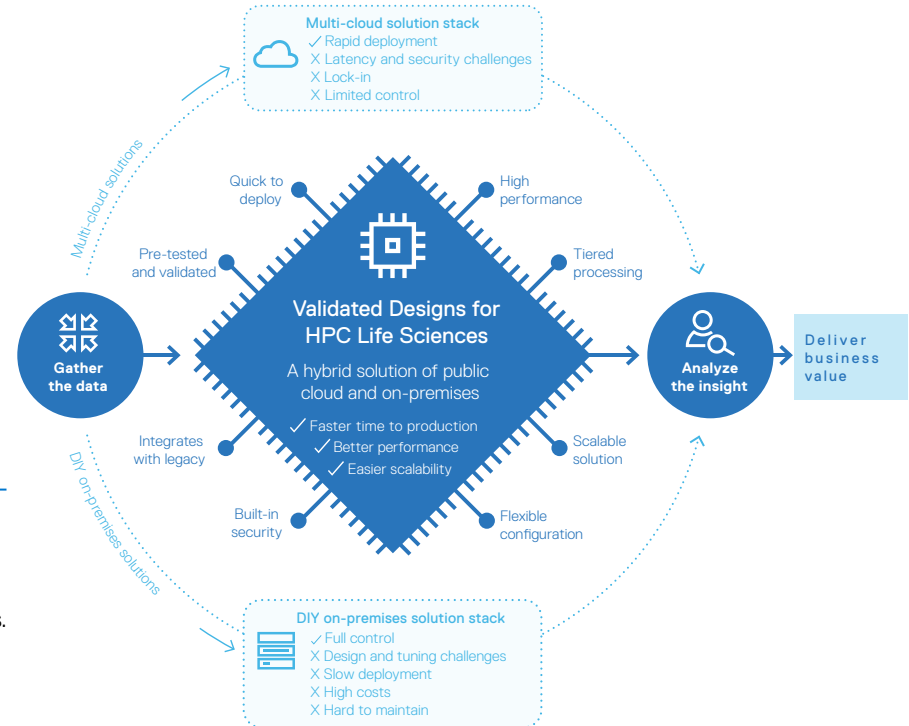
- **Extensive portfolio.** Dell Technologies uniquely provides a portfolio of technologies — spanning workstations, servers, networking, storage, software and services — to create successful AI and HPC implementations. What's more, Dell Technologies provides accelerated performance, efficiency and expertise 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 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 or 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 Life Sciences

Designing and deploying an HPC system for AI and other life sciences 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, to enable business without boundaries. They provide trusted designs 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.

Multi-cloud solution stack
✓ Rapid deployment
X Latency and security challenges
X Lock-in
X Limited control

Multi-cloud solutions

Quick to deploy

High performance

Pre-tested and validated

Tiered processing

Validated Designs for HPC Life Sciences
A hybrid solution of public cloud and on-premises
✓ Faster time to production
✓ Better performance
✓ Easier scalability

Gather the data

Analyze the insight

Deliver business value

Integrates with legacy

Scalable solution

Built-in security

Flexible configuration

DIY on-premises solutions

DIY on-premises solution stack
✓ Full control
X Design and tuning challenges
X Slow deployment
X High costs
X Hard to maintain

THE BENEFITS

Validated Designs for HPC Life Sciences

Dell Technologies Validated Designs simplify your IT transformation and radically shorten time to discovery.

FASTER TIME TO PRODUCTION

- Dramatically accelerate and de-risk infrastructure deployment with engineering-validated solutions that shorten deployment time from months to weeks.
- Tested and validated stacks take the guesswork and risk out of deploying new IT solutions with a plug-and-play experience.
- Services, ranging from consulting and education to integration and support, let you spend more time focusing on the science.
- A self-service environment reduces the time it takes to configure the workspace for analyzing data — creating an easier AI experience.

BETTER PERFORMANCE

- Handle the most demanding life sciences workloads, with HPC power that allows rapid access to data lakes and faster ML and DL training and model validation.
- Run parallel tiered data processing without data bottlenecks, allowing data scientists to fail faster and shorten AI training.
- Work closely with the Dell Technologies HPC & AI Innovation Lab team to optimize solutions for your applications and workloads, with a focus on efficiency, performance and reliability.

EASIER SCALABILITY

- Solutions are highly scalable, starting at easy entry points, so it's easier to achieve maximum return on compute investments.
- Validated Designs for HPC are built on modular building blocks that can be configured and ordered in a simplified process that enables you to scale easily to meet new capacity and performance demands.

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 Technology 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** or **contact** your local representative or authorized reseller.

Email: **hpc.assist@dell.com**

Online resources

delltechnologies.com/ai

delltechnologies.com/hpc

delltechnologies.com/healthcare