

Dell EMC Ready Solutions for HPC Research

Make discoveries faster with artificial intelligence and high performance computing

Table of Contents

Move quickly from raw data to actionable insights.	2
Dell Technologies has what you need	2
Do any of these challenges sound familiar?	3
Dell EMC Ready Solutions for HPC Research	3
Optimize investments	3
Scale easily	4
Reduce risk	4
Customer success stories	4
Technical specifications.	5
Ready Solutions for HPC Research	5
Services and financing	6
Why choose Dell Technologies	7
Customer Solution Centers	7
AI Experience Zones	7
HPC & AI Innovation Lab	7
HPC & AI Centers of Excellence	8
Proven results	8
Take the next step, today.	8

23.5 HPL PFLOPS supercomputer

helps researchers run weather simulations that save lives.¹

390X

increase in farm production compared to traditional methods.²

“The success we have had together reflects our close collaboration and a deep relationship, with attention to every detail, that lets us repeatedly deploy at the cutting edge of technology on-time and on-budget. With this new machine, we will further push the frontiers of science, offering researchers an instrument with capabilities they have never had before.”³

—Dan Stanzione,
Executive Director of
TACC

Move quickly from raw data to actionable insights

To make discoveries, researchers must be able to draw actionable insights from massive amounts of data used 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 adoption of artificial intelligence (AI) for research institutions across a variety of use cases.

While the advanced computing techniques of HPC, data analytics and AI have long been considered separate disciplines, they are converging as the industry recognizes that HPC is required to power the latest AI algorithms. Today, increasingly powerful HPC systems can deliver the throughput and capacity needed to address complex research challenges such as handling massive amounts of data from simulations, sensors and scientific instruments to model, render and analyze, filter, classify and measure scientific data, and manage the time-criticality of research projects.

These advanced computing techniques gives 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.

Dell Technologies has what you need

Expertise and guidance

Technology is emerging quickly, so your team may not have had time to design, deploy and manage solution stacks optimized for emerging workloads. While AI might seem like the latest IT trend, Dell Technologies has been a leader in the advanced computing space for over a decade, with proven products, solutions and expertise. Dell has a team of data analytics, HPC and AI experts dedicated to staying on the cutting edge, testing new technologies and tuning solutions to your applications to help you keep pace with this constantly evolving landscape.

Dell EMC Ready Solutions for HPC

The advantage in today's marketplace goes to the data-driven enterprise. For many organizations, HPC is an important source of competitive advantage. An optimized HPC solution delivers the compute, throughput and capacity needed to manage the rapid data growth and increased workload demands presented by advanced data analytics and a wide range of other workloads. Dell EMC Ready Solutions are workload-optimized rack-level systems with servers, software, networking, storage and services to scale faster with the confidence of an engineering-tested solution while saving valuable time and resources.

Solutions customized for your environment

Dell Technologies uniquely provides an extensive portfolio of technologies to deliver the advanced computing solutions that underpin successful data analytics, HPC and AI implementations. With years of experience and an ecosystem of curated technology and service partners, Dell provides innovative solutions, workstations, servers, networking, storage and services that reduce complexity and enable you to capitalize on the promise of HPC and AI.

¹ Frontera supercomputer at the Texas Advanced Computing Center (TACC). Source: Top500 The List, [June 2020](#), June 2020.

² eWeek, [How Dell EMC is Doing Enterprise AI the Right Way](#), October 2019.

³ Dell Technologies case study, [A New 'Frontera'](#), 2019.

“We have roughly 800 researchers on the system, spread out over 300 different projects. The number of jobs we’re putting through the system has been quite impressive for the size of the system. The throughput has been extraordinarily good. The overall usage allocation has been close to 100%. And, of course, the queue times have been very low.”⁴

—Lev Lafayette,
Platforms Computing
and Training Officer,
University of Melbourne

Do any of these challenges sound familiar?

“We need to be sure we’re getting the required performance from our budget.”

Budgets tend to be tighter for academic and research institutions than for commercial enterprises. To optimize budget, it’s critical to match HPC resources to requirements to avoid costly overprovisioning. Choose a solution stack tailored for your unique requirements — one that is based on performance, efficiency or a balance of both. The Dell Technologies HPC team can help optimize investments on limited budgets with the ability to tune solutions for specific workloads.

“We have trouble providing the immense computational power and storage capacity required for research.”

Researchers need fast, accurate results to investigate, understand and predict increasingly complex phenomena. A balanced HPC solution can deliver the throughput and capacity needed to manage rapid data growth and increased workload demands. Dell EMC Ready Solutions for HPC make it easy to scale with modular, IT building blocks designed for research applications.

“Performing design, deployment, integration and performance tuning is complex.”

Deploying a fast, reliable HPC solution can be a significant investment of time and IT resources, with a chance for errors. Aspects of HPC solutions are interconnected and impact the overall success, performance and productivity of the solution. Dell Technologies reduces risk by allowing customers to test and tune solutions prior to purchase in worldwide Customer Solution Centers. Customers and partners can also evaluate new HPC technologies prior to general availability in the HPC & AI Innovation Lab.

Dell EMC Ready Solutions for HPC Research

Dell Technologies has invested to create a portfolio of Ready Solutions designed to simplify the configuration, deployment and management of HPC clusters. These trusted designs have been optimized, tested and tuned 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 to meet workload requirements and customer outcomes. The modular solution building blocks provide a customized yet validated approach for deploying new clusters, scaling or upgrading their existing environments.

Ready Solutions for HPC Research have been engineered to optimize investments with purpose-built designs, created to scale easier with modular building blocks, and to reduce the risk of potential software and hardware issues.

Optimize investments

Dell EMC Ready Solutions for HPC Research are built with flexible, industry-standard building blocks of compute, networking and storage tested and tuned by Dell Technologies engineering with HPC applications. These purpose-built HPC building blocks are then tailored to speed deployment, help eliminate potential software and hardware issues, and optimize performance. Dell Technologies also offers consulting, education, deployment, support and remote management services to optimize solution productivity and efficiency.

⁴ Dell EMC case study, [The University of Melbourne](#), accessed October 2020.

Optimize investments

Scale easily

Reduce risk

Scale easily

When speed to results matters, Dell Technologies experts can help build an HPC solution that addresses growing research challenges. Dell EMC HPC solutions leverage a flexible building-block approach to easily scale over time. Scale by adding resources such as memory or hard drives inside PowerEdge servers. Add external storage with Dell EMC PowerVault storage arrays, or Isilon scale-out network-attached storage (NAS). 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.

Reduce risk

Dell Technologies is committed to helping more people make more innovations and discoveries than any other technology provider in the world. That's why Dell Technologies engineers and industry experts work in collaboration with Dell Technologies customers and partners to design, deploy and scale HPC solutions for research applications. It not only saves time, it also reduces the risk of potential hardware and software issues. See performance test results for yourself at hpcatdell.com. Test your code via one of the Dell Technologies' worldwide [Customer Solution Centers](#) and/or in the [HPC & AI Innovation Lab](#). Around the world, more than 34,000 full-time Services and Support experts are available every step of the way with consulting, education, deployment, management and support.⁵

Customer success stories

European Council for Nuclear Research (CERN)

4X
performance
increase

300 servers can be
deployed in 30 minutes

5% energy usage
from CPUs, reduced
from 20%

View the case study video: [CERN](#)

Texas Advanced Computing Center (TACC)

38.7
PFLOPS

#1 fastest academic
supercomputer

16K plus Intel
Xeon processors

Read the case study: [A New 'Frontera.'](#)

Lincoln Laboratory at MIT TX-Green System

1+ PFLOPS total peak performance

4X capacity boost

View the case study video: [MIT Lincoln Laboratory](#).

- [The University of Cambridge](#) uses HPC and AI to solve some of today's most demanding data-driven simulation challenges — from those involving medical imaging and genomic analysis to the mapping of exoplanets.
- [Swinburne University of Technology](#) inspires a new generation of scientists with an HPC supercomputer that enables advanced cosmological research.
- [TGen](#) uses advanced computing to fight rare diseases.

Technical specifications

The options below serve as a starting point for a customizable, yet validated solution. A Dell Technologies HPC specialist can assist you with designing an HPC solution for your specific needs and environment. See performance test results at hpcatdell.com.

Ready Solutions for HPC Research



Explore Virtual Rack at <http://esgvr.dell.com/>

Specifications	
PowerEdge Servers with AMD® EPYC™ processors	
Servers	R6515, R6525, R7515, R7525, C6525, XE8545
Accelerators	NVIDIA® A100 or AMD® Instinct™ Mi100
Adapter	Mellanox® ConnectX-6 HDR with OFED driver
NICs	1, 10, 25, 40, 100GbE
Switches	
Top of rack	NVIDIA Mellanox Quantum™ QM8700 series HDR
Management	PowerSwitch S, N and Z series Ethernet
Software (optional, tested, recommended)	
Operating system	Red Hat® Enterprise Linux®
Cluster management	Bright Cluster Manager® or OpenHPC
Server management	iDRAC Enterprise and OpenManage
Storage	
Dell EMC Ready Solutions for HPC NFS, BeeGFS® or PixStor™ Storage Dell EMC PowerScale Family with OneFS	
Services	
Consulting, education, hardware deployment and support, remote management, cloud options, financing	

Specifications	
PowerEdge Servers with Intel® Xeon™ Scalable processors	
Servers	R440, R640, R740/xd, R840, R940, M640, C4140, C6420
Accelerators	NVIDIA T4, P40, V100s in R740 with NVIDIA CUDA® V100s 16GB and 32GB SXM2 in C4140
Adapter	Mellanox® ConnectX-6 HDR 100 or ConnectX-5 EDR with OFED driver
NICs	1, 10, 25, 40, 100GbE
Switches	
Top of rack	NVIDIA Mellanox Quantum™ QM8700 series HDR or Mellanox SB7800 series EDR
Management	PowerSwitch S, N and Z series Ethernet
Software (optional, tested, recommended)	
Operating system	Red Hat® Enterprise Linux®
Cluster management	Bright Cluster Manager®
Server management	iDRAC Enterprise and OpenManage
Storage	
Dell EMC Ready Solutions for HPC NFS, BeeGFS® or PixStor™ Storage Dell EMC PowerScale Family with OneFS	
Services	
Consulting, education, hardware deployment and support, remote management, cloud options, financing	

“We test every piece of hardware, believe it or not. Dell EMC is the only server that can hold up to the type of work that we are pounding on these boxes. Other boxes will fail, and we will end up with them down. And so a big reason that we have Dell EMC servers is because they are bulletproof — you can drop them on their head and they still run — and they are fast.”⁶

—Christopher Sullivan,
Assistant Director for
Biocomputing, Center for
Genome Research and
Biocomputing, Oregon
State University

Solution highlights

- [Dell EMC PowerEdge servers](#) enhance performance across the widest range of applications with highly scalable architectures and flexible internal storage.
- [Dell EMC Ready Solutions for HPC NFS Storage](#) are reliable, easy to administer and have very good performance within certain boundaries.
- [Bright Cluster Manager](#) enables the deployment of clusters over bare metal with a management view that spans the hardware, operating system, software and users.

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.

- [Services for High Performance Computing](#) are delivered by certified experts to help you get the business value of advanced computing. The services include 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.
- The [Education Services](#) team offers courses and certifications in data science and advanced analytics through self-paced online labs and instructor-led workshops.
- The [Deployment Services](#) team has the experience, expertise and best practices to enhance your success with data 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 Services](#) 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, a single point of contact for your support needs.
- Once the HPC system is deployed, [Remote Cluster Management](#) services can help keep IT running smoothly with proactive monitoring and management of the entire HPC solution.
- [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.

⁶ Dell Technologies blog, [Powering Scientific Research with Dell EMC and AMD](#), November 2019.

“Thanks to the strong collaboration of Dell EMC, we now have an efficient, intensive, and stable platform for high performance computing systems, with significantly greater IT efficiency and a 30% lower TCO.”⁷

—Dr. Chen Jiawei, School of Systems Science, Beijing Normal University

Why choose Dell Technologies

We're committed to advancing data analytics, HPC and AI, and we've dedicated a great deal of resources toward that goal.

- Schedule an [executive briefing](#) and collaborate on ways to reach your business goals.
- Dell Technologies [Customer Solution Centers](#) are staffed with computer scientists, engineers and subject matter experts in a variety of disciplines.
- We are committed to [providing you with choice](#). We want you to get what you need and have a great experience working with us. If we don't have what you need, we'll tell you who does. We believe in being open, and we publish our performance results at hpcatdell.com.
- Dell Technologies is the only company in the world with a portfolio that spans from workstations to supercomputers, including servers, networking, storage, software and services.
- Because Dell Technologies offers such a wide selection of solutions, we can act as your trusted advisor without trying to sell you a one-size-fits-all approach to your problem. That range of solutions has also given us the expertise to understand a broad spectrum of challenges and how to address them.

Customer Solution Centers

Our global network of dedicated Dell Technologies [Customer Solution Centers](#) are trusted environments where world-class IT experts collaborate with you to share best practices, facilitate in-depth discussions of effective business strategies and help your business become more successful and competitive. Dell Technologies Customer Solution Centers reduce the risks associated with new technology investments and can help improve speed of implementation.

AI Experience Zones

Curious about AI and what it can do for your business? Run demos, try proofs of concept and pilot software in Singapore, Seoul, Sydney, Bangalore and other [Customer Solution Centers](#). Dell Technologies experts are available to collaborate and share best practices as you can explore the latest technology, get the information and hands-on experience you need for your advanced computing workloads.

HPC & AI Innovation Lab

The [Dell Technologies HPC & AI Innovation Lab](#) in Austin, Texas, is the flagship innovation center. Housed in a 13,000-square-foot data center, it gives you access to thousands of Dell EMC servers, three powerful supercomputers, and sophisticated storage and network systems. It's staffed by a dedicated group of computer scientists, engineers and subject matter experts who actively partner and collaborate with customers and other members of the HPC community. The team engineers HPC and AI solutions, tests new and emerging technologies, and shares expertise including performance results and best practices.

⁷ Dell Technologies case study, [Efficient computing — accelerating systems science research](#), 2019.

“The goal is always to push the boundaries of knowledge and inspire the next generation of scientists. With this new system from Dell EMC, I believe we can do that.”¹²

—Jarrod Hurley,
Professor of Astrophysics,
Swinburne University
of Technology

HPC & AI Centers of Excellence

As data analytics, HPC and AI converge and the technology evolves, Dell Technologies worldwide HPC & AI Centers of Excellence provide thought leadership, test new technologies and share best practices. They maintain local industry partnerships and have direct access to Dell and other technology creators to incorporate your feedback and needs into their roadmaps. Through collaboration, [Dell Technologies HPC & AI Centers of Excellence](#) provide a network of resources based on the wide-ranging know-how and experience in the community.

Proven results

Dell Technologies holds leadership positions in some of the biggest and largest-growth categories in the IT infrastructure business, and that means you can confidently source your information technology needs from Dell Technologies.

- #1 in servers⁸
- #1 in converged and hyper-converged infrastructure (HCI)⁹
- #1 in storage¹⁰
- #1 cloud IT infrastructure¹¹

See [Dell Technologies Key Facts](#).

Take the next step, today

Don't wait to find out how Dell Technologies can simplify and speed your adoption of engineering tested, validated solutions for research applications and workloads. Contact your Dell Technologies or authorized channel partner representative for more details right away.

⁸ IDC [WW Quarterly Server Tracker](#), Units & Revenue, September 2020.

⁹ IDC [WW Quarterly Converged Systems Tracker](#), Vendor Revenue, September 2020.

¹⁰ IDC [WW Quarterly Enterprise Storage Systems Tracker](#), Vendor Revenue, September 2020.

¹¹ IDC [WW Quarterly Cloud IT Infrastructure Tracker](#), Vendor Revenue, September 2020.

¹² Dell EMC case study, [Swinburne University](#), Accessed October 2020.

Contact us

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

