

# HPC & AI Centers of Excellence

Hubs for innovation and expertise



## Advanced computing at the speed of innovation

We live in an exciting time. Advancements in processing power and connectivity combined with massive new sources of real-time information are fueling the next industrial revolution and the next quantum leap in human progress. The catalysts for this change, data analytics, high performance computing (HPC) and artificial intelligence (AI), give you the power to break new ground, make important discoveries, and solve some of the most important challenges of our time.

These technologies are rapidly converging and expanding into exciting new use cases in a broadening number of industries. And of course, there are always bigger questions and data sets on the horizon, requiring HPC to keep pace with the speed of discovery and innovation.

This rapid pace of change opens a world of opportunities to accelerate results and innovation while reducing risk on a global scale. However, there's a lot that has to happen to get you from where you are today to where you want to be tomorrow.

That's where Dell Technologies comes in. We offer not only world-class technology solutions, but also world-class expertise as you chart your path to digital transformation. In our network of worldwide resource centers, you can design solutions for your environment, test drive cutting-edge technologies, and collaborate with experts. We'll be there for you on every step of your journey to becoming a data-driven business, where the right combination of data analytics and AI can be optimized for your workloads and your business goals.

## Make your digital future a reality

Dell Technologies can partner with you, collaborate, and help turn your vision into value. You can choose to attend a customized Executive Briefing or schedule an engagement at one of our worldwide Customer Solution Centers.

### Dell Executive Briefing Centers

#### Strategize, plan and learn

Our Executive Briefing Program can help you create a digital strategy designed for your organization to thrive now and in the future. All briefings are uniquely designed around your needs, challenges, opportunities and goals. We give you a chance to collaborate one-on-one with our executives and subject matter experts (SMEs) from across Dell Technologies, engage in candid discussions and cultivate a plan to make your transformation successful. You can attend a briefing at a Dell office or yours. We can dig a little deeper with a focused briefing, or you can stop by to interact with our technologies first-hand.

To learn more, visit [delltechnologies.com/ebp](https://delltechnologies.com/ebp), or [contact your sales representative](#) to schedule an engagement.



Dell Customer Solution Center

## Dell Customer Solution Centers

### Design, build and test

Global Customer Solution Centers can help you plan and implement your digital transformation goals. Experience a customized engagement designed to help you address business challenges or innovate for success. You will work with subject matter experts in dedicated labs stacked with the latest and greatest products and solution showcases. Remote connectivity enables you to include global team members, or work with us from your own location. Services include:

- **Validate: Proof of concept** — Solution architects enable practical, hands-on implementation based on your test cases. Prove and optimize solutions. Benefit from best practices and recommendations from our experts.
- **Innovate: Design workshop** — Whiteboarding and solution conversations with our experts help you explore your current environment, your future objectives and the most suitable solutions to available to address both.
- **Collaborate: Technical deep dive** — Learn more about how the proposed solutions work through product demonstrations and solution-focused discussions with subject matter experts.

To learn more, visit [dell.com/csc](http://dell.com/csc), or [contact your sales representative](#) to schedule an engagement.

## AI Experience Zones

### Take machine intelligence for a spin

Curious about AI and what it can do for your business? Run demos, try proofs of concept and pilot software in Singapore, Seoul, Sydney and Bangalore.

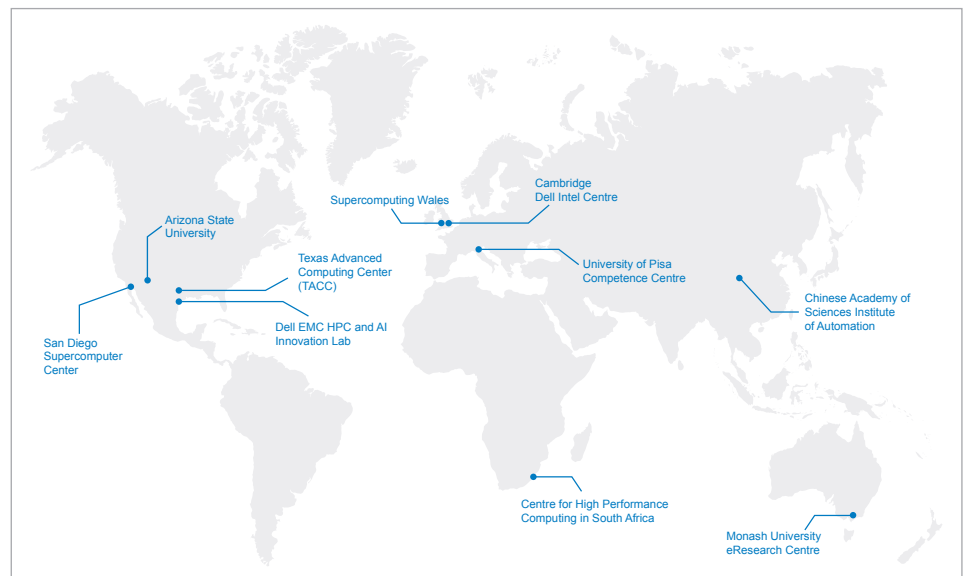
Dell Technologies experts collaborate and share best practices as you explore the latest technology and get the information and hands-on experience you need for your advanced computing workloads. [Contact your sales representative](#) to schedule a visit.

## Dell HPC & AI Centers of Excellence

### Hubs for innovation and expertise

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

### Dell HPC & AI Centers of Excellence locations



Dell HPC & AI Centers of Excellence bring collaborative expertise, including:

- **High-speed data analytics** help you discover new ways to process, visualize and predict future needs.
- **AI, machine learning and deep learning expertise**, best practices, and testing and tuning on a wide array of the latest technologies optimize results.
- **Visualization, modeling and simulation** of complex data sets using a range of high-powered visual-computing solutions across multiple locations.
- **Performance analysis, optimization and benchmarking** help point you to the right technology for the right application and to optimize application performance.
- **System design, implementation and operation** together with monitoring and I/O benchmarking help avoid performance bottlenecks, decrease power and cooling needs, and address reliability and resilience issues.



**Dell HPC & AI Innovation Lab**

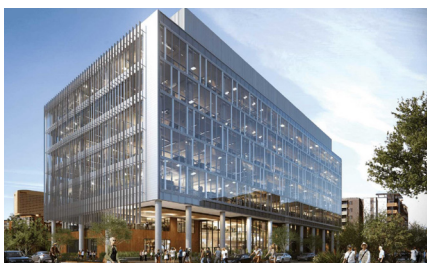
### Dell HPC & AI Innovation Lab

**Developing innovative, world-class solutions through community collaboration**

The Dell HPC & AI Innovation Lab in Austin, Texas, is the flagship innovation center. Housed in a 13,000-square-foot data center, it has thousands of servers, three powerful HPC clusters, 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 system performance results and best practices.

- **Zenith** — A [TOP500](#) ranked system created in partnership with Intel®, Zenith showcases Intel's latest compute, fabric, memory, storage and software technologies.
- **Rattler** — The result of a partnership among Dell, Mellanox®, Bright Computing® and NVIDIA®, Rattler is designed for extreme scalability, as well as to provide application-specific characterizations and benchmarking.
- **Minerva** — Named after the Roman goddess of wisdom, this system features PowerEdge C6525 servers with second-generation AMD® EPYC™ ("Rome") processors, Mellanox® InfiniBand® HDR100 and NFS storage.

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**Arizona State University**

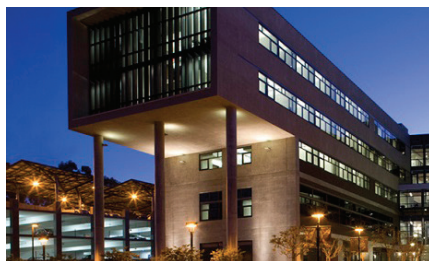
### Arizona State University

**Build bigger models. Take on bigger projects. Ask bigger questions.**

Arizona State University (ASU) provides high-performance and high-throughput computing environments to support research data needs, including a Big Data Analytics Engine that uses a Hadoop cluster for advanced data analysis and machine learning. ASU's data intensive ecosystem and highly available 100 gigabit network also connects an ESNET Science DMZ, large-scale data storage and elastic capacity to the public cloud. ASU experts provide access to multiple research and education clusters, and offer consultation and training on software and algorithms.

- **Agave** — With OpenStack® dynamic provisioning and orchestration, the Agave cluster includes over 300 TFLOPs of computational power connected with Intel® Omni-Path. With three petabytes of multi-tiered storage, it has BeeGFS for fastscratch storage.
- **Saguaro** — This cluster provides more than 92 TFLOPS of computational power linked with InfiniBand to 400TB of high performance parallel Lustre fastscratch storage. Saguaro is interlinked to the campus Science DMZ and other systems.
- **NGCC** — For data intensive computing, the NGCC cluster has 44 Hortonworks® Hadoop® nodes interconnected by 10 and 40GbE Ethernet for 960TB of HDFS capacity and Apache Spark™.

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**San Diego  
Supercomputer Center**

## San Diego Supercomputer Center

### HPC for the 99 percent

The San Diego Supercomputer Center (SDSC) is considered a leader in data-intensive computing and cyberinfrastructure, providing resources, services, and expertise to the national research community, including industry and academia. It offers an accessible, integrated network of computer-based resources and expertise focused on accelerating scientific inquiry and discovery. SDSC supports hundreds of multidisciplinary programs spanning a wide variety of domains, from earth sciences and biology to astrophysics, bioinformatics, and health IT. SDSC is a partner in Extreme Science and Engineering Discovery Environment (XSEDE), the most advanced collection of integrated digital resources and services in the world.

- **Expanse** — Projected to have a peak speed of 5 Petaflop/s, Expanse will about double the performance of Comet serving both well-established applications in areas such as molecular dynamics, as well as rapidly growing demand for resources to support machine learning and artificial intelligence. The system includes Mellanox HDR interconnect, 12PB of high-performance Lustre, 7PB of object storage, and more than 800TB of NVMe solid state storage.
- **Comet** — A petascale supercomputer with nearly 2,000 Dell EMC PowerEdge servers, Comet is designed to transform advanced scientific computing by expanding access and capacity among traditional and non-traditional research domains.

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**Texas Advanced  
Computing Center**

## Texas Advanced Computing Center

### Powering discoveries that change the world

The Texas Advanced Computing Center (TACC) designs and operates some of the world's most powerful computing resources. The center's mission is to enable discoveries that advance science and society through the application of advanced computing technologies.

- **Wrangler** — Designed for large-scale data transfer, analytics and sharing, Wrangler provides flexible support for a wide range of software stacks and workflows. Its scalable design allows for growth in the number of users and data applications.
- **Stampede2** — A large-scale supercomputing system that pushes the envelope of computational capabilities, Stampede supports thousands of researchers, leveraging 60–70 servers per rack and using Intel® Xeon® Phi™ and Intel Omni-Path Architecture (OPA).
- **Frontera** — The 5th most powerful supercomputer in the world, and the fastest supercomputer on a university campus, this system opens up new possibilities in science and engineering. [Frontera](#) has two computing subsystems, multiple storage systems, as well as interfaces to cloud and archive systems, and a set of application nodes for hosting virtual servers.

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**Chinese Academy of Sciences  
Institute of Automation**

## Chinese Academy of Sciences Institute of Automation AI and Advanced Computing Joint Lab

**Promoting innovation and breakthroughs at the forefront of science**

Dell China collaborates with the Chinese Academy of Sciences on a joint AI and advanced computing laboratory. This lab focuses on research and applications of new computing architectures in the fields of brain information processing and AI. Research conducted in the lab spans cognitive function simulation, deep learning, brain computer simulation and related new computing systems. The lab also supports the development of brain science and intellect technology research.

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**Monash University  
eResearch Centre**

## Monash University eResearch Centre

**21st-century research discovery through the application of advanced computing**

The Monash eResearch Centre at Monash University supports research by partnering with research groups, instrument facilities, technology companies and IT service providers, providing advice and access to advanced computational and data infrastructure. Its aim is to accelerate the research process and to improve the quality and impact of Monash University's research through eResearch expertise, cutting-edge technology and community engagement. By collaborating with world-leading technology partners and national research infrastructure providers, Monash University provides researchers with state-of-the-art infrastructure and practices to accelerate the industry's ability to bring new technologies to the market.

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**Centre for High Performance  
Computing in South Africa**

## Centre for High Performance Computing in South Africa

**World-class HPC that enables cutting-edge research**

The Centre for High Performance Computing (CHPC) in South Africa is the largest HPC facility in Africa. The main objectives of the center are to enable South Africa to become globally competitive and to accelerate Africa's socio-economic upliftment through the effective application of high-end cyberinfrastructure.

- **Lengau** — CHPC worked with Dell and Mellanox to build the 40,000-core one-petaFLOPS Lengau HPC system. Launched in 2016, the Lengau system is still the fastest on the African continent and the second fastest in the southern hemisphere.<sup>1</sup>

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<sup>1</sup> CHPC, "CHPC's Lengau Cluster Remains on TOP500 List," June 2018.



Cambridge Dell Intel Centre

## Cambridge Dell Intel Centre

**Lowering barriers. Accelerating research.**

The Cambridge Dell Intel Centre combines the proven operational expertise of the University of Cambridge in providing HPC services to its world-leading teaching and research institutions with the technical expertise of Dell and a network of carefully selected partners. The University's Research Computing Service provides leading-edge research computing services across academic disciplines and to the broader realm of the UK scientific and industrial community. Today, to help its constituents stay at the leading edge of AI and scientific research, the Research Computing Service has launched the [UK's fastest academic supercomputer](#): the Cumulus–UK Science Cloud.

- **Cumulus** — Providing more than two petaFLOPS of performance, and powered by Dell EMC PowerEdge servers, Intel Xeon processors and the Intel OPA, the Cumulus–UK Science Cloud incorporates OpenStack® software to control pools of compute, storage and networking resources and make them readily accessible to users via a cloud interface.

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University of Pisa Competence  
Centre for Cloud and HPC

## University of Pisa Competence Centre for Cloud and HPC

**Leadership through collaboration**

The Competence Centre at the University of Pisa has been created to respond to the rapidly growing need for cutting-edge infrastructure solutions, allowing university researchers to share and power their work, and visitors to get insights into the latest and most efficient infrastructure technology. From the latest in (private) cloud computing to HPC solutions, to software defined network and storage solutions, and system benchmarking — the Centre can help organizations achieve key performance and strategic goals. The Centre is also leading edge in solid state technologies involving NVMe and NVMe over fabric technologies.

The University of Pisa is using deep learning technologies and systems from Dell EMC for several applications to power research and contribute advancing the state of the art in the discipline.

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Supercomputing Wales

## Supercomputing Wales

**At the forefront of world-class research**

Supercomputing Wales has two supercomputer hubs based at Cardiff and Swansea universities, with research teams across the consortium universities accessing the facilities. Together, the hubs represent a full suite of HPC and High Performance Data Analytics (HPDA) hardware and software. With 13,080 processing cores, the hubs are connected to high speed memory and storage, delivering 1 petaflop of computing power.

The program brings together the expertise, experience and dedication of global partners, Atos® and Dell, to create Wales' first Supercomputing Centre of Excellence.

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## Contact us

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

## Join the community

Dell Technologies is committed to fostering the exchange of ideas for the advancement of innovative, powerful data analytics, HPC and AI solutions. Contact your Dell or authorized partner sales representative about gaining access to Dell Technologies resources. Join the [Dell HPC Community](#), visit [dell EMC.com/hpc](https://dell EMC.com/hpc) or [dell EMC.com/ai](https://dell EMC.com/ai) to learn more.

## Why choose Dell for data analytics, HPC and AI

### Dell Technologies is different

We're committed to advancing data analytics, HPC and AI.

- Come in for an [executive briefing](#), and collaborate on ways to reach your goals.
- [Dell Technologies Customer Solution Centers](#) are staffed with 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](#).
- Dell Technologies is the only company in the world with a portfolio that spans from Alienware to supercomputers, including workstations, servers, networking, storage, software and services.
- Because Dell 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 comes with the expertise to understand a broad spectrum of challenges and how to address them.

### 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 IT needs from Dell Technologies.

- #1 in servers<sup>2</sup>
- #1 in converged and hyperconverged infrastructure (HCI)<sup>3</sup>
- #1 in storage<sup>4</sup>
- #1 cloud IT infrastructure<sup>5</sup>

See [Dell Technologies Key Facts](#).

<sup>2</sup> IDC [WW Quarterly Server Tracker](#), Vendor Revenue, September 2019.

<sup>3</sup> IDC [WW Quarterly Converged Systems Tracker](#), Vendor Revenue, September 2019.

<sup>4</sup> IDC [WW Quarterly Enterprise Storage Systems Tracker](#), Vendor Revenue, September 2019.

<sup>5</sup> IDC [WW Quarterly Cloud IT Infrastructure Tracker](#), Vendor Revenue, September 2019.

### HPC & AI Resource Center

Download white papers from the HPC Resource Center at [dell EMC.com/hpcresources](https://dell EMC.com/hpcresources)

### Technical documentation

See performance results, architectures and blogs from engineering at [hpcatdell.com](https://hpcatdell.com)

### Virtual Rack

See select HPC systems in the virtual rack [esgvr.dell.com](https://esgvr.dell.com)

### Join the HPC Community

A worldwide technical forum that fosters the exchange of ideas [dellhpc.org](https://dellhpc.org)