HPE High Performance Computing

Powerful, leading-edge HPE solutions accelerate advancements in industry, academia, and government

Hewlett Packard Enterprise

Supercomputing in demand

In the quest to solve some of the world's most pressing questions and challenges—from engineering, manufacturing, and national security to life, earth, and space sciences—commercial enterprises, universities, and government institutions today are increasing their reliance on **high-performance computing (HPC) solutions**.

They are also turning to HPE—the global leader in powerful **supercomputing platforms**. This is because we have the most comprehensive, secure, purpose-built portfolio for production supercomputing. We are at the forefront of the movement toward exascale. And we have the proven expertise and skills, partner ecosystem, and deep commitment to innovation that lends itself to supporting a broad and diverse range of research endeavors.

A decades-long history of industry-leading technology

Starting in 1938 with the delivery of our first Oscillators for Walt Disney, our first computers in 1963, including the first device to be called a personal computer in 1968, HPE has always been a technology leader. And we are not stopping. In 2016, HPE acquired SGI, cementing our leadership position in HPC today and in the future. This combination of decades-long engineering expertise and leadership platforms is why HPE has today's strongest product portfolio, and is on the path forward to next-generation system breakthroughs.

The HPE supercomputing portfolio—secure, purpose-built HPC solutions

Today's HPE HPC offering robustly addresses the full range of customers' high-performance computing needs and workloads.

For petaFLOPS scale, the **HPE SGI 8600 System** is HPE's successor to the SGI ICE XA. This liquid-cooled platform delivers leading performance, density, and efficiency and is used for extremely large deep learning applications to help solve the world's most complex scientific challenges. Considered the most powerful distributed-memory supercomputer in the world, the HPE SGI 8600 approaches exascale performance with seamless scalability to thousands of nodes and maximum energy efficiency.

The **HPE Apollo 6000 Gen10 System** delivers industry-leading secure compute for customers who deploy hundreds of servers for HPC environments to run diverse workloads and applications across traditional and multi-cloud environments. This air-cooled system provides fast and resilient compute, storage, and fabric technologies built with rack-level efficiencies to deliver exceptional price performance.

The new highly integrated and air-cooled **HPE Apollo 2000 Gen10 System** is best suited for commercial organizations that need an efficient scale-out alternative as they enter the realm of HPC. This solution delivers twice the density of traditional rack-mount systems and firmware-level server security with a flexible scale-out architecture for enterprise and HPC workloads.

Our offerings are rounded out with strong support for GPU-dense computing, machine learning, and AI-focused products, complemented with a preeminent choice of software and services.

HPE SGI 8600 System

HPE Apollo 6000 Gen10

HPE Apollo 2000 Gen10

Supercomputing solutions push knowledge boundaries

Research—The recent deployment of the 5.3 petaFLOPS Cheyenne supercomputer for the National Center for Atmospheric Research (NCAR) and NASA's Pleiades—both of which are based on system architecture and technology now leveraged in the HPE SGI 8600 —are examples of how HPE technology is meeting ever-growing technical workload compute requirements.

The Cheyenne supercomputer is helping scientists and researchers all over the world study weather prediction, wind energy, hydrology, climate change, and air quality. Cheyenne has a peak computation rate of almost 3 billion calculations per second for every watt of energy consumed and is three times more energy efficient than NCAR's previous supercomputer.

Likewise, NASA's Pleiades is one of the world's largest supercomputers, with over 11,440 nodes, 22,800 processors, and 245,536 cores. With 7.24 peak petaFLOPs, it supports more than 1,200 NASA scientists and engineers across a diverse range of applications, including space exploration, space vehicle design, and earth studies.

Industry—The digitization of chemical research is progressing rapidly, which is why BASF and HPE built one of the world's largest supercomputers in the industry, leveraging the new HPE Apollo 6000 Gen10 System. This supercomputer can reduce processing times in chemical research from months to days, enabling complex simulations of processes, reactions, and exact virtual modeling of material structures to help develop new plastics, colors, and cosmetics. At more than 1 petaFLOPS, it exceeds the performance of the computers used to date at BASF by up to 100 times.

Continuing innovation—on the path to exascale

To address rising big data volumes, exascale computing—essentially systems capable of at least 1 quintillion calculations per second (1 exaFLOPS)—is the next milestone on the HPC roadmap. HPE and many others are exploring technology advancements that can achieve this tenfold improvement in computing performance while also incurring only a small increase in power.

HPE has been awarded a research and development contract from the U.S. Department of Energy (DOE) Exascale Computing Project (ECP) under a program called PathForward. The program will accelerate research and development (R&D) to support the government's growing supercomputing needs. It also furthers the DOE's goals of maximizing the benefits of HPC for the United States by accelerating the development of a capable exascale computing ecosystem.

"We see this DOE grant as a vote of confidence in the ability of HPE and Hewlett Packard Labs to help overcome daunting technology challenges that are impeding everyone's progress toward exascale computing. As the global HPC market leader, HPE is highly motivated and well positioned to accelerate the move toward this next milestone in computing capability."

– Steve Conway, Research Vice President, HPC, Hyperion Research

Fundamental technologies of the architecture that will be instrumental in the exascale project include a new memory fabric and low-energy photonics interconnects. HPE also continues to explore nonvolatile memory options that could attach to the memory fabric, significantly increasing the reliability and efficiency of exascale systems.

"NCAR requires an increasingly more advanced system. For example, doubling the resolution of a weather system requires a tenfold increase of compute power."

– Anke Kamrath, Acting Director of CISL at NCAR

"The new supercomputer [based on the HPE Apollo 6000 Gen10 System] will promote the application and development of complex modeling and simulation approaches, opening up completely new avenues for our research at BASF."

– Dr. Martin Brudermueller, Vice Chairman of the Board of Executive Directors and Chief Technology Officer, BASF

Top 10 supercomputing manufacturers worldwide as measured by TOP500[1]

30.4%	12.1%	6.4%	4.0%	3.4%
HPE	**Cray Inc.**	**IBM**	**Huawei**	**Dell**
18.7%	9.8%	4.3%	3.8%	2.8%
Lenovo	**Sugon**	**Inspur**	**Bull**	**Fujitsu**

58.3%

HPE is the undisputed leader in the supercomputing market with a market share of more than 58.3% in the U.S.

[1] TOP500, June 2017.

HPE software solutions and HPE Pointnext services

HPE serves as a one-stop-shop for all HPC software needs. The HPE Performance Suite offers HPE-authored system management solutions that help you deploy HPC systems faster, operate them more efficiently, and boost their productivity. **HPE storage** and data management products allow HPC compute servers to run at their maximum speed, and include the Apollo 4520 turnkey Lustre parallel file system storage solution, as well as the HPE Data Management Framework hierarchical storage manager for efficient storage utilization, data assurance, and streamlined data workflows.

Our **HPE Pointnext** experts offer a range of HPC services—from advisory and design; benchmarking and tuning services; factory pre-installation, configuration, and acceptance; as well as training and operational services.

Extended community

As the leader in the HPC industry, we have literally thousands of customers who have successfully implemented complex HPC solutions. Each of these installations help us refine and develop even better solutions. Our user community, the Hewlett Packard Enterprise Consortium for Advanced Scientific and Technical (HP-CAST), is a dynamic and growing group of HPC leaders across academia, government, enterprise, and more. With semi-annual primary meetings and numerous regional meetings, the group is instrumental for sharing successes, challenges, and future directions that can further drive the success of HPC (**hp-cast.org**).

Leader in the HPC market

Today, HPE has thousands of employees with strong HPC backgrounds in research, hardware, software, performance, consulting, and support roles. And the proof is in our market position. HPE is the undisputed leader in the supercomputing market with a market share of more than 58.3% in the U.S.[1] This leadership translates into thousands of customers helping us deliver the best solutions in the market.

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