White Paper

Fast-Growing Dell Closes In On HPC Server Market Leadership

Earl Joseph, Steve Conway, Bob Sorensen, Alex Norton and Mark Nossokoff
November 2020

HYPERION RESEARCH OPINION

For decades high performance computing (HPC) has contributed enormously to the advancement of science, industry, national and regional security, and the quality of human life. Although HPC is sometimes narrowly seen as limited to government and academic research, this transformational technology is also crucial for a wide range of commercial enterprises, including automotive and aerospace companies, financial institutions, pharmaceutical firms, entertainment companies and others.

HPC systems, specifically designed to handle the demanding computational, data storage, and bandwidth requirements typical of scientific and engineering applications, are available with a wide range of price points, ranging from over $500 million for the fastest systems in the world, to near $20,00 for systems targeted for small research groups or even single users. In 2019, prices starting below $20,000 enabled the sale of 87,190 HPC systems worldwide and expanded the size of the worldwide HPC market to a record $27.9 billion.

Only the largest, most dedicated vendors are capable of addressing a global market this large and diverse. In the past five years, Dell Technologies has more than maintained its position as one of the top vendors in the worldwide HPC market; the company's unrivaled revenue growth rate (CAGR) has enabled Dell Technologies to close in on the number one spot in this strategically important IT market.

This paper looks at Dell Technologies' growth as an HPC leader in recent years. Hyperion Research believes that the company's strategy and market momentum position Dell Technologies well to benefit from (and help drive) the continued growth of this worldwide market as HPC use expands at the forefront of AI, cloud computing and enterprise data center technology.

SITUATION OVERVIEW

The worldwide high performance computing (HPC) market has become increasingly important as an unrivaled venue for advanced R&D and as a revenue opportunity for technology vendors as shown by:

- Global spending on HPC servers, storage, software and technical support jumped from $18.8 billion in 2010 to $27.8 billion in 2019, en route to a Hyperion Research forecast (Covid-19-dampened) $36.6 billion in 2024. Adding revenue from HPC usage in third-party clouds lifts the 2024 total to $45.4 billion. That's a large enough market for even the largest IT vendors to pursue.

- The market's robust growth is heavily related to HPC's unrivaled ability to enable innovation in science, engineering and, more recently, data science. Of the $18.3 billion that Hyperion Research projects will be spent on HPC server systems alone in 2024, $7.8 billion, or nearly half, will be for systems used primarily for AI and other data-intensive work. HPC is nearly indispensable today at the forefront of AI R&D for economically important, emerging use cases including automated driving, precision medicine, Smart City development, Internet of Things, edge computing and more. Developments in the HPC-enabled AI market foretell the future direction of the mainstream AI market.

- Yet another factor contributing to the forecast growth of the global HPC market is the movement of this transformational technology into new-to-HPC environments, especially third-party clouds and enterprise data centers. In 2019, about 20% of all HPC workloads were being run in external clouds, double the percentage of just a few years prior. In one of our recent studies, 36% of respondents said they have integrated HPC systems into their enterprise data centers to accelerate challenging business operations such as business intelligence, fraud detection and sales analysis. Half of these users were first-time adopters of HPC.

Given the HPC market's strategic importance and impressive growth, it's no wonder the market has attracted many new vendors and became increasingly competitive. To be a leader in this expanding, increasingly heterogeneous global market requires an astute vision and strategy, a comprehensive portfolio of products and an array of talented personnel.

This paper examines Dell Technologies' rapid rise in becoming a market leader in the worldwide HPC market.

DELL TECHNOLOGIES GROWING HPC LEADERSHIP OVER THE YEARS

Dell Technologies has long been one of the world's leading providers of HPC server systems, with a strong combination of capable hardware/software configurations and a proven range of technical support for key HPC applications sectors.

The company's unrivaled revenue growth rate in recent years has enabled Dell to close in on the number one spot. In 2012, Dell was the number three player in this high-growth market, selling $1.5 billion worth of HPC server systems. In 2019, Dell's industry-leading 8.7% CAGR (2012-2019) moved the company into the number two position worldwide, with 22% of the global HPC server market revenues, with sales worth more than $3.0 billion.

Dell's growth has been even more impressive in the highly competitive Supercomputers segment, defined by Hyperion Research as HPC systems sold for $500,000 and more. In 2012, the company recorded modest sales of $199 million in this critical segment. By 2019, Dell's Supercomputer segment sales had quintupled to about $1.0 billion, representing a CAGR of 16.7% (2012-2019). Dell also had 11 installations on the November 2019 version of the Top500 list (http://www.top500.org/) of the world's most powerful supercomputers, with three systems included in the top 100.

More recently, Dell has aggressively moved into the upper ranks of HPC performance. On the most recent Top500 list, Dell provided two of the top ten most powerful HPCs in the world, including the number six-ranked HPC with a theoretical peak performance of over 51 petaflops, installed at Italian global energy company ENI, and the number eight system, Frontera, with a theoretical peak performance of over 38 petaflops, installed at the Texas Advanced Computing Center at the University of Texas-Austin.

In addition to the company's demonstrated capabilities in HPC hardware, Dell has deep expertise in scientific and engineering domains important to HPC users. This allows the company to conduct peer-to-peer selling and support customers across a wide range of critical HPC application areas including:

- Healthcare and Life Sciences, such as in precision medicine transformation to accelerate time-to-insight and reduce lengthy technology implementations, as well as provide innovative healthcare solutions that securely connect clinical teams and patients.
- Manufacturing practices that tap into advances in AI, edge computing, and data analytics to speed up manufacturing processes and increase throughput and reliability.
- Oil and gas exploration and simulation capabilities designed to reduce costs by enabling more comprehensive, accurate, and detailed visualizations and surveys, increase overall productivity to further improve data-driven decision making capabilities, and handle large data-sets and time-critical computing processes.
- Digital Cities capabilities aimed at improving government support through integrated command and control while transforming the strategic planning process and enabling more efficient resource allocation as well as support improved E-Government services through integrated citizen services built on effective aggregation of data generated from multiple sources, formats and protocols onto a single common data platform.

DELL TECHNOLOGIES HPC AND AI SOLUTIONS

Dell reports that customers have experienced multiple successes from deploying Dell Technology HPC and AI solutions, including these examples:

- Mastercard® is using AI to protect its customers from fraud.
- Caterpillar® is leveraging autonomous mining vehicles.
- Ziff.ai performs image, voice and video recognition using AI-enabled algorithms.
- AeroFarms is using image recognition and classification to adjust nutrients, light and other factors to improve crop yield, taste and texture.
- Simon Fraser University scientists are tracking viruses by their DNA to contain and treat outbreaks faster.
- The University of Pisa is using deep learning technologies from Dell for DNA sequencing, including encoding DNA as an image.
- OTTO Motors is using autonomous vehicles/robots in supply chain fulfillment/inventory management.
- Epsilon uses Dell-enabled AI for marketing services and real-time content.

This brief excerpt from Dell's website summarizes Dell's approach to the expanding world of HPC:

Discovery and innovation have always started with great minds dreaming big. As data analytics, high performance computing (HPC) and artificial intelligence (AI) continue to converge and evolve, they are fueling the next industrial revolution and the next quantum leap in human progress. And with the help of increasingly powerful technology, you can dream even bigger.

HPC and AI are technologies designed to unlock the value of customer data. While they have long been treated as separate, these technologies are converging as it becomes clear that

analytics and AI are both big-data problems that require the power, scalable compute, networking and storage provided by HPC.

Formerly the domain of specialists using expensive, proprietary supercomputers, recent advances in computing, networking and storage technologies have made HPC and thus data analytics and AI, available using small clusters and workstations. This changes the game for more traditional HPC and puts AI within reach for a wider range of users.

For example, enterprises that have been collecting data for years can now analyze historical data using AI algorithms to gain faster market insights, increase efficiency and recognize higher return on investment (ROI) for data-driven investments. That's why organizations of all sizes and in a broadening array of industry verticals are leveraging powerful HPC solutions to run the data analytics and AI applications that help them answer bigger questions and make more amazing discoveries, faster, to keep pace with competition that's coming from every angle.

SUCCESS STORIES USING DELL TECHNOLOGIES

Translational Genomics Research Institute (TGen)

Biosciences in general and genomics in particular has been the tip of the spear in leveraging AI and applying training and inferencing techniques to develop the life-changing field of precision medicine. Benefiting researchers and patients alike, precision medicine enables rapid diagnosis of complex symptoms and creating treatments unique to each individual patient. The Translational Genomics Research Institute (TGen) has partnered with Dell Technologies as a prime example of furthering precision medicine advancements by applying HPC-enabled AI infrastructure to cancer, neurological disorder, infectious disease and rare childhood disorder research.

Capturing, retrieving, analyzing, managing and securely processing massive amounts of data requires intelligent systems that incorporate AI and machine learning to identify the proper and accurate diagnosis. The computation, storage and analytics of the Dell Technologies solution accelerates the baseline interrogation of the data allowing the researchers and specialists to finer analytics.

Konica Minolta

As the resolution of imaging gets finer and finer, the amount of data generated, captured and stored grows in direct proportion. In turn, visualization and animation of the larger datasets drives corresponding requirements for higher network performance and compute capabilities.

Konica Minolta, working closely with Dell Technologies, has applied Dell HPC-enabled AI infrastructure to their X-ray and Dynamic Digital Radiography (DDR) workloads to accelerate analysis of more precise imaging to enable doctors to make more accurate diagnoses and determine improved surgical or treatment plans for their patients.

Dubai Electricity and Water Authority

Once thought as futuristic, the concept of a "smart city" is developing into a reality. Dubai Electricity and Water Authority (DEWA) selected Dell Technologies as their foundational partner in supporting the Smart Dubai Initiative to make Dubai the smartest city in the world.

Managing energy consumption and utilization is a key element in developing a smart city. DEWA is working with Dell to:

- Apply IoT technologies to connect solar energy to houses and buildings
- Create smart applications that use smart meters and grids that contribute to fast-service connection, predictive analytics for fast response, and for proper energy use rationing

DEWA is also leveraging Dell Technologies to store, manage and protect data generated from Rammas, DEWA's virtual robotics deployed to learn and understand the needs of customers according to their enquiries.

Lastly, Dell Technologies is powering Moro, the UAE's digital hub. Moro will utilize essential functions of Dell's infrastructure such as cloud, security, machine learning, AI, big data and analytics, storage and servers to provide IT services to the public and private sectors within the UAE, including DEWA.

DELL TECHNOLOGIES LEVERAGES ITS LEADERSHIP IN OTHER IT AREAS TO BOOST ITS HPC OFFERINGS

Dell Technologies has many advanced technologies across multiple IT areas, that it applies to support HPC. Most broadly, Dell is the number one provider in servers to the overall IT sector. According to IDC[1] Dell represented nearly 20% of the overall server revenue share for the first quarter of 2020, almost $500 million more than the second highest vendor.

Dell's storage leadership stems from the integration of EMC's performant storage products and the Dell storage lineup of products. Dell represents a third of the entire external storage market from an OEM vendor perspective, resulting in quarterly revenues north of $2 billion.

According to ITBrand[2] in their annual survey that ranks networking vendors on a variety of categories, Dell Technologies was selected as the market leader for their open networking switch technology for the fifth time.

Converged and hyperconverged systems, which are systems sold with four main components integrated (server hardware, disk storage systems, networking equipment and basic software elements) represent a smaller, but valuable sector of the IT market. According to IDC[3] tracking, Dell Technologies is the number one branded vendor in this space.

[1](https://www.idc.com/getdoc.jsp?containerId=prUS46534520#:~:text=Overall%20Server%20Market%20Standings%2C%20by,Inspur%20Power%20Systems%20at%207.1%25)

[2](https://itbrandpulse.com/it-pros-vote-2019-networking-brand-leaders/)

[3](https://www.idc.com/getdoc.jsp?containerId=prUS46148920)

FUTURE OUTLOOK

The worldwide HPC market has been expanding at a robust rate, especially in recent years. Hyperion Research expects the market to resume this healthy growth after the impact of the Covid-19 pandemic on HPC subsides. Growth will be driven by organic expansion for established applications and new, economically important use cases in artificial intelligence (e.g., precision medicine, automated driving, smart cities and Internet of Things), cloud computing and enterprise data centers.

Thanks to an unrivaled growth rate among major HPC vendors, Dell Technologies has been closing in on HPC market leadership in recent years. Equally important, the company is heavily involved in each of the significant new HPC use cases that present new revenue opportunities for capable vendors. Dell Technologies is one of only a few companies in the world with sufficient resources and proven determination to pursue the attractive HPC market in all of its growing diversity and across all price points, up to the world's most powerful supercomputers.

Hyperion Research, therefore, believes that Dell Technologies' strategy and market momentum position the company well to benefit from (and help drive) the continued growth of this worldwide market as HPC use expands at the forefront of AI, cloud computing and enterprise data center technology.

LEARN MORE

- Dell Technologies Key Facts: https://www.dellemc.com/en-me/collaterals/unauth/offering-overview-documents/solutions/key_facts_about_dell_technologies.pdf
- Dell Technologies global supply chain, Dell Technologies on Demand, Services and Payment Solutions, delivered with a commitment for driving human progress
- Dell's AI solutions: https://www.delltechnologies.com/en-us/collaterals/unauth/brochures/solutions/hpc_ai_convergence_brochure.pdf

About Hyperion Research, LLC

Hyperion Research provides data-driven research, analysis and recommendations for technologies, applications, and markets in high performance computing and emerging technology areas to help organizations worldwide make effective decisions and seize growth opportunities. Research includes market sizing and forecasting, share tracking, segmentation, technology and related trend analysis, and both user & vendor analysis for multi-user technical server technology used for HPC and HPDA (high performance data analysis). We provide thought leadership and practical guidance for users, vendors and other members of the HPC community by focusing on key market and technology trends across government, industry, commerce, and academia.

Headquarters

365 Summit Avenue
St. Paul, MN 55102
USA
612.812.5798
www.HyperionResearch.com and www.hpcuserforum.com