Fujitsu on High-Performance Computing

July 2025

Overview

- Society, business, science, and the systems that support all three are becoming more complex. They rely on ever-greater computing power and technical capabilities to provide essential analysis, insight, optimization and control. The process is self-reinforcing — greater complexity demands greater computing power, which enables even greater complexity.
- The demand for ultra-scale computing is now spreading beyond universities and well-funded research labs. Ultra-scale computing, delivered as-a-service in the cloud, democratizes access to the world's most powerful computing.
- Within its computing portfolio, Fujitsu offers solutions for supercomputing, a quantum simulator, quantum-inspired Digital Annealing, and quantum computing. Fujitsu is a world leader in several of these technologies.

Industry Trends in Brief

- Driven by complexity, demand for computing power continues to rise. The supercomputers market, for example, is expected to register a compound annual growth rate (CAGR) of 9.5% between 2022 and 2027, with one of the significant drivers being the increasing use of cloud technology.[1]
- Historically restricted to public, university, and commercial research environments, supercomputing is now applied in almost every industry.
- In addition, enterprises with vast amounts of data to manage and process for AI are increasingly looking to leverage advanced computing to analyze this data and aid their decision-making.
- However, in the face of global heating and mandates worldwide to achieve net-zero carbon emissions, the power consumption of high-performance computers is increasingly in the spotlight. Vendors are responding with new, lower-power technologies that meet these demands.
- In addition, access to ultra-scale computing is undergoing a process of democratization, available for delivery as-a-service through the cloud, with different types of computing resources automatically identified and optimized for different workloads.
- As-a-Service advanced computing accelerates innovation across a wide range of fields. These include developing new medicines, reducing and preventing natural disasters, developing new materials, enabling manufacturing without the need for prototyping, resolving societal issues, progressing cutting-edge research, and boosting business competitiveness.

[1] https://www.businesswire.com/news/home/20220217005848/en/Global-Supercomputers-Market-2022---2027-Increasing-Demand-for-Higher-Processing-Power-to-Drive-the-Market-Growth---ResearchAndMarkets.com

Fujitsu and HPC

- Fujitsu has a long-standing history in supercomputing. As of June 2025, the supercomputer Fugaku, jointly developed by RIKEN and Fujitsu, has successfully retained the top spot for eleven consecutive terms in the Graph500 BFS (Breadth-First Search), a major high-performance computer ranking , and has also taken second place in the HPCG benchmark, as well as seventh place for the TOP500 and sixth place for the HPL-MxP rankings.
- Fugaku is a parallel computer with nearly eight million CPU cores. The A64FX CPU combines the properties of both vector and scalar processors and use high bandwidth memories to deliver faster performance.
- Leveraging technology cultivated through world-leading supercomputer development, including Fugaku, Fujitsu is currently developing FUJITSU-MONAKA*, a next-generation Arm-based processor scheduled for release in 2027, designed to address the challenges of next-generation data centers with its unmatched performance and power efficiency. FUJITSU-MONAKA caters to a diverse range of customer needs ranging from AI and high-speed simulation to data analysis, and also drives down the total cost of ownership (TCO) from deployment to operation.
- *) FUJITSU-MONAKA: This is based on results obtained from a project subsidized by the New Energy and Industrial Technology Development Organization (NEDO).
- Fujitsu has been awarded a contract by the Japanese research and development institute RIKEN to design a next-generation flagship supercomputer, provisionally named FugakuNEXT. The contract encompasses the overall system, computing nodes, and CPU components and the basic design phase is scheduled to run until February 27, 2026, incorporating advanced technologies from the FUJITSU-MONAKA CPU and a successor CPU, FUJITSU-MONAKA-X (tentative name), with enhanced AI processing capabilities.
- Fujitsu has also developed an AI computing broker middleware technology designed to enhance GPU computational efficiency in AI processing and address the global GPU shortage. The new technology integrates Fujitsu's proprietary adaptive GPU allocator technology, which dynamically allocates GPUs for real-time high-efficiency processing, with various AI processing optimization techniques.
- Fujitsu and its partner RIKEN have succeeded in developing a world-leading 256-qubit superconducting quantum computer incorporating newly-developed high-density implementation techniques in March 2025. Both organizations integrated the 256-qubit superconducting quantum computer into its platform for hybrid quantum computing lineup and will offer it to companies and research institutions globally starting in the first quarter of fiscal 2025. Both organizations will further enhance the platform's usability by strengthening seamless collaboration between quantum and classical computers, enabling the efficient execution of hybrid quantum-classical algorithms.
- Cost and skills shortages remain significant obstacles for many companies and organizations aiming to apply advanced computing technologies. To address this issue, starting in Japan, Fujitsu offers Fujitsu cloud service HPC through its Fujitsu Computing as-a-Service (CaaS) portfolio. CaaS HPC provides optimized computing environments for HPC applications. Cloud service HPC equipped with PRIMEHPC FX1000 which is based on the technology used in the supercomputer Fugaku, high-performance CPUs from Intel, and GPUs from NVIDIA, can be used as an environment for developing and running simulations and AI applications. These enable users from a wide range of industries to easily tap into the power offered by Fujitsu's advanced computing technologies without the need to commit to substantial, long-term investment.

Fujitsu quotes on advanced computing

- **Vivek Mahajan, Corporate Executive Officer, Corporate Vice President, CTO in charge of System Platform, Fujitsu Limited:**

"The convergence of evolving technologies like AI and the increasing urgency of sustainability demands innovative solutions. Fujitsu's computing technologies are key to addressing these challenges. Evolving from our legacy of world-leading supercomputing expertise, we proudly introduce the FUJITSU-MONAKA processor. With this high-performance, energy efficient, cutting-edge FUJITSU-MONAKA processor, Fujitsu empowers our customers' business growth while driving green IT initiatives. This move marks an important milestone toward democratizing high-performance computing and will play an important role in achieving Fujitsu's Purpose – making the world more sustainable by building trust in society through innovation."

- **Kohta Nakashima, VP, Head of Computing Laboratory, Fujitsu Research, Fujitsu Limited:**

"The smart society we live in today, underpinned by the advent of the digital age, relies on ability of computing technologies to solve increasingly complex business problems, with a significant impact on computing workloads. In particular, the demands of AI workloads are increasing dramatically, making it essential to optimize the utilization of computing resources for AI. AI computing broker provides a technical solution to address this requirement. As computing demands grow across every segment of society, faster computers are absolutely critical if these are to be met."

Reference customers

- Fujitsu Japan Embarks on Joint Research for COVID-19 Therapies Using World's Fastest Supercomputer with Researchers of Research Center for Advanced Science and Technology, The University of Tokyo
- Fujitsu Leverages World's Fastest Supercomputer 'Fugaku' and AI to Deliver Real-Time Tsunami Prediction in Joint Project
- Deucalion: a new EuroHPC supercomputer has been inaugurated - European Commission (europa.eu)

Relevant Fujitsu Products/Milestones

- Looking Back on Supercomputer Fugaku Development Project
- Supercomputer Fugaku retains first place worldwide in Graph500 rankings
- Fujitsu launches AI computing broker middleware to address global GPU shortages and enhance AI processing efficiency
- Fujitsu develops technology to speed up quantum circuit computation in quantum simulator by 200 times

Further reading

- Transforming Society in the Digital Age with the World's Most Advanced Computing
- Fugaku and associated technologies help to solve major challenges in the world today
- Fujitsu Supercomputer PRIMEHPC: High-performance, highly scalable, highly reliable, superior power-saving supercomputer
- Fujitsu Computing as-a-Service (CaaS)
- Supercomputer Fugaku CPU A64FX Realizing High Performance, High-Density Packaging, and Low Power Consumption
- One researcher's quest for life-saving breakthroughs in tsunami flooding prediction using supercomputer Fugaku and AI: FUJITSU BLOG – Global
- Taking on the challenge of COVID-19: The birth of six-dimensional interconnect technology for the supercomputer Fugaku (part 1): FUJITSU BLOG - Global
- Supercomputer Fugaku: Fujitsu Global
- Documents – Supercomputer Fugaku: Fujitsu Global
- How supercomputer technology is improving everyday life: FUJITSU BLOG - Global

