

World's Leading Scientific Supercomputing Centers Adopt NVIDIA NVQLink to Integrate Grace Blackwell Platform With Quantum Processors

News Summary:

- NVIDIA NVQLink to be broadly adopted by more than a dozen supercomputing centers across the globe, joining U.S. labs and quantum builders to advance quantum computing.
- NVQLink connects quantum processors with NVIDIA accelerated computing, enabling large-scale quantum-classical workflows powered by the NVIDIA CUDA-Q platform.
- A first-of-its-kind open and universal interconnect architecture, NVQLink provides the critical link the world's supercomputing centers need to integrate a rich array of quantum processors.
- Quantum computing company Quantinuum's latest Helios quantum processor uses NVQLink to integrate NVIDIA GPUs and demonstrate the first scalable real-time decoding for quantum error correction.

SC25—NVIDIA today announced that the world's leading scientific computing centers are adopting [NVIDIA® NVQLink™](#), a first-of-its-kind, universal interconnect for linking quantum processors with state-of-the-art accelerated computing.

Tapping the low-latency, high-throughput interconnect, more than a dozen supercomputing centers and national research institutions across Asia and Europe are joining U.S. facilities in advancing their ability to research, develop and harness the integration of quantum and classical hardware.

"In the future, supercomputers will be quantum-GPU systems — combining the unique strengths of each: the quantum computer's ability to simulate nature and the GPU's programmability and massive parallelism," said Jensen Huang, founder and CEO of NVIDIA. "NVQLink with CUDA-Q is the gateway to that future — uniting quantum and GPU computing into a single, coherent system to push the frontier of what's computable and unlocking new scientific discoveries."

By uniting quantum processors with NVIDIA accelerated computing, NVQLink's open system architecture overcomes control and error-correction challenges and enables the development of hybrid quantum-classical applications. It delivers 40 petaflops of AI performance at FP4 precision with a GPU-QPU throughput of 400 Gb/s and a latency of less than four microseconds.

NVQLink allows the coupling of quantum processors and GPUs via tight integration with quantum control systems and GPU supercomputing within the [NVIDIA CUDA-Q™](#) software platform. NVQLink was designed in collaboration with quantum processor and controller builders, as well as supercomputing centers across the world, including in Asia, such as:

- Japan's Global Research and Development Center for Business by Quantum-AI technology (G-QuAT) at the National Institute of Advanced Industrial Science and Technology (AIST)
- Japan's RIKEN Center for Computational Science
- Korea Institute of Science and Technology Information (KISTI)
- Taiwan's National Center for High-Performance Computing (NCHC)
- Singapore's National Quantum Computing Hub (a joint initiative of Singapore's Centre for Quantum Technologies, A*STAR Institute of High Performance Computing and National Supercomputing Centre Singapore)
- Australia's Pawsey Supercomputing Research Centre

Europe and the Middle East are also embracing quantum computing research with supercomputing and quantum technology centers supporting NVQLink, including:

- CINECA - Italy
- DCAI, operator of Denmark's AI Supercomputer
- France's Grand Équipement National de Calcul Intensif (GENCI)
- The Czech Republic's IT4Innovations National Supercomputing Center (IT4I)
- Germany's Jülich Supercomputing Centre (JSC)
- The U.K.'s National Quantum Computing Centre (NQCC)
- Poland's Poznań Supercomputing and Networking Center (PCSS)
- Technology Innovation Institute (TII), UAE
- Saudi Arabia's King Abdullah University of Science and Technology (KAUST)

They join the U.S. national laboratories that recently announced integration with NVQLink technology for cutting-edge research, including:

- Brookhaven National Laboratory
- Fermi National Accelerator Laboratory
- [Lawrence Berkeley National Laboratory](#)
- Los Alamos National Laboratory
- MIT Lincoln Laboratory
- National Energy Research Scientific Computing Center
- Oak Ridge National Laboratory
- Pacific Northwest National Laboratory
- Sandia National Laboratories

Real-World Hybrid Quantum-Classical Applications

Quantinuum recently announced that its latest Helios QPU, and future generations of its quantum processors, will be integrated with NVIDIA GPUs through NVQLink to orchestrate quantum error correction.

NVQLink and CUDA-Q allowed the deployment of quantum error-correction techniques to successfully protect the delicate quantum information within the Helios QPU from noise, or unwanted disturbances that cause errors in quantum systems.

This demonstration is the world's first real-time use of a scalable decoder for a class of quantum error-correction codes known as qLDPC codes. The Quantinuum team demonstrated active error correction and decoding with a decoder implementation that achieved a reaction time of 67 microseconds, exceeding Helios' two-millisecond requirement by 32x. Key to achieving this result was NVQLink's ability to provide a flexible and configurable decoder capable of massive parallelism.

The microsecond latencies and extremely high throughput provided by NVQLink are made accessible to developers through real-time application programming interfaces in NVIDIA CUDA-Q. This lets scientists and developers easily build and test approaches to quantum error correction and quantum-GPU applications within a single programming environment.

In addition, NVQLink's use of Ethernet allows researchers to easily scale the classical compute they draw on as quantum processors and applications expand.

Availability

Quantum builders and supercomputing centers interested in NVIDIA NVQLink can sign up for access on [this webpage](#).

Learn more about how NVIDIA NVQLink connects quantum processors with GPU-powered supercomputers on the [NVIDIA technical blog](#).

About NVIDIA

[NVIDIA](#) (NASDAQ: NVDA) is the world leader in AI and accelerated computing.

Certain statements in this press release including, but not limited to, statements as to: in the future, supercomputers being quantum-GPU systems — combining the unique strengths of each: the quantum computer's ability to simulate nature and the GPU's programmability and massive parallelism; the benefits, impact, performance, and availability of NVIDIA's products, services, and technologies; expectations with respect to NVIDIA's third party arrangements, including with its collaborators and partners; expectations with respect to technology developments; and other statements that are not historical facts are forward-looking statements within the meaning of Section 27A of the Securities Act of 1933, as amended, and Section 21E of the Securities Exchange Act of 1934, as amended, which are subject to the "safe harbor" created by those sections based on management's beliefs and assumptions and on information currently available to management and are subject to risks and uncertainties that could cause results to be materially different than expectations. Important factors that could cause actual results to differ materially include: global economic and political conditions; NVIDIA's reliance on third parties to manufacture, assemble, package and test NVIDIA's products; the impact of technological development and competition; development of new products and technologies or enhancements to NVIDIA's existing product and technologies; market acceptance of NVIDIA's products or NVIDIA's partners' products; design, manufacturing or software defects; changes in consumer preferences or demands; changes in industry standards and interfaces; unexpected loss of performance of NVIDIA's products or technologies when integrated into systems; and changes in applicable laws and regulations, as well as other factors detailed from time to time in the most recent reports NVIDIA files with the Securities and Exchange Commission, or SEC, including, but not limited to, its annual report on Form 10-K and quarterly reports on Form 10-Q. Copies of reports filed with the SEC are posted on the company's website and are available from NVIDIA without charge. These forward-looking statements are not guarantees of future performance and speak only as of the date hereof, and, except as required by law, NVIDIA disclaims any obligation to update these forward-looking statements to reflect future events or circumstances.

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