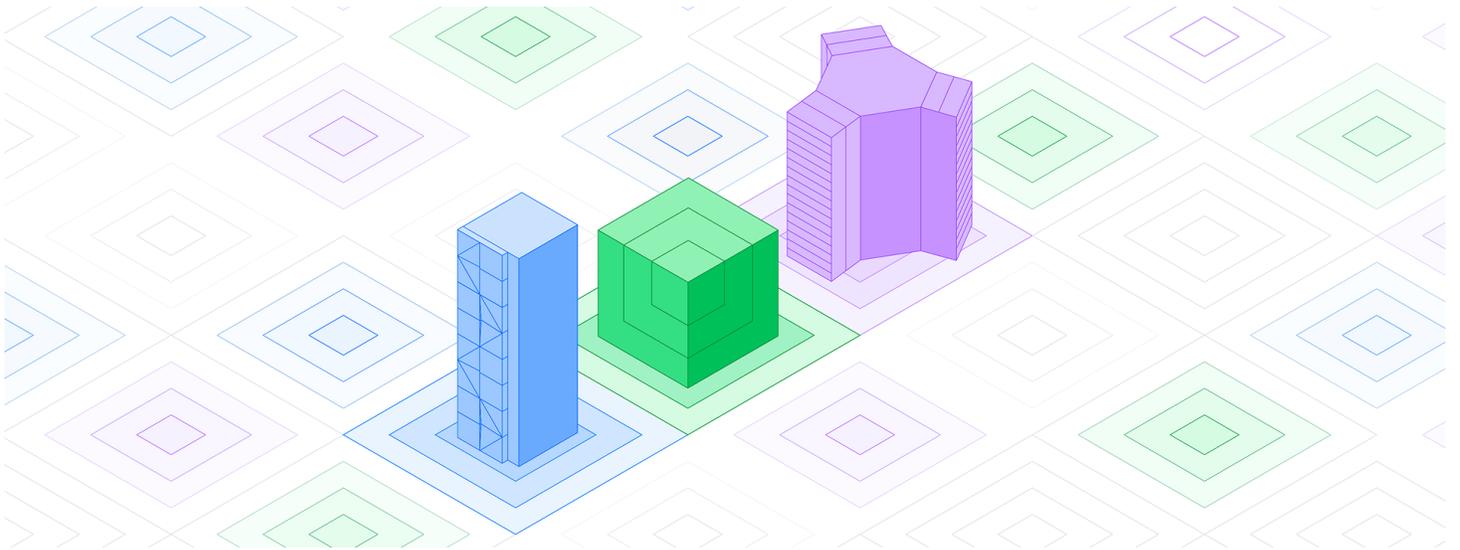


IBM Releases a New Blueprint for Quantum-Centric Supercomputing

- **New reference architecture outlines a practical, scalable path for combining quantum and classical computing**
- **Scientific breakthroughs in chemistry, materials science, and molecular simulation are pushing beyond the limit of classical computing driven through quantum-centric approach**
- **IBM's architecture brings quantum and classical computing together through open software and coordinated workflows**



YORKTOWN HEIGHTS, N.Y., March 12, 2026 — IBM (NYSE:[IBM](#)) today [unveiled](#) the industry's first published quantum-centric supercomputing reference architecture, a new blueprint for integrating quantum computing into modern supercomputing environments. The architecture shows how quantum processors (QPUs) can work alongside GPUs and CPUs —across on-premises systems, research centers, and the cloud—in order to tackle scientific challenges that no single computing approach can solve on its own.

Designed for today's workloads and built to evolve over time, the architecture brings quantum and classical systems together into a unified computing environment. It combines quantum hardware with powerful classical infrastructure, including CPU and GPU clusters, high-speed networking, and shared storage, to support computationally intensive workloads and algorithms research.



On top of this foundation, IBM's approach enables coordinated workflows that span quantum and classical computing. Integrated orchestration and open software frameworks, including Qiskit, allow developers and scientists to access quantum capabilities through familiar tools and workflows—making it easier to apply quantum computing to problems in areas such as chemistry, materials science, and optimization.

“More than four decades ago, Richard Feynman envisioned computers that could simulate quantum physics,” said **Jay Gambetta, Director of IBM Research and IBM Fellow**. “At IBM, we’ve spent years turning that vision into reality. Today’s quantum processors are beginning to tackle the hardest parts of scientific problems—those governed by quantum mechanics in chemistry. The future lies in quantum-centric supercomputing, where quantum processors work together with classical high-performance computing to solve problems that were previously out of reach. IBM is building the technology and systems that brings this future of computing into reality today.”

Scientists are already using IBM's quantum-centric architecture to deliver accurate results for real experiments. Recent results represent some of the strongest evidence yet that quantum computers combined with classical computing workflows can be used to accelerate scientific discovery:

- Researchers from **IBM, the University of Manchester, Oxford University, ETH Zurich, EPFL, and the University of Regensburg** [created](#) a first-of-its-kind half-Möbius molecule, verifying its unusual electronic structure with a quantum-centric supercomputer published in *Science*.
- **Cleveland Clinic** [simulated](#) a 303-atom tryptophan-cage mini-protein, one of the largest molecular models ever executed on a quantum-centric supercomputer.
- A team from **IBM, RIKEN, and the University of Chicago** [uncovered](#) the lowest-energy state of engineered quantum systems, outperforming state-of-the-art classical-only approaches.
- **RIKEN and IBM scientists** [achieved](#) one of the largest quantum simulations of iron-sulfur clusters, a fundamental molecule in biology and chemistry, through closed loop data exchange between a co-located IBM Quantum Heron processor and all 152,064 classical compute nodes of RIKEN's Fugaku supercomputer.
- **Algorithmiq, Trinity College Dublin, and IBM** collaborators [published](#) methods in *Nature Physics* to accurately simulate many-body quantum chaos systems, such as collections of atoms and electrons, using classical compute resources for

noise mitigation.

These results confirm the ability of IBM's quantum computers to deliver value to scientific problems.

As new quantum-centric algorithms emerge, IBM's global ecosystem of clients and partners will continually evolve this architecture to support sophisticated resources, networks and software capabilities. For example, IBM and **Rensselaer Polytechnic Institute** are improving how workflows can be seamlessly scheduled and orchestrated across quantum and high-performance computing resources. Deploying new algorithms on top of this maturing architecture will drive the next wave of applications in chemistry, materials science, optimization, and beyond, poising them to scale exponentially.

You can read more about IBM's progress in extending useful quantum computing to HPC centers [here](#); and more technical detail about the first reference architecture for quantum-centric supercomputing, [here](#).

About IBM

IBM is a leading global hybrid cloud and AI, and business services provider, helping clients in more than 175 countries capitalize on insights from their data, streamline business processes, reduce costs and gain the competitive edge in their industries. Thousands of governments and corporate entities in critical infrastructure areas such as financial services, telecommunications and healthcare rely on IBM's hybrid cloud platform and Red Hat OpenShift to affect their digital transformations quickly, efficiently and securely. IBM's breakthrough innovations in AI, quantum computing, industry-specific cloud solutions and business services deliver open and flexible options to our clients. All of this is backed by IBM's legendary commitment to trust, transparency, responsibility, inclusivity and service.

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