

ACCELERATING GROUNDBREAKING SCIENTIFIC DISCOVERIES WITH QUANTUM-POWERED RESEARCH

D-Wave Quantum Inc. offers researchers powerful annealing quantum computing technology capable of fueling important scientific advancements.

With the world’s largest quantum computer consisting of 5,000+ qubits, a real-time quantum cloud service, development tools, specialized training, and active collaborations with research institutions worldwide, D-Wave can help researchers turn complex research challenges into impactful discoveries.

D-Wave delivers access to cutting-edge quantum technologies— both quantum and hybrid-quantum solutions — that can meet the needs of the research

community and leading national laboratories conducting research on topics ranging from materials science and AI to optimization.

D-Wave is the only company developing both annealing and gate-model quantum computing systems. Its technology integrates seamlessly with other technologies such as cloud computing and high-performance computing, enabling researchers to explore the full potential of hybrid systems.



“Together with D-Wave, we are putting quantum computing power into the hands of our researchers who want to harness this transformative technology to solve the world’s toughest challenges.”

—Yannis C. Yortsos, Dean of the USC Viterbi School of Engineering

COHERENT QUANTUM DYNAMICS AT SCALE

In early 2024, the company released its 1200+ qubit Advantage2™ annealing quantum computing prototype, providing performance improvements over its previous Advantage™ system. The prototype’s early performance benchmarks over its predecessor include:

- 20 times faster time-to-solution on an important class of hard optimization problems
- Increased qubit connectivity from 15-way to 20-way to solve larger problems
- 40% increase in energy scale, delivering higher quality solutions
- Doubled coherence for faster time-to-solution

COMPARISON OF D-WAVE’S SYSTEMS

System	D-Wave 2000Q™ QPU	Advantage QPU	Latest Advantage2 QPU Prototype (July 2024)
Better Solutions (Satisfiability problems)	-	Better solution quality than D-Wave 2000Q QPU 81% of the time	Better solution quality than Advantage QPU 87% of the time
Time-To-Solution (3D lattice problems; annealing time)	-	10x faster than D-Wave 2000Q QPU	20x faster than Advantage QPU
Topology	Chimera™ topology	Pegasus™ topology	Zephyr™ topology
Qubits	2000+	5000+	1200+
Couplers	6000+	40,000+	11,000+
Connectivity	6-way	15-way	20-way
Largest embedded 3D lattice	8x8x8	15x15x12	6x6x16
Largest embedded clique	64	180	82

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The Advantage2 prototype is a significant step toward the full Advantage2 system, which features a lower-noise fabrication stack and Zephyr topology in the latest prototype. This system will be D-Wave's sixth-generation quantum computer and is designed to provide even greater computational abilities for customers.

D-Wave recently introduced the fast-anneal feature, available on all its systems — including the new Advantage2 prototype — giving quantum researchers access to powerful, coherent quantum annealing. The feature greatly reduces the impact of external disturbances such as thermal fluctuations and noise that often hinder quantum calculations.

Customer interest in the fast-anneal feature is evidenced by the fact that it has solved more than 4 million problems in the four months since its launch in April 2024.

Scan the QR code to read this paper.



“Fast anneal will assist researchers in observing the distinctive physical processes inherent in the quantum world. Heightened coherence and reduced environmental interference will open avenues in quantum sciences.”

—Alejandro Lopez-Bezanilla, Staff Research Scientist at Los Alamos National Laboratory

24/7 RESEARCH WITH REAL-TIME ACCESS

Real-time access to D-Wave's quantum resources is available through the Leap™ quantum cloud service, allowing researchers to develop, test, and deploy quantum algorithms and applications on D-Wave's quantum systems reliably and securely. The Leap service providing a cost-effective, rapid launchpad with over 99.9% uptime and availability.



99.9%
UPTIME AND
AVAILABILITY



“By providing direct access to quantum computing's central nervous system, D-Wave is single-handedly opening new horizons for our research on quantum computing and AI.”

—Ed Heinbockel, President and CEO of SavantX

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