

D-Wave: Setting New Standards in Quantum Computing Performance

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IDC'S QUICK TAKE

On November 6, 2024, D-Wave Quantum Inc. (D-Wave) announced the successful calibration and benchmarking of its new 4,400+ qubit Advantage2 quantum processing unit (QPU). Results indicate substantial performance improvements related to speed-up, precision and accuracy of results, and longer coherence times. These findings underscore D-Wave's commitment to delivering transformative quantum computing solutions that can address a range of larger and more complex optimization problems.

NEWS HIGHLIGHTS

On November 6, 2024, D-Wave Quantum Inc., a full-stack quantum computing company that develops annealing quantum computers, [announced](#) the successful calibration and benchmarking of its new 4,400+ qubit Advantage2 quantum processing unit. According to D-Wave, this development marks a significant milestone in the company's sixth-generation annealing quantum computing system. The Advantage2 processor demonstrates substantial performance improvements over the current Advantage system, solving complex computational problems in optimization, AI, and materials science — in some instances 25,000 times faster and five times better solutions on problems requiring a high degree of precision. The new processor also shows significant enhancements such as longer qubit coherence time, doubled that of the current Advantage QPU, increased energy scales (up 40%), and an advancement from 15 to 20-way qubit connectivity. Based on these results, D-Wave concludes that the sixth-generation Advantage2 processor can deliver D-Wave faster, more accurate solutions for larger, more complex optimization problems.

IDC'S POINT OF VIEW

The successful calibration and benchmarking of D-Wave's 4,400+ qubit Advantage2 processor represents a pivotal advancement in the field of quantum computing. For almost four decades, quantum computing hardware developers promoted the concept that quantum computers would aid scientists and engineers in their ability to solve intractable business and scientific problems faster, more accurately, and in a less expensive manner than what could be achieved using classical compute systems. The Advantage2 processor's ability to solve complex computational problems 25,000 times

faster and with five times better solutions on problems requiring a high degree of precision highlights D-Wave's commitment to delivering useful quantum computing systems to end users, and the potential that annealing quantum computers will have in revolutionizing organizations' ability to solve complex optimization problems. These performance gains are not merely incremental but transformative, setting a new benchmark for quantum computing capabilities.

To date, D-Wave's quantum annealing systems are one of the few quantum computing technologies used by organizations to run production use cases to gain business value. The range of optimization problems that can be applied to the annealing quantum computer, including AI and materials science problems, demonstrates a versatility once thought to be limited only to gate-based systems. This versatility will help expand the adoption of quantum computing to a larger number of potential end users across multiple industries. Consequently, it may be that the long-sought after killer use case for quantum is in fact quantum optimization.

Historically, D-Wave's technologies have often come under intense scrutiny and criticism due to the company's unique approach to exploit the quantum properties of qubits. Recent announcements such as this are quickly helping demonstrate the value that the company's technology can bring to end users, affording the company the recognition it deserves.

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