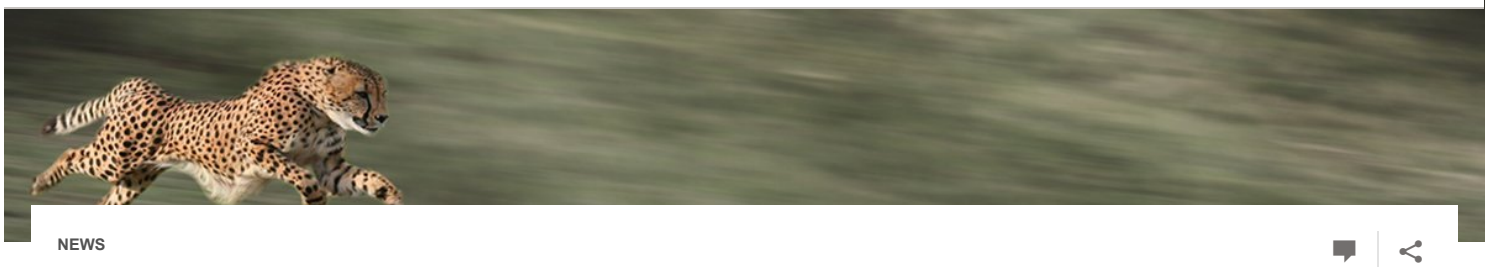

NEWS

Honeywell touts quantum computer speed, but how fast is fast?

Honeywell has delivered what it believes is the industry's fastest quantum computer. But analysts say it will take more than superior speed to win over most IT users.

Ed Scannell, Senior Executive Editor

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Making good on its promise from March, Honeywell formally delivered its first quantum computer and claims it is the fastest system in the world.

The Honeywell system has a quantum volume of 64, twice that of any available quantum system, including those from IBM, Rigetti and IonQ. The system targets several markets facing computational problems that can't be solved by classical computers, in particular the financial market.

Honeywell has "dozens" of users evaluating the system, according to Tony Uttley, president of Honeywell Quantum Solutions. One is JPMorgan Chase, which is primarily interested in developing quantum software for fraud detection.

Users lacking the necessary quantum skills can work with Zapata and Cambridge Quantum Computing, two companies Honeywell has invested in that specialize in converting real world problems into quantum algorithms.

"Some customers know how to write quantum algorithms, so we can give them an API to log in to our systems enabling them to get back their results quickly," he said.

The three areas of focus among users right now center around optimization, machine learning, financials and chemistry, according to Uttley.

"Those areas are the ones where algorithms are available over the near term that can leverage both classical and quantum resources," he said.

HONEYWELL

The Honeywell system has a quantum volume of 64.

The reality of quantum computing today

Despite Honeywell's Quantum Volume milestone, some analysts caution it is still too early in the quantum computing competition to place much emphasis on a system's overall performance. First, not all quantum suppliers ascribe to the same performance metric and second, there are different architectural approaches to developing quantum systems where one benchmark may favor one system over that of competing systems.

"The reality is vendors can't agree on a specific benchmark because we're so early in the development of quantum computing," said Bob Sorensen, senior vice president of research, chief analyst for quantum computing, at Hyperion Research LLC. "There's no general agreement on what really matters and what doesn't matter. Any vendor is going to be very careful about a benchmark that may make their product or technology direction look weak while someone else looks better."

The current Quantum Volume metric has been defined by IBM, which a number of IBM's quantum competitors have adopted. They believe the metric takes into consideration not just the raw speed of a system but a handful of other capabilities that also contribute to overall performance. However, IBM and Rigetti employ a superconducting approach to building quantum systems, as opposed to the trapped ion approach of Honeywell and IonQ.

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>
> **Bob Sorensen**
> SVP of research, chief analyst for quantum computing, Hyperion Research LLC

Quantum vendors run the risk of confusing and losing potential buyers by pitching them on the benefits of various qubit benchmarks because ultimately that is not what they are interested in. They are more interested in how a certain hardware architecture can run applications faster and more efficiently, resulting in significant ROI.

"[Users] don't care so much about quantum supremacy or quantum advantage," Sorensen said. "If they are going to get a system for a reasonable price or accelerate an application [performance] by 50 times with a quantum algorithm or hybrid algorithm, they are going to be really happy."

James Sanders, an analyst at 451 Research who focuses on cloud and managed services, agrees quantum system vendors need more than compute muscle to win users, and require more practical utility. The introduction of speedier systems should raise the visibility of the technology among IT shops.

"The utility of a quantum computer will increase as quantum volume increases," Sanders said. "I'm not sure when [quantum systems] reach production quality but the more utility you bring to the table, the more developer interest you can generate."

Through an agreement Honeywell signed last year with Microsoft, users can access Azure and Q#, Microsoft's open source programming language, to create and run quantum algorithms. Q# is part of Microsoft's Quantum Development Kit that also includes Q# libraries, quantum simulators and extensions to accommodate working with other programming environments.

Azure Quantum offers developers the ability to benchmark their algorithms across different quantum systems, giving users and developers a more level playing field to compare quantum systems, said Paul Smith-Goodson, a quantum computing analyst at Moor Insights & Strategy.

He noted that Microsoft software takes into consideration each computer's different architecture, fidelity and level of connectivity, which essentially determine how the hardware uses quantum technologies such as superposition, entanglement and interference.

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