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CLOUD

Quantum Computing Is Moving from Theory to Reality

Companies like JPMorgan Chase are using the still-experimental tech to solve real-world problems.

by Erin Brereton

Erin Brereton has written about technology, business and other topics for more than 50 magazines, newspapers and online publications.

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Until recently an abstract concept, quantum computing is gaining notice in several industries, including financial services, manufacturing and logistics.

In June, for example, JPMorgan Chase published data on its

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experiments using Honeywell's quantum technology, describing its efforts to "produce a quantum oracle," or to use math to better predict the future. The financial services giant is accessing the technology directly via API, according to Honeywell Quantum Solutions President Tony Uttley, who says the company is interested in tasks such as optimization around trading strategies and fraud detection.

The JPMorgan Chase study, while academic in nature, is being received in computer science and business circles as an exciting development.

"Now you can actually start to use real quantum algorithms on real quantum computers, understand how they work, which classes are working better than others, and start to pinpoint those use cases you think are going to be the most profound," Uttley says.

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How Does Quantum Computing Work?

Instead of the binary 1s and 0s traditional computers use, quantum computing involves quantum bits, or qubits, which can be read as 1s, 0s — or both.

That seemingly subtle difference will allow quantum computers to process massive amounts of information, solving drastically more complex problems than a regular computer would be able to — in less time — in the near future, according to Paul Smith-Goodson, quantum computing analyst with Moor Insights & Strategy.

"While quantum usage is still in its early stages, several providers are offering cloud access to the technology," Smith-Goodson says. "It's come a long way — much faster than what was originally anticipated. A lot of companies are doing experimenting using quantum computing."

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Becoming a Leader in Quantum Computing

IBM has offered cloud access to quantum computers since 2016 via its website-based IBM Quantum Experience; nearly 250,000

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people have registered to do so, says Robert Sutor, vice president of IBM quantum ecosystem development.

"We have democratized access to quantum computers since the very beginning because we felt it was such a new technology, and we have to get people ready," Sutor says.

Quantum computing still has some distance to go to reach its full potential. For now, error rates are too high, producing what researchers call "noise" in the data the machines produce.

"The more qubits you have, the more noise you generate," he says. "To do a really serious type of quantum computing, to model or create a new drug or simulate a very complex chemical, you're going to need millions to billions of qubits. Right now, we're just not at the stage where we can scale up to that point because we have limitations with noise."

But the technology's potential is irresistible, and big companies are exploring it. Aerospace company Boeing, for example, is using it to model the movement of air and water over surfaces, and it's helping Daimler Mercedes-Benz, in its work to create new lithium car batteries.

"In this very short period of time, we have gotten people involved with business use cases: applications like chemistry and looking at how to do some aspect of artificial intelligence better," Sutor says. "Financial companies are asking, 'How do we get the most accurate view of the price of a financial portfolio?' People are on track to take better advantage as we create more powerful machines."

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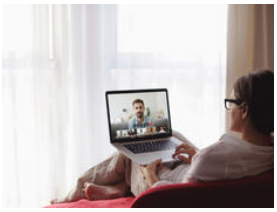

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