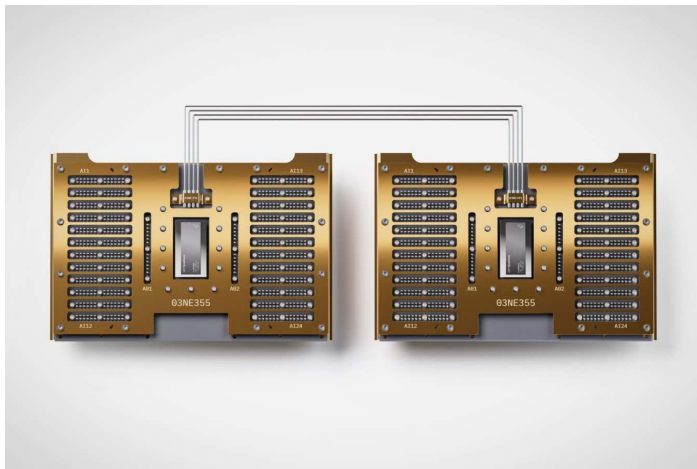


IBM will release the largest ever quantum computer in 2025

Following successful early demonstrations of linking two quantum computing chips, IBM is aiming to break records for the largest quantum computer yet by combining many of them in parallel

By [Karmela Padavic-Callaghan](#) on December 30, 2024



Multiple copies of IBM's quantum Flamingo chip can be connected together. IBM

IBM is planning to build the largest quantum computer so far, by linking together smaller machines to create one with a recording-breaking number of quantum bits, or qubits. The firm's first steps on this path in 2025 should see it hit a new qubit record, and it eventually plans to more than triple the size of the largest existing quantum computer.

It has only been six years since [IBM unveiled its first commercial quantum computer](#). That device had 20 qubits, the basic building blocks of any quantum computer, and was available for researchers to use over the internet. Now, the company's largest quantum chip, called Condor, [has 1121 qubits](#), though IBM's [Jay Gambetta](#) says the average user of its quantum computing services only works with 100 qubits.

IBM isn't the current record holder for most qubits – that goes to [the start-up Atom Computing](#), which announced a 1180-qubit device in 2023 – but it is keen to regain the title, and is looking at new ways of doing so.

“We know we can’t just make Condor but 10 times bigger,” says Gambetta. “The only way to get quantum advantage is to combine different components.” This is an issue of engineering as much as it is of quantum physics – as the number of qubits increases it becomes more practically difficult to fit all of them and the quantum computer’s input and output wires onto a single chip.

To get around this, IBM is going modular, connecting several smaller quantum processors to create a more powerful, “parallelised” machine. It has already prototyped a new chip called Flamingo and is planning to connect three of them into a 1386-qubit system in 2025.

It also has plans for another chip called Kookaburra, which will be unveiled in 2026, to become a building block for a quantum computer with 4158 qubits. This machine will be created by connecting three Kookaburra chips together, which would open a several thousand-qubit gap between it and all other quantum computers in both commercial and academic labs. However, Gambetta says it may take a few years to demonstrate its full functionality.

Connecting these chips will require hundreds of components called “couplers,” and IBM has so far built and tested two kinds of these, but one more, which Gambetta says will be necessary for fully modular quantum computers, is still under development. These components differ in whether they connect adjacent chips, faraway chips or individual qubits at a distance.

In November, the company [connected two of its 127-qubit chips](#) to perform a calculation requiring 142 qubits – more than either chip could manage alone. The task now is to increase that total number while making sure the qubits don’t make more errors than when the chips are kept separate.