

IBM reveals the world's smallest chip

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Today's top story, from reporter Sascha Brodsky:

IBM has unveiled the world's first sub-1 nanometer chip technology, a research breakthrough the company said could reshape the next generation of computing by packing more performance into smaller devices.

AI models continue to grow larger and more complex, increasing demand for more computing power as conventional transistor scaling becomes more difficult. IBM said that its latest research pointed to a different approach. Instead of continuing to shrink transistors primarily across a flat surface, researchers stacked them vertically in a new 3D architecture called "nanostack."

"Nanostack is happening today because of some key technologies that were not available in the past," Huiming Bu, VP for Global Semiconductor R&D at IBM, said.

The architecture roughly doubled transistor density compared with IBM's 2-nm technology. Bu said nanostack could pack roughly 100 billion transistors into a chip about the size of a fingernail. Each process node measures just 7 angstroms, making it about 10,000 times narrower than a human red blood cell. Bu noted that it could deliver up to 70% greater energy efficiency and up to 50% higher performance than IBM's 2-nm technology, introduced in 2021.

IBM's announcement arrives as TSMC, Intel and Samsung push to build smaller chips for AI. TSMC is producing 2-nm chips, while Intel and Samsung continue developing the next generation of chipmaking technology.

For decades, chipmakers boosted performance by shrinking transistors, the tiny switches that process information inside every processor. According to Bu, continued scaling has become increasingly difficult because making transistors smaller also makes them harder to manufacture and control, pushing researchers to look for new ways to improve performance.

Although the nanostack technology remains in the research stage, IBM said it could influence chip design for years to come.

"With our new nanostack architecture, we're not just making smaller transistors, we're reinventing how chips are built to deliver dramatically more power and energy efficiency," Jay Gambetta, Director of IBM Research and IBM Fellow, said in a news release. "This industry-first innovation continues IBM's legacy of leading in next-generation technologies and sets the foundation for the next era of computing."