

IBM Unveils World's Smallest SRAM Memory Cell

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IBM today announced it has built a critical component for a high-speed computer memory that is about ten times smaller than those currently available, potentially enabling a major system performance boost for critical business applications.

Called a static random access memory ([SRAM](#)), this form of memory is needed in greater and greater quantities on computer processor chips to enable the higher system performance required for demanding applications like banking and digital media. Yet, the space available for SRAM on these chips is limited by cost and manufacturing limitations, presenting a significant technical challenge. IBM has demonstrated that the SRAM memory can be made significantly smaller and still operate properly, thereby allowing more to be included on each chip.

Traditionally, SRAM is made more dense by shrinking its basic building block, often referred to as a cell. The new IBM SRAM cell is less than half the size of the smallest experimental cell reported to date, and ten times smaller than those available today. To put this in perspective, about 50,000 of the IBM cells could fit on the circular end of a single human hair. This breakthrough demonstrates the possibility of continued system performance improvement for three additional technology generations beyond what is currently manufactured. The technology is being unveiled in December at the 2004 International Electron Devices Meeting (IEDM) in San Francisco.

"Our continued commitment to technology leadership is driven by the needs of our customers," said Dr. T.C. Chen, vice president of Science

and Technology, IBM Research. "Our ability to create critical electronic components at these small scales ultimately means our systems will be able to tackle harder problems. We develop the technology and our server systems are the vehicles that put this technology to work in powerful ways."

IBM researchers optimized the SRAM cell design and circuit layout to improve stability and developed several novel fabrication processes in order to make the new SRAM cell possible. The key element was IBM's utilization of mixed electron-beam and optical lithography to print the aggressive pattern dimensions and densities. SRAM cell size is a key technology metric in the semiconductor industry, and this work demonstrates IBM's continued leadership in cutting-edge process technology.

The SRAM cell size achieved by IBM could enable on-chip memories with ten times higher capacity than the current state-of-the-art technologies. This innovative technology could pave the way for new applications, such as faster search processing, and enable the growth of on demand computational capabilities for IBM customers.

About SRAM

SRAM is a type of fast, on-chip memory that holds its data without external refresh for as long as power is supplied to the circuit. Each memory is an array of many cells. A typical SRAM cell contains six transistors and acts as a single-bit storage element. Although not as dense, SRAM is many times faster than dynamic random access memory (DRAM). SRAM is essential for storing critical data that must be quickly and frequently retrieved by the processor.

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