

Silicon giant

New Itanium processor tops 1.7 billion transistors

INTEL COFOUNDER GORDON MOORE CERTAINLY DOESN'T take himself too seriously. Consider the title of his industry-changing article, which appeared in the April 19, 1965, issue of *Electronics* magazine. He called it "Cramming more components onto integrated circuits."

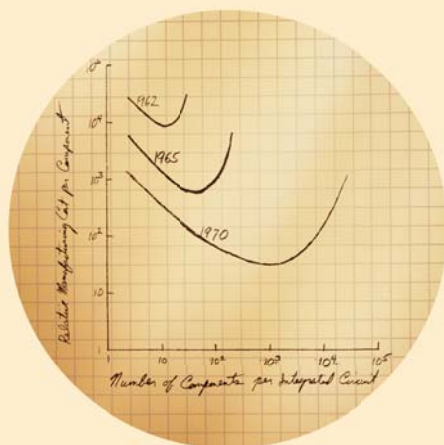
Here's what Moore had to say back in 1965: "The complexity for minimum component costs has increased at a rate of roughly a factor of two per year.... Certainly over the short term, this rate can be expected to continue, if not to increase. Over

the longer term, the rate of increase is a bit more uncertain, although there is no reason to believe it will not remain nearly constant for at least 10 years. That means by 1975, the number of components per integrated circuit for minimum cost will be 65,000. I believe that such a large circuit can be built on a single wafer."

The recent introduction of the Dual-Core Intel® Itanium® 2 processor doubtless gave Moore a renewed sense of pride in his company. This processor line, previously code-named Montecito, is designed for the most sophisticated mission-critical computing platforms in the world. Compared with the existing single-core version, the dual-core, 1.7 billion transistor Montecito processor delivers twice the performance with a 20 percent reduction in power consumption. Cache memory has nearly tripled—from 9 to 24 megabytes—and the number of threads (related to processing efficiency) has increased from one to four.

Montecito certainly makes Lisa Graff proud. As general manager of server platforms at Intel, Graff is responsible for both Intel Xeon® and Itanium processor-based platform management. The recent launch of this powerful new processor continues the steep upward trajectory for performance: With increased transistor counts comes ever-greater processing power, measured in millions of instructions per second (MIPS).

But there's also something new. "Historically, performance increases have been tied to the frequency of the processor," Graff explained. "Intel has propelled that trend of higher performance, faster chips, and lower costs by essentially doubling the number of transistors on the processor every



In 1965, Gordon Moore sketched out his prediction of the pace of silicon technology. Decades later, Moore's Law remains true, driven largely by Intel's unparalleled silicon expertise.

Copyright © 2005 Intel Corporation.



“Intel has **propelled** that trend of **higher performance, faster chips, and lower costs** by essentially **doubling** the number of transistors on the processor every 18 to 24 months, just as **Moore’s Law predicted.**”

Lisa Graff, Intel general manager of server platforms

18 to 24 months, just as Moore’s Law predicted. This has resulted in the terrific standards-based price/performance curve that the computing industry has enjoyed for tens of years.”

According to Graff, other factors have now come into play. “Today, we are increasing performance by adding more cores to each processor, which has a very important and interesting effect: Not only does performance go up, but at the same time we are able to lower overall power consumption for both the processor and the system. We can also embed capabilities such as virtualization, security, manageability, and enhanced cache reliability directly into the microprocessor.”

For the basic Itanium architecture, Intel worked closely with HP to create an architecture that was optimized for high-end computing. The latest multi-core Itanium technology allows users to reap the benefits of massively parallel computing, enabling maximum performance for enterprise applications.

“Intel is very excited about our Itanium roadmap,” said Graff. “Our next Itanium processor, called Montvale, will come out in 2007. Tukwila is slated for introduction in 2008; this is a multicore processor that will provide another huge jump in performance along with significant memory and I/O enhancements. After Tukwila, we have yet another processor in development called Poulson. We are making a major investment in Itanium processors, as demonstrated by this very strong roadmap.” Montecito is scheduled to enter the HP Integrity NonStop server roadmap in mid-2007.

The investment doesn’t stop there. For example, the Itanium Solutions Alliance—a global consortium of industry leaders dedicated to acceleration of

Itanium-based solutions—has publicly committed to more than \$10 billion in research, development, and marketing through 2010.

The close link to Intel’s aggressive Itanium roadmap is good news for HP Integrity NonStop server customers. “I think they’re getting the best of both worlds,” said Graff. “They can leverage HP’s leading design capabilities with these incredibly reliable systems, which the most mission-critical workloads and applications in the world rely on. And they don’t need to make any compromise in terms of the microprocessor. Itanium is especially designed for high-end applications, exactly the kind that Integrity NonStop systems target.”

According to Graff, Intel continues to work closely with HP to understand its systems and solutions direction; similarly, HP works with Intel on processor direction. “Intel and HP have had a long and mutually beneficial relationship,” she concluded. “This level of collaboration enables us to embed capabilities in the processor that HP can use directly to enhance the system and meet the mission-critical needs of its customers. It’s a great approach to putting a high-performance, high-capability solution together.”

As Gordon Moore so cogently stated in his February 2003 speech to the International Solid-State Circuits Conference: “There is certainly no end to creativity.” The fruitful alliance between HP and Intel—and the remarkable innovation it delivers on an ongoing basis—bears out this assertion. ♦

