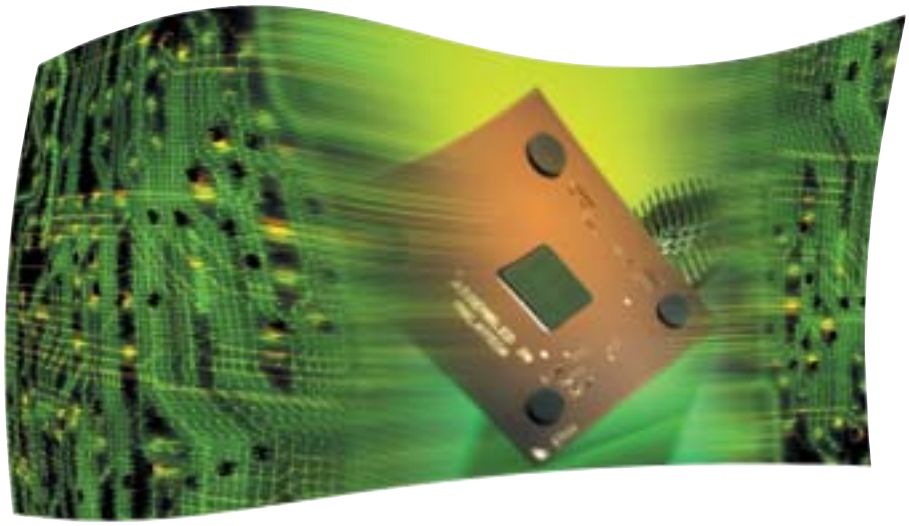
behind the news

Chip maker Intel reveals what we can expect from the processors of the future. Ursula Seymour and James Niccolai quiz the technology giant about its plans for smaller, cooler, faster components



Intel has revealed details about a set of new important techniques it will use to make computer chips in the future. The company sees the advances as essential for it to continue its steady progress toward faster, smaller, cheaper microprocessors.

At the Intel Developer Forum it outlined plans to use new materials and structures to create the microscopic transistors that cover the surface of silicon chips. Besides boosting PC performance, the techniques should enable chips to combine communications with computation, reducing the cost and increasing the power of mobile phones, network equipment and other gear.

"We envision a future where information becomes more personal, where my communications device is in my lapel pin, where I have instant access to knowledge whatever I am doing and wherever I am," said Pat Gelsinger, Intel vice president and chief technology officer.

Moore problems

Transistors act like tiny switches on the surface of chips, turning on and off at lightning speed to represent the ones and zeros of binary computer code. As transistors get smaller and multiply in number, however, challenges arise that threaten to block the progress of Moore's Law, a decades-old prediction that the number of transistors on a chip will double roughly every two years.

One challenge being addressed by Intel is finding a way to pass more electrical current through transistors without them burning up or leaking electricity.

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Wilfred Pinfold, Intel's technology director of microprocessor research, told *PC Advisor* that the company's focus had altered when it came to developing new chips. "We've changed how we look at power. In the past it wasn't a limiter for us, but now the cost of the cooling system is a real factor. We think about power [and how to dissipate the heat it causes] a lot earlier now, and that has changed a lot of things. But if you are good at dealing with power you can often push performance too," he explains.

Material gains

Intel is developing new methods that will let it fit more transistors on a chip, but by using more efficient ways of transmitting data it will still be able to offer lower voltage and cooler chips.

As the silicon used to make chips today is not the best material to promote heat dissipation, Intel is also using a new material, Silicon Germanium, to make some of its chips when it moves to a new '90 nanometer' manufacturing process toward the end of next year. The material is a better conductor of electricity and can help boost chip performance. It is more expensive too and Intel will restrict its use initially to chips in communications equipment such as optical networking components.

Pinfold says developing chips for specific environments will inform design decisions far more in the future. "The form factor you have will be far more appropriate to the task you need to do," he says. "Even at the silicon building block level you are dealing with something more appropriate." He believes that we will see "a much broader base of microprocessors, which will be tailored to different devices".

Boosting the transistor count will allow Intel to integrate new functionality on its processors. For example, by the middle of the decade it expects to combine analogue components like a radio frequency receiver with logic components, creating in effect a miniature and inexpensive radio on a single chip. For users it means that any device with an Intel processor will in effect include wireless capabilities for free. ■

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