Ю.Баяковский

Семинар – 13 февраля 2006

Cell’s nine processors make it a supercomputer on a chip

IEEE Spectrum | January 2006

WINNERS & LOSERS

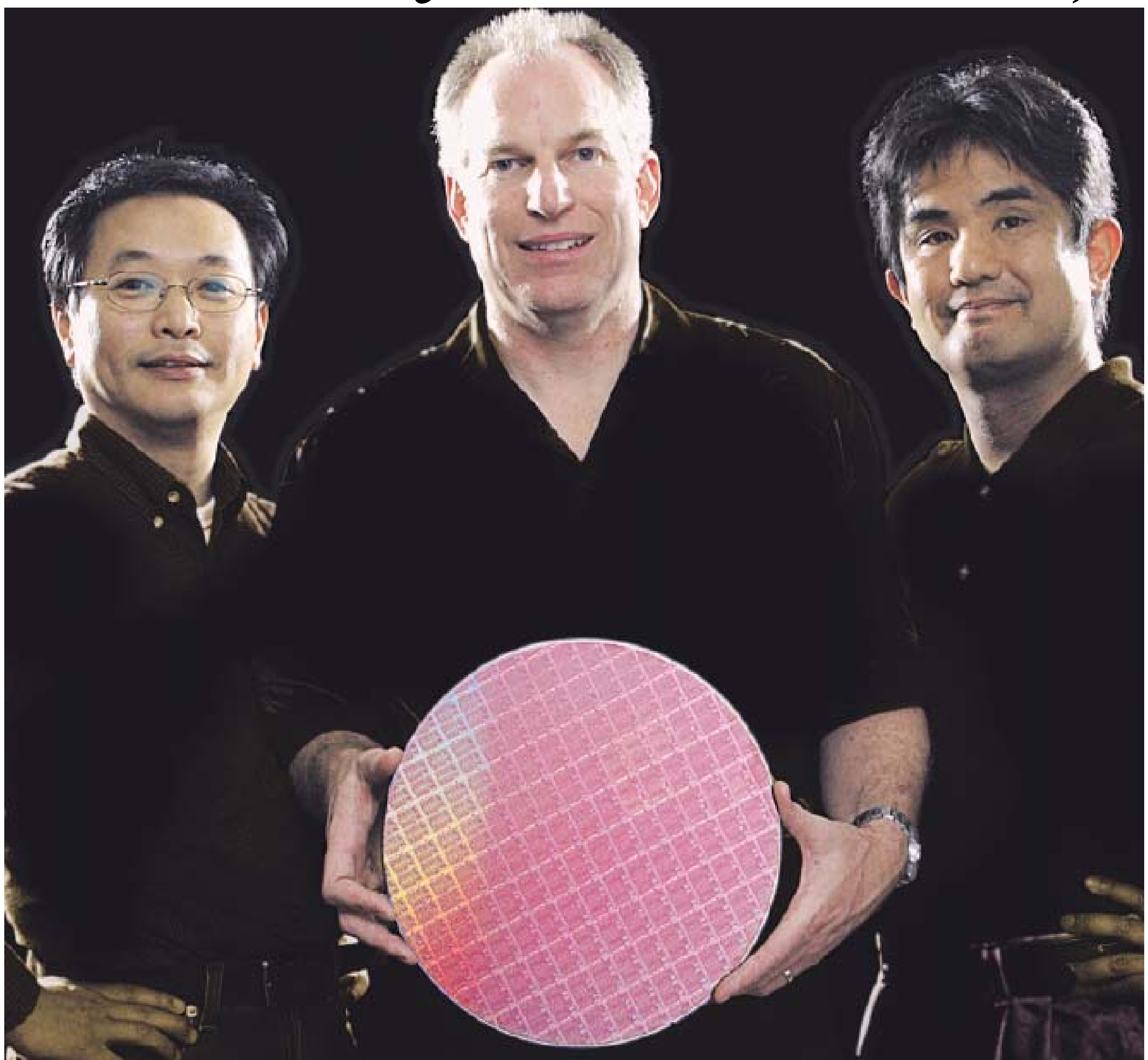
True technologists thrive on the chance to be in on the moment of creation, to make something elegant and enduring. Maybe once in their career, if they're really fortunate, they might even get a chance to help fundamentally change the way we work, commute, or play.

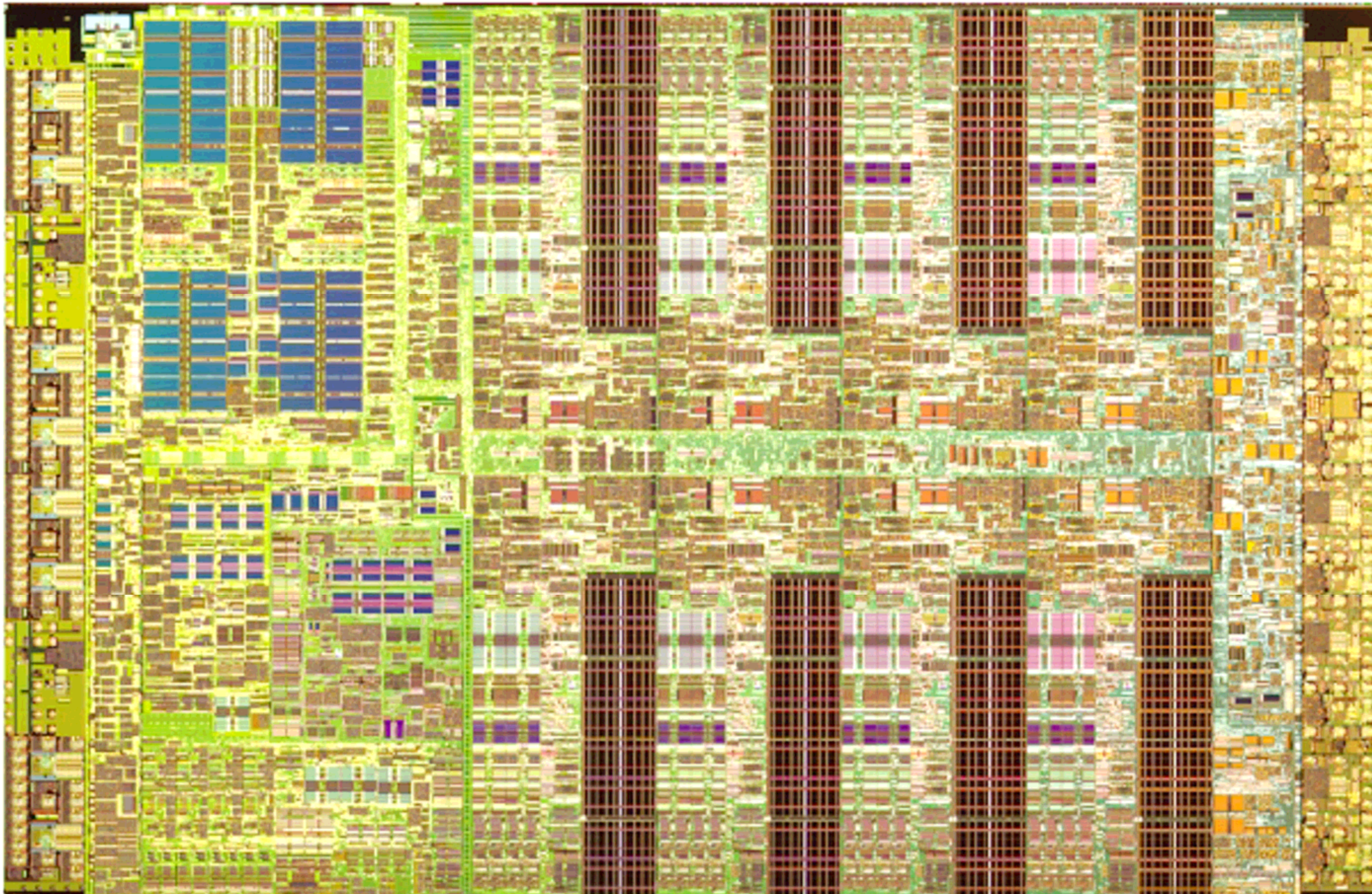
Of course, in this big game, technical prowess is necessary but not sufficient for victory. It's all about the project: is it in sync with the shifting shoals of government regulation, market competition, investor interest, and the most murky of all, the public zeitgeist?

To pick the winning and losing projects, we simply considered the feasibility of their goals. We analyzed these goals in light of technical and technology-related factors: regulation, competition, relevant technology and market trends, and more.

MULTIMEDIA MONSTER

(IBM, Sony, and Toshiba)





CELL CITY MAP: The Cell microprocessor that will power Sony's PlayStation 3 game console has nine processor cores. The core making up the left quarter of the chip is similar to the processors in Apple computers. The other eight cores, notable by their columns of memory [brown], are designed to do multimedia tasks.

Executives at Sony Corp., in Tokyo, wanted more than just an incremental improvement over PlayStation 2’s processor, the Emotion Engine. What they got was a 36-fold acceleration, to a whopping 192 billion floating-point operations per second (192 gigaflops). Because Cell is a combination of general-purpose and multimedia processors, it defies an exact comparison with other upcoming chips, but it’s thought to be more powerful than the chips driving competing game systems.

Cell can calculate at such blazing speed, in part, because it’s made up of nine processors on a single chip of silicon, optimized for the kind of real-time calculations needed in today’s broadband, media-rich environment. A specially designed 300-gigabit per-second bus knits the processors into a single machine.

Toshiba Corp., in Tokyo, for one, plans to build television sets around it. The company has already shown that a single Cell processor can decode and display 48 compressed video streams at once, potentially allowing a television viewer to choose a channel based on dozens of thumbnail videos displayed simultaneously on the screen. And in a smaller market, Cell has already found its first outside customer in medical- and military-systems maker Mercury Computer Systems Inc., which is developing a two-Cell blade server due out by April.

With two such massive consumer electronics makers as Toshiba and Sony behind it, Cell is an obvious attempt to control the “digital living room,” as technology executives have dubbed their dream of a home where all the media players are intelligent and networked together.

Cell, on the other hand, has an asymmetric architecture that contains two different kinds of cores [see photo, “Cell City Map”]. One, the Power processing element, is similar to the CPU in a Mac; it runs the Linux operating system and divides up work for the other eight processors to do. Those eight—called Synergistic processing elements—are designed specifically to juggle multimedia applications: video compression and decompression, encryption and decryption of copyrighted content, and, especially, rendering and modifying graphics.

The Synergistic elements were built from the ground up to do what are called single-precision floating-point calculations—the kind of operations needed for dazzling three-dimensional graphics and a host of other multimedia tasks. The design traded flexibility—a Synergistic element is not versatile enough to run the Linux operating system on its own—for eye-popping speed.

When pushed to its 5.6-gigahertz limits, a single unit can do 44.8 billion singleprecision floating-point calculations per second. Not wanting to cut Cell off from a role in scientific computing, its designers included circuitry in each Synergistic element that can do the more exacting calculations, called double-precision, that scientists demand, but its performance is only about one-tenth that of the single-precision unit.

The chip’s commercial success will depend on whether programmers can learn to exploit its full potential. To that end, the developers have from the beginning put a high priority on crafting the appropriate software tools.

Indeed, some think Cell is an indication of what’s to come in other microprocessors. “In the future, we’ll see convergence of general-purpose multiprocessors and game- and media-oriented processors,” says Princeton’s Lee. “Media processors will become more general purpose, and general purpose, more multimedia.” And with any luck, that will make your living room a more entertaining place.

Ссылки

- http://www.eweek.com/article2/0,1895,1768416,00.asp
- http://en.wikipedia.org/wiki/Cell_(microprocessor)
- http://www-1.ibm.com/businesscenter/venturedevelopment/us/en/featurearticle/gcl_xmlid/8649/nav_id/emerging