Many Changes in Past Decade

Dominance Shifts; Players Come and Go; Litigation Continues to Thrive

Microprocessor Report is now 10 years old. Having been a part of the newsletter for exactly half that time, I wasn't involved in the earliest coverage. Rereading those early issues, however, I was struck by how many things were different—and, of course, by the few things that haven't changed very much.

In 1987, we were very worried about buses. It was an awkward transition period between the first half of the 1980s, when the industry took whatever buses IBM developed, to the second half of the 1990s, when we take whatever Intel gives us. But at the time, the PC industry was upset enough about IBM's Micro Channel to develop EISA, a more straightforward extension of the ISA bus (a.k.a. the AT bus). This key act broke IBM's dominance over PC design.

There was also an inordinate amount of interest in NuBus, fueled by its inclusion in the Macintosh II. Unlike the PC buses, NuBus was based on an IEEE standard, and it was technically superior to EISA or Micro Channel. In the long run, of course, Apple's refusal to open the Macintosh market to other vendors doomed NuBus to obscurity.

The issue of Mac vs. PC was still open in 1987. At Comdex, Intel claimed that, for the first time, 386 sales exceeded those of all other 32-bit processors, including the then-popular 68020. Motorola countered with a claim that the 68020 represented 72% of all 32-bit microprocessors sold to date. Its successor, the 68030, reached the market by the end of 1987, putting it two years behind the 386. The 68030 was in many ways a cleaner design than the 386, but its late entry, combined with the PC's ascendency over the Mac, doomed the Motorola chip on the desktop.

The emergence of RISC processors helped seal this doom. In 1987, the philosophy of RISC had already been discussed (more often argued) for years, but the first RISC-based systems were just emerging. The top RISC platforms were SPARC, MIPS, and Clipper. Clipper, however, had just been transferred to Intergraph after National bought Fairchild, and its long-term prospects were already in question.

Many other companies were committed to RISC. HP was already shipping PA-RISC processors, but only in very expensive workstations and minicomputers. Motorola's 78000 RISC program, later announced as the 88000, was well under way, and AMD was already sampling the 29000. Despite Intel VP David House's denouncing RISC as "the last hope of the have-nots," Intel was about to announce not one but two new RISC architectures, the i960 and the i860. Projects that eventually became IBM's POWER and Digital's Alpha were in their early stages. Many of these RISC chips displaced 680x0 processors from workstations.

The microprocessor industry was as litigious in 1987 as it is today; the most prominent suit was between Intel and NEC, based on Intel's claim that the Japanese vendor had stolen its 8086 microcode and implemented it in NEC's V20 and V30 chips. The court eventually ruled that NEC's parts did not infringe on Intel's copyrighted microcode, but the victory was Pyrrhic: the V20 and V30 were irrelevant by the time the suit was settled, and NEC never developed a 386-compatible processor that would have allowed it to compete with Intel in the lucrative PC market.

By 1987, Intel had established itself as the leading player in the microprocessor market, but it did not have quite the dominant position it has today. Motorola was still a strong competitor, but its problems with the 68030 and later the 68040 would leave Intel as the undisputed microprocessor leader, outside of embedded applications.

Within the x86 market, AMD competed as a licensed second source of the 286. Intel's refusal to license the 386 was beginning to strangle AMD, however, and with the introduction of the 386SX in 1988, Intel was able to crush demand for the 286. AMD fought back by pushing the 286 to 16 MHz, faster than Intel's versions, but Intel's 20- and 25-MHz 386 chips solidified its hold on the PC market.

Of course, the technology has changed most of all. In 1987, 1-Mbit DRAMs were still struggling to reach per-bit price parity with 256-Kbit chips; today, many microprocessors have 256 Kbits of on-chip *cache*, and 16-Mbit DRAMs are common. Similarly, RISC CPU clock speeds have reached 600 MHz, and even Intel is shipping chips that run 15 times faster than its 1987-vintage processors. Overall performance has increased at an even greater rate, as most microprocessors now include pipelining and superscalar features not found in the 386.

Over the next decade, the technology will undoubtedly change more rapidly than the business environment. Neither microprocessor lawsuits nor Intel's dominance is likely to go away, although perhaps both will diminish over time. Emerging applications, such as network computers and PDAs, are likely to cause the biggest turmoil in the next 10 years. As these changes unfold, *Microprocessor Report* is committed to keeping you informed. M

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