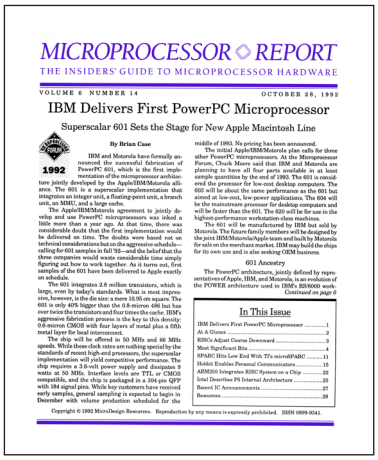
First Takes

Our Initial Look at Major News Events

The next several pages present a selection of quotes from the past 10 years of Microprocessor Report, *providing a look back at how we reported and analyzed the critical news of the day. To highlight their historical nature, the excerpts are presented in the style and typefaces we used through the end of 1995. All these articles were written by the* MPR *staff, except as noted. I hope you enjoy them!*

EISA Spells Trouble for Micro Channel

OCTOBER 1988—Why all the excitement? Certainly it's not because of any dazzling technical innovation. EISA is a straight-forward extension of the AT bus, and is something that should have been—and in fact largely was—done two years ago. The reason that EISA is significant is that the "gang of nine" PC-compatible system vendors (AST, Compaq, Epson, HP, NEC, Olivetti, Tandy, Wyse, and Zenith) represent a larger share of the PC market than does IBM, and are thus in a position to divert a significant portion of the high-end PC business away from Micro Channel. The wide support for EISA is a strong statement that the PC market as a whole will not blindly follow IBM by making Micro Channel machines. IBM has clearly lost control of the personal computer market.



MICROPROCESSOR REPORT
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IBM Delivers First PowerPC Microprocessor

Superscalar 601 Sets the Stage for New Apple Macintosh Line

By Brian Case

IBM and Motorola have formally announced the successful fabrication of PowerPC 601, which is the first implementation of the microprocessor architecture jointly developed by the Apple/IBM/Motorola alliance. The 601 is a superscalar implementation that integrates an integer unit, a floating-point unit, a branch unit, an MMU, and a large cache.

The Apple/IBM/Motorola agreement to jointly develop the PowerPC microprocessors was inked a little more than a year ago. At that time, there was considerable doubt that the first implementation would be delivered on time. The doubts were based on technical considerations but on the aggressive schedule calling for 601 samples in fall '93—and the belief that the three companies would waste considerable time simply figuring out how to work together. As it turns out, first samples of the 601 have been delivered to Apple exactly on schedule.

The 601 integrates 2.8 million transistors, which is large, even by today's standards. What is most impressive, however, is the die size: a mere 10.95 cm square. The 601 is only 40% bigger than the 0.8-micron 486 but has over twice the transistors and four times the cache. IBM's aggressive fabrication process is the key to this density: 0.6-micron CMOS with four layers of metal plus a fifth metal layer for local interconnect.

The chip will be offered in 50 MHz and 66 MHz speeds. While these clock rates are nothing special by the standards of recent high-end processors, the superscalar implementation will yield competitive performance. The chip requires a 3.6-volt power supply and dissipates 9 watts at 50 MHz. Interface levels are TTL or CMOS compatible, and the chip is packaged in a 304-pin QFP with 184 signal pins. While key customers have received early samples, general sampling is expected to begin in December with volume production scheduled for the middle of 1993. No pricing has been announced.

The initial Apple/IBM/Motorola plan calls for three other PowerPC microprocessors. At the Microprocessor Forum, Chuck Moore said that IBM and Motorola are planning to have all four parts available in at least sample quantities by the end of 1993. The 601 is envisioned the processor for low-cost desktop computers. The 603 will be about the same performance as the 601 but aimed at low-cost, low-power applications. The 604 will be the mainstream processor for desktop computers and will be faster than the 601. The 620 will be for use in the highest-performance workstation-class machines.

The 601 will be manufactured by IBM but sold by Motorola. The future family members will be designed by the joint IBM/Motorola/Apple team and built by Motorola for sale on the merchant market. IBM may build the chips for its own use and is also seeking OEM business.

601 Ancestry

The PowerPC architecture, jointly defined by representatives of Apple, IBM, and Motorola, is an evolution of the POWER architecture used in IBM's RS/6000 work-

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EISA eventually killed Micro Channel, and IBM has not successfully created any new PC standards.

Motorola Preannounces the 68040

APRIL, 1989—The 68040 is unquestionably an impressive technical achievement. However, it is being squeezed between the better price/performance of RISC processors and the massive software base of Intel's 80x86 architecture. All things considered, it's going to be a tough battle for Motorola to maintain their market share in the 32-bit microprocessor market.

The 68040 led to the loss of the 68K's entire share of the 32-bit desktop microprocessor market.

IBM Seeks RISC Revenge

MARCH 7, 1990—IBM's long-awaited RISC-based workstations have finally been introduced. IBM is probably the only company that could introduce a new, proprietary architecture now and make it successful. … It will be a significant competitor at the system level and thus reduce the market for other RISC chips. … The sleeping giant has awoken and will leave some carnage behind.

IBM's RS/6000 has taken a significant share of the RISC workstation market and led to PowerPC.

PA Workstations Set Price/Performance Records

APRIL 3, 1991—Hewlett-Packard has revealed its first line of low-cost PA-RISC workstations, previously known by the code-name "Snakes," as the HP Apollo 9000 Series 700. … The impressive performance offered by these workstations may enable HP to become a significant player in the RISC workstation market despite its very late entry.

HP has also taken a significant share of the RISC workstation market.

ACE Defines MIPS/Intel Platform

MAY 1, 1991—At an April 9 press conference in New York City, the seeds of change for the personal computer industry were sown. The Advanced Computing Environment (ACE) is potentially the most significant development in the personal computer business since the introduction of the Macintosh. …

The success of [ACE] depends, to some degree, on how well the 586 [Pentium] compares to the R4000 in price and performance. If … the 586 arrives late or falls significantly short in performance, as RISC advocates expect, [ACE] machines will be poised to become the most significant new personal computing platform for the 1990s.

ACE never lived up to its initial billing, due in part to a clever response by Intel:

NOVEMBER 18, 1992—In response to the RISC threat from ACE, Intel accelerated its P5 [Pentium] program and began showing up at every PC industry conference touting the P5 as being only a few months behind the R4000 and offering higher performance. … As a result, the ACE effort collapsed, and the P5—still a paper tiger—appeared to have triumphed.

In the meantime, however … the P5 is turning out to be not a few months behind the R4000, but over a year later—and by the time the P5 is shipping, the [R4400] will be shipping with perhaps 50% better

performance than the P5. Intel's pre-emptive strike against the ACE initiative turns out to be, at best, wishful thinking, and at worst, a fraud.

Intel Announces 50-MHz 486

JUNE 26, 1991—The 50-MHz 486, operating at a faster clock rate than any other commercially available microprocessor, demonstrates Intel's continuing lead in process technology. Motorola, by contrast, is still struggling to get the 68040 up to 33 MHz, and no RISC processor vendor has announced a chip faster than 40 MHz. This also shows that the complex instruction formats of the 386 architecture are not necessarily a barrier to high clock rates.

While x86 chips have achieved high clock rates, RISC processors have pulled ahead in this race. The 680x0 has fallen by the wayside.

Apple/IBM Deal Catapults RS/6000 to Prominence

JULY 24, 1991—It is hard to conceive of another event that could have as big an impact on the future of RISC microprocessors as the IBM/Apple alliance. ... ACE is interesting, and it will yield products more quickly, but it pales in comparison to the potential of the IBM/Apple venture. If all goes well, the new venture will dramatically widen the range of applications for the [PowerPC] architecture and could well make it the highest-volume RISC architecture for desktop computers. Even more significantly, it will speed the shift of desktop computers from CISC to RISC, and presents Intel with the most serious threat yet to its dominance in microprocessors. The real battle for the desktop of the 1990s has now begun.

PowerPC became the highest-volume desktop RISC but failed to pose much of a threat to Intel.

Sun and TI Preview Viking as "SuperSPARC"

SEPTEMBER 18, 1991—While SuperSPARC is an impressive chip, it is not clear that it was the best approach for Sun to take. The leap from today's SPARC processors, with no superscalar capabilities and no on-chip cache, to SuperSPARC is a large one. ... A simpler design could have been completed much sooner and might have kept Sun on a steeper performance growth curve. [SuperSPARC] is already late because of its aggressive design, and if it is further delayed by debugging problems, Sun—and other SPARC vendors—will be left behind in the performance race.

SuperSparc put Sun well behind in the performance race, a position from which it has yet to escape.

Cyrix Joins x86 Fray with 386/486 Hybrid

APRIL 15, 1992—Cyrix is, in some ways, the most promising of the Intel-compatible microprocessor vendors. The 486SLC provides more differentiation than the AMD processors, and it appears to be faster than the C&T part.

... The legal cloud remains, and while Intel will surely scare away a few of Cyrix's customers and induce Cyrix to spend many millions of dollars in legal fees, it seems unlikely that Intel will be able to keep Cyrix's products from the market. ... Somewhere along the line, it is even possible that an agreement might be reached [for Cyrix] to license Intel's patents.

Unlike C&T, Cyrix has survived and even challenged AMD before being purchased by National (see MPR 8/25/97, p. 1), thus gaining an Intel patent license.

Local Buses Poised to Enter PC Mainstream

JULY 8, 1992—Despite attempts to downplay the "bus war" aspect of the VL-Bus/PCI controversy, the reality is that there will be a market battle between the two standards. VL-Bus has the early advantage, but when PCI silicon and systems become widely available, the magnitude of support Intel has rallied behind PCI bus could give it the long-term edge. In any case, the days of graphics controllers and other high-speed peripherals on the antiquated AT bus, the baroque EISA bus, or the unpopular Micro Channel are clearly numbered, and the PC architecture will be better for it.

VL-Bus was dominant in the 486 era, but PCI took over the industry during the Pentium transition. Nearly all graphics controllers today are connected via PCI.

Windows NT Offers RISC a Chance on the Desktop

JULY 29, 1992—The forthcoming release of Windows NT is bad news for OS/2; with NT so close to general availability, IBM will find it more difficult to convince users they need OS/2. ...

Windows NT could well mark the end of Unix's chance for breaking into the high-volume desktop market. For years, Unix has been far more capable than PC operating systems, but it has been hard to use and the standards have been fragmented. ... Windows NT will give PC users the multitasking, networking, and other advanced features that Unix offers, while at the same time tapping into the unstoppable momentum of Windows applications.

OS/2 died, Unix never got into the PC market, and NT is now eating into the Unix workstation market.

PowerPC Gains NT and PCI Support

DECEMBER 6, 1993—Attempting no less than to duplicate its success with the original IBM PC, the world's largest computer company has announced what it hopes will be the standard platform for personal computing into the next century. IBM, along with Motorola, unveiled a specification for PowerPC running Big Blue's AIX and Workplace OS, Sun's Solaris, Taligent OS, and perhaps most importantly, Microsoft Windows NT. IBM

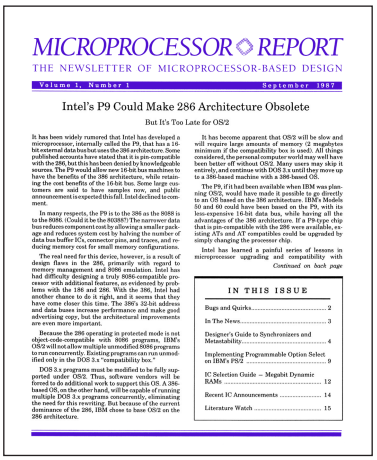
expects all of these operating systems to ship by the second half of next year [1994].

… The Prep platform needs another major system vendor to commit; one small division of IBM [the Microelectronics division] may not be enough to propel it to success. PowerPC's price/performance advantage will not spur the volume of IBM's Prep systems without a high-volume OS. IBM Microelectronics is off to a good start in supplying the chip sets and design kits needed to spur a clone market; the table is set, but we're waiting for the guests to arrive.

No major PC maker bought into Prep, leaving NT on PowerPC to collapse, along with Workplace OS and Taligent, but a nascent Mac clone market has emerged.

RISC Reaches Mainstream with Power Macs

MARCH 28, 1994—There is little doubt that this product line will, in a single year, vault PowerPC to the top position among RISC architectures. It also demonstrates a way for large numbers of users to smoothly migrate from a CISC to a RISC architecture. Most important, it puts a RISC system on equal footing with x86 PCs, except for the choice of operating system. Unfortunately, Apple's long-standing software advantage is eroding. …


MICROPROCESSOR REPORT
THE NEWSLETTER OF MICROPROCESSOR-BASED DESIGN
Volume 1, Number 1 September 1987
Intel's P9 Could Make 286 Architecture Obsolete
But It's Too Late for OS/2
It has been widely rumored that Intel has developed a microprocessor, internally called the P9, that has a 16-bit external data bus but uses the 386 architecture. Some published accounts have stated that it is pin-compatible with the 286, but this has been denied by knowledgeable sources. The P9 would allow new 16-bit bus machines to have the benefits of the 386 architecture, while retaining the cost benefits of the 16-bit bus. Some large customers are said to have samples now, and public announcement is expected this fall. Intel declined to comment.
In many respects, the P9 is to the 386 as the 8088 is to the 8086. (Could it be the 80287?) The narrower data bus reduces component cost by allowing a smaller package and reduces system cost by halving the number of data bus buffer ICs, connector pins, and traces, and reducing memory cost for small memory configurations.
The real need for this device, however, is a result of design flaws in the 286, primarily with regard to memory management and 8086 emulation. Intel has had difficulty designing a truly 8086-compatible processor with additional features, as evidenced by problems with the 186 and 286. With the 386, Intel had another chance to do it right, and it seems that they have come closer this time. The 386's 32-bit address and data buses increase performance and make good advertising copy, but the architectural improvements are even more important.
Because the 286 operating in protected mode is not object-code-compatible with 8086 programs, IBM's OS/2 will not allow multiple unmodified 8086 programs to run concurrently. Existing programs can run unmodified only in the DOS 3.x "compatibility box."
DOS 3.x programs must be modified to be fully supported under OS/2. Thus, software vendors will be forced to do additional work to support this OS. A 286-based OS, on the other hand, will be capable of running multiple DOS 3.x programs concurrently, eliminating the need for this rewriting. But because of the current dominance of the 286, IBM chose to base OS/2 on the 286 architecture.
It has become apparent that OS/2 will be slow and will require large amounts of memory (2 megabytes minimum if the compatibility box is used). All things considered, the personal computer world may well have been better off without OS/2. Many users may skip it entirely, and continue with DOS 3.x until they move up to a 386-based machine with a 386-based OS.
The P9, if it had been available when IBM was planning OS/2, would have made it possible to go directly to an OS based on the 386 architecture. IBM's Models 50 and 60 could have been based on the P9, with its less-expensive 16-bit data bus, while having all the advantages of the 386 architecture. If a P9-type chip that is pin-compatible with the 286 were available, existing ATs and AT compatibles could be upgraded by simply changing the processor chip.
Intel has learned a painful series of lessons in microprocessor upgrading and compatibility with
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PowerPC's future in the low-cost system market is rocky. Apple's initial 601-based systems do not deliver the clear price/performance advantage promised by RISC advocates. Systems using the 603 and 604 should do a better job. Fundamentally, however, most buyers choose Windows or Macintosh first, then pick a processor—so the best case for Apple is to replace all its 680x0 systems with PowerPC systems and snatch a few PC customers at the periphery of the market.

Although the Power Macintosh did make PowerPC the best-selling desktop RISC architecture, it failed to convince Windows users to switch to Macintosh.

Intel, HP Ally on New Processor Architecture

JUNE 20, 1994—Setting the stage for new architecture battles at the end of the decade, Intel and Hewlett-Packard have announced a partnership to develop a next-generation CPU architecture that will eventually replace the current x86 and PA-RISC architectures. The companies stress that processors implementing the new design will be fully compatible with current software. These processors are not expected to ship before 1998, although neither company is willing to discuss product details at this time.

… We expect that, in about 10 years, Intel will stop making pure x86 chips in favor of [IA-64] chips. Intel will continue to milk the x86 cash cow as long as it can, and it certainly has the resources to develop both x86 and [IA-64] chips simultaneously, particularly with HP's help on the latter. Intel's P6, due in late 1995, probably will be the last pure x86 core that Intel develops. The company may carry the P6 through two IC process shrinks, boosting the clock rate and reducing its cost. … Even as the P7 [Merced] rolls out, Intel will continue proliferating versions of the P6; it may take five or six years for [IA-64] products to dominate Intel's line.

Check back with me in 2004 on this one.

Universal Serial Bus to Simplify PC I/O

APRIL 17, 1995—USB's backers clearly have grand ambitions for the bus, and it is tempting (particularly for competitors of the bus!) to discount it as all paper, with not even a complete specification—much less any actual device implementations—available. It is indeed possible, though unlikely, significant problems will be found in turning the design into reality. It would be a mistake, however, to underestimate the ability of USB's backers to drive this standard to dominance.

Although it is still not widely used, USB has become the dominant serial interface and has nearly obliterated competing efforts.

Nx686 Competes with Pentium Pro

OCTOBER 23, 1995—Launching an aggressive program to bring Pentium Pro performance to the masses before Intel does, NexGen unveiled its Nx686 processor. … Although Intel has yet to announce any processor with multimedia extensions, NexGen has jumped the gun with its own enhancements. The tiny company claims its chip costs less to build than Pentium Pro as well. … Despite its incompatible pinout, the 686 should significantly raise NexGen's market profile.

After being purchased by AMD and turned into the K6, the chip did ship a few weeks before Intel's mass-market version of the P6, Pentium II.

Sun to Market Java Chips

FEBRUARY 12, 1996—Riding a wave of Java mania, Sun revealed plans to market a new line of microprocessors that will natively execute Java code. … While Java is hot on the Internet, its appeal for embedded systems, most of which are not networked, is unclear. Most embedded designers would not want to give up 90% of their performance to switch to interpreted Java. … Thus, we expect the Java chips to find tough sledding in the embedded market.

Still too early to make a call on this one. ♦