MOST SIGNIFICANT BITS

■ AMD Readies Enhanced K5…

AMD is on the verge of announcing new K5-PR120 and K5-PR133 processors, matching the performance of Intel's 120- and 133-MHz Pentiums. The new chips are the first K5s to exceed Pentium's per-cycle performance: the PR120 runs at 90 MHz, the PR133 at 100 MHz. This is close to the architectural performance originally targeted for the chip and delivers on the roadmap AMD laid out earlier this year *(see **100401.PDF**)*. Production is ramping now, with full production in Q4.

The enhanced design boosts the chip's per-clock performance slightly above that of the Cyrix 6x86, which requires a 110-MHz clock to hit the P133 performance point. *(The P-rating is based on Winstone 96 running under Windows 95; see **100202.PDF**)*. The limited clock speed of the K5 design, however, keeps it from hitting the same performance levels as the Cyrix or Intel chips. Although 166- and 200-MHz Pentiums are today's hot machines, the K5 will address the needs of about half of the desktop market; since AMD is not pushing the K5 into notebooks, this works out to a third of the total Pentium market.

Of course, addressing only the lower portion of the market limits AMD's profits. AMD has priced its chips aggressively, offering the chips at the same price as Intel's next-lower clock speed: $106 for the K5-PR120 and $134 for the K5-PR133. This is an especially deep discount on the PR133; Intel's Pentium-133 is priced at $204.

Now that the architectural performance enhancements are complete, AMD will focus on speed tuning. Skipping over PR150, the next step is a PR166 chip (probably running at 120 MHz), which is planned for production in 1Q97; there are no immediate plans for a PR200 version.

Note that AMD has dropped the 5K86 name in favor of AMD-K5. To eliminate any confusion over the chip being a Pentium, the company uses "PR," for performance rating, rather than simply "P"—a change we suspect was strongly encouraged by Intel's legal department. For end-user marketing purposes, AMD plans to make a seamless transition to the enhanced core by not giving it a different name; the K5-PR75 through K5-PR100 use the original core and run at the same clock speed as their Pentium equivalents, while the K5-PR120 and faster chips run at slower clock speeds but deliver equivalent performance.

■ …and Moves 133-MHz 486 into Embedded

Giving up on its alchemic attempt to change a 486 into a Pentium, AMD has rechristened its misnamed Am5x86 *(see **0915MSB.PDF**)* as the Am486DX5-133 and officially assigned the chip to its embedded marketing group. The DX5, which sells for $34 in quantity, is the fastest 486-based processor available from any vendor, capping the company's line of DX2-66 and DX4-100 microprocessors.

AMD initially positioned the chip as a midrange desktop processor in the wake of schedule slips in its Pentium-class K5 *(see **100401.PDF**)*. Although virtually identical to the 486DX4, the chip was dubbed Am5x86-P75 in an attempt to convince PC buyers that the processor delivered Pentium-75 performance. The obvious overlap with Cyrix's unrelated 5x86 only added to the confusion.

In the PC market, the Pentium name implies performance; in the embedded space, it implies heat. Thus, when repositioning the chip as an embedded processor, AMD changed the name to the somewhat more accurate 486DX5-133. At 33 MHz, the part's external bus runs at one-fourth of the core frequency; the 16K write-back cache is similar to Intel's write-back parts, maintaining socket compatibility with other 486 chips.

■ StrongArm Screams Ahead to 233 MHz

Broadening its line, Digital upped the speed of its dangerously fast StrongArm-110 processor to 233 MHz and dropped the price of another by 15%. The new high end of the high-end embedded CPU line sells for $49, replacing the 200-MHz chip, which is now priced at $42 in quantity.

A second new speed grade was also announced, a 166-MHz part running at 2.0 V, for users more concerned about cost than power consumption. The company still offers its 160-MHz 1.65-V part at $49, but at just $34, the 166-MHz chip is a better value for systems with a bigger power budget. The 100-MHz chip still brings up the rear at $29.

With five speed grades and two voltage levels for designers to choose from, Digital has adequately covered the price, power, and performance range for some time to come. Various StrongArm-based Internet terminals and network computers have been demonstrated, but any major system announcement will have to wait until later this fall.

■ Philips MIPS Chip Runs Windows CE

Philips has spun out a third version of its OneChip PDA MIPS processor, this one tailored for handheld units running Microsoft's recently announced Windows CE, previously known as Pegasus *(see **1012MSB.PDF**)*. The new PR31500 is similar to the highly integrated 31100 *(see **1006MSB.PDF**)* but adds a 32-entry TLB for running Windows CE.

The new device is bundled with its mixed-signal companion chip, the UBC1100, and fax/modem software for $39 in large quantities. Availability is immediate.

Philips joins NEC, Casio, LG, HP, and Compaq in supporting the new Windows CE operating system. The latter four all use Hitachi's SH7708 or derivatives thereof *(see **1012MSB.PDF**)*, while NEC and Philips rely on their own MIPS-based processors. The first handheld units running Windows CE are expected to be announced at Fall Comdex and to ship late this year.

■ Acer Produces Integrated 386SX Clone

Jumping onto the tail end of a receding bandwagon, Acer Laboratories has released its first integrated microprocessor, a 386SX-compatible chip with a memory controller, real-time clock, and ISA bus interface. The 40-MHz chip, dubbed M6117, sells for $24 in quantity and is available now.

Better known for its core-logic and peripheral chip sets, Acer codeveloped a 386SX core with an unnamed Japanese company two years ago. That part, the M1386SX, was merged with Acer's existing 1217 chip set to produce the M6117. Acer has not licensed the 386 architecture from Intel; the company pays Intel a royalty on each part it ships, although it does not believe it has any legal requirement to do so.

Although 486 processors are now available for $24 or less, none offers the Acer chip's level of integration. The M6117 competes most closely with Intel's 386EX, a relatively expensive part with similar integration. Thus, Acer has delivered a technically superior solution for handheld PCs and embedded systems relying on the full PC architecture. The new wave of Windows CE handhelds, however, needs no ISA bus and, in fact, no x86 compatibility at all, leaving the M6117 out of the running for this emerging market.

■ More Macintosh Compatibles Emerge

With the fate of PowerPC at stake, Motorola and IBM are trying hard to spur the Macintosh market. Motorola has announced it will sell under its own name a line of PowerPC systems that run Mac OS, while IBM has signed its first Mac licensee, a small Japanese firm called Akia.

The IBM deal is its first under the terms of its sublicensing agreement with Apple *(see 100602.PDF)*. Akia was founded two years ago by the former president of Dell's Japanese subsidiary. The $50-million company currently sells PC-compatible systems but plans to migrate its entire business to Macintosh compatibles, starting with the first products in 4Q96. One differentiator is a plan to build desktop Macs with LCD displays, a popular configuration in space-constrained Japanese offices.

Motorola's new StarMax systems range in price from $1,600 to $4,000 without a monitor and will be available in October. The company also announced PowerStack systems that run Windows NT on PowerPC. Both lines will be sold primarily to corporate users, although the direct-mail firm Mac Warehouse will offer some StarMax systems.

These deals aim to boost interest in the Macintosh at a time when Apple's efforts have been poorly received *(see 1012ED.PDF)*. With limited progress on other fronts, IBM and Motorola rightly see Mac OS as the only short-term opportunity for increasing sales of PowerPC processors.

Although the latest announcements stretch the number of Mac OS licensees to seven, to date only Power Computing has sold a significant number of Mac compatibles. While Motorola and Akia may make some headway in niche markets, only a major PC maker's adoption of Mac OS could have a significant impact on PowerPC processor sales.

■ Silicon Graphics Rolls Out New Systems

Silicon Graphics has refreshed its entire product line with new R5000- and R10000-based workstations and servers. The new O2 workstations, in a black sculpted case resembling a lump of mud, include either a 180-MHz R5000 or 175-MHz R10000 processor. The new Origin servers are multiprocessor systems with 180- and 195-MHz R10000s. The complete absence of 200-MHz versions of either processor indicates a continued inability on the part of MIPS CPU vendors to produce parts at this speed in volume. (NEC claims to be producing 200-MHz R10000s, but they are few and far between.)

For the O2, SGI used commodity SDRAM to build a powerful memory subsystem with a peak bandwidth of 2.1 Gbytes/s. Most of this bandwidth is for the graphics subsystem; the R5000 maxes out at less than 0.2 Gbytes/s. The memory system, along with SGI's proprietary graphics chip, supports a rendering rate of 375,000 complex 3D triangles per second on even the entry-level O2.

For $5,995, the entry-level O2 includes a 180-MHz R5000, no L2 cache, 32M of SDRAM, a 1G disk, and a 17-inch monitor. This system carries estimated scores of 3.2 SPECint95 and 4.4 SPECfp95 (base). The $8,995 model adds a 512K cache, pushing SPEC95 performance to 4.3 and 5.4, and comes with 64M of SDRAM and a 2G disk.

The Origin servers also have a high-bandwidth memory system that unleashes the performance of the R10000. The new systems, with a 195-MHz CPU and 4M of cache, are expected to deliver at least 8.9 SPECint95 and 17.2 SPECfp95 (base); the latter score is 30% better than in previous systems and brings the R10000's FP performance roughly on par

with that of leaders like the PA-8000 and Digital's 500-MHz 21164 *(see* **1013CW.PDF***)*. The least expensive SGI system that delivers this level of performance is an Origin 2000 server that starts at $45,000.

With impressive graphics performance, the O2 should do well in traditional SGI strongholds like CAD- and 3D-content creation. For basic integer and even floating-point applications, however, a Pentium Pro box far exceeds the performance of an R5000 system. The R10000 maintains a significant FP edge over any x86 processor but is available only in fairly high priced systems.

SGI also announced it is replacing the processors in 4,000 of its systems due to a manufacturing defect in R10000 chips built by NEC. These chips can draw excessive current, causing a system crash as well as permanent damage to the processor. NEC says it has fixed the problem in the R10000 chips it is currently shipping.

■ Sun, Apple Ally on Multimedia Library

In an odd alliance, Sun and Apple have joined forces behind a new way to accelerate multimedia software. A key problem with multimedia instruction-set extensions, such as Sun's VIS and Intel's MMX, is that they are difficult to use. Compilers won't emit the new instructions for existing code, and assembly-language coders must grapple with the complexities of a fully exposed parallel (SIMD) architecture.

To simplify this situation, Sun has developed a thin software layer that allows applications to perform common operations, such as discrete cosine transforms (DCTs) and matrix algebra, via function calls. This function library, MediaLib, accesses routines hand-coded to take full advantage of the VIS instructions. Sun has also produced a version implemented in standard C that runs on any processor.

Apple chose to endorse MediaLib despite having no processors with multimedia instructions in its current product line. Applications that move to MediaLib today, however, can take advantage of future multimedia extensions simply by accessing a new library. Apple is also rumored to be adding Trimedia chips to some of its future systems, and MediaLib could be used to access these media processors as well.

With every major microprocessor vendor deploying or planning multimedia extensions, Sun expects more companies to line up behind MediaLib. If the new API becomes a standard, software vendors will find it easier to use new instructions, and end users will see the benefits of these new instructions more quickly. Ⓜ