

■ HP Extends PA-RISC Plans

With Merced's debut delayed until mid-2000 (see MPR 6/22/98, p. 1), Hewlett-Packard has revised its timing for converting from PA-RISC to IA-64. The company plans to deploy new PA-RISC processors through at least 2001 and, if its customers demand it, beyond. HP did not, however, disclose many details about these future processors.

The new roadmap starts with the PA-8500 processor, which is set to debut at 440 MHz in January (see MPR 10/26/98, p. 4). This part will be followed in 2000 with the PA-8600 at 560 MHz. This second device is presumably just a shrink of the PA-8500 to a 0.18-micron process. HP is also committed to delivering the PA-8700, with a clock speed of 720 MHz, in 2001, which is after the planned debut of Merced. This could indicate that HP is nervous about Merced's ability to meet its schedule, its reduced performance goals (see MPR 10/26/98, p. 16), or both.

The roadmap also includes rather nebulous products listed as the PA-8800 and PA-8900 that could be deployed in 2003 and 2004. HP says the former processor will reach a clock speed of 900 MHz, while the latter will hit 1.2 GHz in an unspecified process. These chips are likely to be extensions of the current 8x00 core rather than a completely new core, as most of HP's CPU designers are moving over to IA-64 projects. HP admits that the 8800 and 8900 will be developed only if customers demand further extensions to the PA line. The company hopes that these customers will instead switch to IA-64.

The second IA-64 processor, code-named McKinley, is said to deliver much better performance than Merced and should be able to emulate PA-RISC applications at roughly the speed of the PA-8700 while offering much better performance on recompiled code. If all goes well, McKinley, due to debut in late 2001, should eliminate the need for any PA processors beyond the 8700. If not, HP's new plan shows that it won't leave its current customers in the lurch. —L.G.

■ MIPS R12000 Not Dead Yet

Has anyone seen the R12000? With Silicon Graphics now solidly in the IA-64 camp and MIPS Technologies spun off to pursue embedded controllers, one can't help but wonder whether the R10000's overdue replacement will see the light of day. SGI assures us that it will—just a little later than expected.

Originally slated for 1H98, SGI now says it will deliver the R12000 (see MPR 10/6/97, p. 1) around the end of this year, with volume rapidly surpassing the R10000. Although the new processor is nearly six months late, it remains on target to meet its goal of 300 MHz in NEC's 0.25-micron process. Even at this speed, however, the processor's 17 SPECint95 and 27 SPECfp95 (base) ratings—which would have been competitive had the part delivered on time—put it far behind the Alpha 21264-575 at 26/41 and the PA-8500-400 at 30/50.

The reason for the delay is a sad but now common tale in the microprocessor industry: a long debugging cycle. Even though the R12000 is only a minor change to the R10000 from a programmer's perspective, it changes the microarchitecture in ways that forced a completely new physical layout. With basic changes such as deeper instruction queues, improved branch prediction, and an extra pipeline stage to relieve pressure on critical speed paths, the part had to be debugged from scratch. Delays in getting enough parts from NEC to debug pushed the schedule out further, and the loss of key MIPS engineers when SGI announced the IA-64 deal didn't help.

But not only is the R12000 alive and kicking, it is apparently not the end of the line for MIPS processors at SGI. To fill the ever-widening gap between today and Merced, SGI will shrink the R12000 to 0.15 micron by the middle of next year, allowing it to reach speeds of up to 400 MHz.

SGI will turn the crank on the R12000 one more time, delivering the R14000 in early 2000. The R14000 will make only minor logic changes to the R12000, the most significant of which will be a doubling of the system-bus bandwidth to 1.4 Gbytes/s (sustained), fixing a long-known weakness in the R12000 design. The part will also adopt double-data-rate (DDR) SRAMs, boosting the L2 cache bandwidth as well. The R14000 will be built in NEC's 0.15-micron copper process and operate at speeds up to 500 MHz.

The R14000, however, is likely to be the end of the line for high-end MIPS processors. The company has no plans for any MIPS processors beyond the R14000; instead, it will focus on converting to IA-64. —K.D.

■ ATI Buys Chromatic, But MCC Gets Mpack

Having canceled further development of its Mpack media processor earlier this year in favor of a new media-processor architecture now under development (see MPR 8/3/98, p. 4), Chromatic has been shopping around for a new investor to provide the funding needed for the new project. For \$67 million, ATI Technologies (www.atitech.com) has come up the winner in this competition.

This price includes all outstanding shares in Chromatic plus assumption of the company's outstanding debts. ATI thus obtains Chromatic's next-generation media processor and the company's complete intellectual-property portfolio, but Chromatic's Mpack product line will be sold separately to Multimedia Convergence Corporation (MCC).

ATI plans to use Chromatic's next-generation technology to develop low-cost computers, set-top boxes, and consumer devices. No mention was made of mainstream PC plans for the future Chromatic media processor. Either ATI has learned from Chromatic's mistakes with Mpack, or ATI is simply keeping its PC plans secret for the time being.

MCC's plan to purchase the rights to sell and support all existing Mpack Mediaware products shows that ATI is

concerned solely with future Chromatic developments. MCC (www.mconline.com) intends to develop new Mpack products, but it hasn't said whether this includes new Mpack chips or just new software or add-in cards.

No price was announced for the Mpack sale, which is still pending. Mpack is certainly worth much less than Chromatic's patent portfolio and ongoing research, which fetched just \$67 million in the ATI deal. In a way, MCC is getting a great deal—hundreds of man-years of development for just pennies on the dollar—but it seems unlikely that MCC can make a good business out of Mpack sales and development after Chromatic failed to do so. —*P.N.G.*

■ AMD, Cyrix Drive New Low-Cost PCs

Compaq, IBM, and Packard-Bell all announced new entry-level PCs using AMD and Cyrix processors, showing the continuing strength of the Intel alternatives in top-brand, bottom-price systems. Compaq's \$699 Presario Internet PC uses a Cyrix M II-300 processor and includes 64M of DRAM and a 4G hard drive. Compaq also introduced the \$1,199 Presario 5150 with a 350-MHz AMD K6-2, 64M of DRAM, and an 8G disk, plus K6-based notebooks running at 266 and 300 MHz. Intel-based systems are starting to mingle with AMD- and Cyrix-based products: in the notebook lineup, the \$1,699 Presario 1235 and \$2,399 Presario 1250 are both K6-based, while in between lies the \$1,999 Presario 1240 with a Pentium/MMX processor.

Compaq introduced two systems aimed at educational markets. These systems, the Presario 2412ES and 2416ES, are priced at \$999 and \$1,249. Unlike the other systems mentioned above (and below), these prices include the monitor. The less-expensive system uses an M II-300, while the higher-end model has a 333-MHz K6-2 (plus more DRAM and a bigger disk). Also included in the education line is a \$1,749 notebook based on a 266-MHz K6.

IBM's \$599 Aptiva E Series model D1N (this is IBM's idea of a consumer product name?) uses the M II-300, which IBM calls the "IBM 300 Performance Rated MMX-Enhanced Processor" (presumably because it is made in an IBM fab, at least for another month or two). This system has only 32M of DRAM and a 3.2G hard drive.

Packard-Bell, which in June added Cyrix M II systems to a previously all-Intel line, has now added AMD K6-2 systems as well. The \$899 model 955 uses a 333-MHz K6-2 and includes 64M of DRAM and an 8.4G disk.

PCs with AMD and Cyrix processors have become a major part of the retail PC market, and Compaq's educational line shows another broadening of the Intel alternative territory. Can business PCs with non-Intel processors from companies such as Compaq and IBM be far behind? —*M.S.*

■ Stellar Offers 3D Graphics Cores

Hoping to establish itself as a supplier of intellectual property for 3D graphics, Stellar Semiconductor has released two new 3D-graphics cores suitable for incorporation into

dedicated graphics chips or more highly integrated products such as core logic or CPUs. The new PXm and TXm cores incorporate Stellar's unique PixelSquirt architecture (see [MPR 6/23/97, p. 1](#)), in which multiple processing elements each handle the rendering of a single on-screen pixel.

Stellar is returning to its roots in 3D intellectual property, having designed PixelSquirt graphics chips for S-MOS. In 1997, S-MOS chose to get out of the increasingly competitive graphics-chip business, and Stellar (then known as RSSI) decided to begin marketing its chip designs itself.

PixelSquirt offers inherently good scalability, and the two new cores, written in synthesizable Verilog, take advantage of this characteristic. The PXm core provides all the basic 3D features supported in Microsoft's Direct3D version 5 API and needs just 250,000 gates. In 600,000 gates, the TXm core adds D3D version 6 features such as texture compression, multitexturing, antialiasing, and bump mapping. Customers would need to either add a host interface (typically AGP or PCI) and a local memory controller to these cores to create a standalone graphics chip or provide interfaces to equivalent features as part of an integrated design.

Stellar (www.stellarsemi.com) is already testing a customer's PXm-based graphics chip, which should be announced by the end of the year. The first TXm-derived chip should begin sampling in 1Q99, with production planned for 2Q99. These early design wins will prove the basic soundness of the PXm and TXm cores and should help Stellar sell these cores to other customers. —*P.N.G.*

■ C-Cube Offers Affordable MPEG-2 Codec

When C-Cube Microsystems introduced its DVx real-time MPEG-2 encoder architecture last year (see [MPR 12/8/97, p. 1](#)), it aimed the first DVx chips at professional applications and priced them accordingly. The DVxpert series addressed the needs of digital-video broadcasters with chip sets priced at about \$1,500, while chips in the DVxpress family, aimed at "prosumer" and professional video-editing applications, were priced at \$175 and up.

C-Cube's latest DVx chip will allow mainstream products to benefit from real-time MPEG-2 encoding. The new DVxplore codec, priced at \$75 in volume, will be demonstrated at Comdex this week and enter production by the end of the year.

DVxplore has been endorsed by several PC multimedia vendors including Matrox and Creative Labs; we expect these vendors to ship DVxplore-based products by mid-'99. The key advantage of MPEG-2 in these applications is a substantial reduction in the data rate needed to achieve a given level of quality compared with the DV algorithm found in consumer digital-video camcorders. The DVxplore can also be used to encode and decode DV and MPEG-1 content, ensuring compatibility with existing equipment.

Although DV has been very popular among early adopters of high-end consumer technology, MPEG-2 will bring the benefits of digital video to broader markets, espe-

cially PC users. As the first affordable MPEG-2 encoder on the market, the DVxplore is likely to be a very successful product. —*P.N.G.*

■ Evergreen Ships PCI-Based CPU Upgrades

CPU upgrades have never had great success, and the challenges of implementing them have only increased—leading Intel to back away from its OverDrive product line (see MPR 9/14/98, p. 5). Evergreen Technologies, long a distant second to Intel in the CPU upgrade market, is taking a new approach that gets around many of the limitations of a traditional upgrade: a CPU upgrade on a PCI card, called EclipsePCI.

The PCI-based upgrade module carries the processor, cache memory, and DRAM, enabling the speed of the memory system to be matched to the processor's. Because it connects via PCI, the new processor does not have direct access to signals such as interrupt and DMA controls. Evergreen's technique uses the system's original processor to pass these signals along.

When the system boots up, it runs from the original processor. Thus, from the perspective of the BIOS, nothing has changed, eliminating the need for a BIOS update, which is sometimes problematic with a CPU upgrade. At the end of the BIOS boot-up process, the processor on the upgrade card takes over; when the operating system boots, the only processor it sees is the one on the upgrade card. The original processor, in the meantime, is left sitting in a tight loop in

which it responds to interrupt and DMA requests and passes them along to the upgrade processor via writes to mailbox registers on the upgrade card.

This approach cleverly avoids many of the difficulties of processor upgrades, albeit at an increased cost: the new CPU requires its own north bridge, special support logic, L2 cache, and DRAM, all on the upgrade card. DRAM is relatively cheap today, and the upgrade card provides a full processor/memory subsystem upgrade.

As with any CPU upgrade, graphics, disks, and so forth may then become the system's weak point, and with the inexpensive systems available today, simply replacing existing PCs is often attractive. Most upgrades are still less expensive than new systems, however, and they are actually much easier to deal with: no software needs to be reinstalled, and no data transferred. Unlike a motherboard upgrade, the PCI-based CPU/memory upgrade does not require any reconfiguration of disk drives and other peripherals.

Evergreen, (www.everttech.com) is initially offering two versions, both intended as upgrades for Pentium systems. One uses Intel's Mendocino processor (in the 370-pin PGA), and the other is a Super 7 (100-MHz Socket 7) design that initially will use an AMD K6-2 processor. The upgrade boards will also be available unpopulated for dealers and VARs that want to add their own processor and memory. Limited samples will be available this year, with production in 1Q99. Evergreen has not yet announced detailed pricing. —*M.S.* 