Most Significant Bits

PowerPC 615 to Surface in 1996

According to informed sources, IBM continues to work on a processor that will perform high-speed emulation of x86 code in addition to native execution of PowerPC. This project is popularly known as the 615 *(see **080704.PDF**)* but has a different code name and will probably sport a different product number when it is released. The project has hit many snags due to the complexity of supporting for two instruction sets and will not, despite rumors, appear this year; it is currently on track to appear in systems late in 1996.

The PowerPC alliance is working on enhanced versions of its 604 and 620 chips that will be announced by the end of this year and will probably be called the 604e and the 620e *(see **0903MSB.PDF**)*. Like the 603e, these chips will feature larger caches and faster clock speeds than the current versions. Contrary to some press reports, the "e" does not indicate emulation support; these chips will not include any new hardware features for x86 emulation.

Finally, the alliance is also working on an improved software emulation scheme to replace the current x86 emulation for PowerPC. The goal of this software is to deliver significantly improved emulation performance on standard PowerPC chips and possibly eliminate the need for hardware emulation features. The sources do not expect this software to be ready for end users until 1997, however, leaving a window for the "615" to hit.

PowerPC 603 Leaps to 166 MHz

At the recent Hot Chips conference, Motorola and IBM disclosed that they will shrink the 603e to 0.5-micron five-layer-metal CMOS later this year, boosting the clock rate from 100 MHz to as high as 166 MHz. At that speed, the part is slated to deliver 165 SPECint92 and 150 SPECfp92, roughly the performance of a 120-MHz 604. Even at the higher clock speed, the power dissipation is just 2.5 W thanks to the smaller gates and a 2.5-V core. The die size of the new part is 81 mm^2, giving it a much lower manufacturing cost than the 604: about $45 compared with $120, according to the MDR Cost Model.

The companies stopped short of announcing the price for the new part. Given the manufacturing cost advantage, however, it should be priced significantly below the $583 that IBM is quoting for the 120-MHz 604. Since Intel offers similar performance with its 133-MHz Pentium, which should sell for about $600 by the end of the year, the partners would have to price the 166-MHz 603e at $300 to establish a 2-to-1 price/performance advantage over Intel's chip. The new design has been fabricated, and the vendors expect general sampling in 4Q95 with volume production the following quarter.

Apple Revamps Macintosh Line

Completing the transition from NuBus to PCI and improving the Macintosh's price/performance position, Apple has rolled out a full line of new systems using 601, 603, and 604 processors. Previously, Apple had announced only one PCI Mac—the high-end, 604-based 9500 *(see **090803.PDF**)*. Apple's entry-level systems remain 68040-based, so the transition to PowerPC is not quite complete.

The least-expensive systems are in the Performa line, aimed at home and home-office markets. These systems have only a single NuBus expansion slot (and no PCI slots) and are sold fully configured, with keyboard, monitor, and display. The base of the line is the 6116CD, using a 60-MHz 601 processor and carries a street price about $1,900 with 8M of RAM, a 700M disk, double-speed CD-ROM, 14" monitor, and external modem.

The 5200CD, which has a built-in monitor and has been sold to the education market since this spring, uses a 75-MHz PowerPC 603 (not 603e). With 8M of RAM, an 800M hard drive, 4× CD-ROM, and a fax/modem, the system sells for about $2,000. Add-in modules provide an optional TV tuner and MPEG decoder. The 6200CD is a modular version with a separate monitor, and it starts about $300 higher. These two systems have been very popular and are driving demand for 603 processors, which Apple purchases primarily from Motorola.

All the new systems for business users include three PCI slots, separate internal and external SCSI buses, and Ethernet. The low-end system, the 7200, is based on the PowerPC 601 (still built only by IBM) and is offered in 75- and 90-MHz versions. With 8M of RAM and a 500M disk, it costs about $1,700 for the 75-MHz system and $1,900 for the 90-MHz model. (All Macs except Performas are priced without keyboard or monitor but include a quad-speed CD-ROM drive.)

The next step up, the 7500, uses a 100-MHz 601, adds video-input capability, and sells for $2,700 with 16M of RAM and a 500M disk. A major advantage of this system over the 7200 is that, like the models above it, the CPU and clock chip are on a daughtercard, making upgrades simple. The system board will support 601 or 604 processors with clock speeds up to 150 MHz; the bus speed remains at 50 MHz. Pricing and availability of CPU upgrade boards has not been announced.

Finally, the 8500 includes a 120-MHz 604 processor (sourced from both IBM and Motorola) and adds a 24-bit video input and output system. With 16M of RAM and a 1G disk, it is priced at about $4,000.

PowerPC-based PowerBooks will not make their debut until next week; a full line of systems is expected to be shipping in September.

Interestingly, all the PCI-based systems have their graphics system on the motherboard, not on a PCI card, and only the low-end model—the 7200—includes an accelerated graphics controller. The 7500 and 8500 use VRAM-based frame buffers; because of the fast processors and 50-MHz bus, they perform well even using the CPU for all graphics operations. The 7200's bus runs at one-half the CPU speed (37.5 or 45 MHz) and therefore gains more from the Apple-designed accelerated graphics controller. Third-party PCI graphics cards can, of course, be added. Apple's top-of-the-line 9500 has no motherboard graphics and is available either with no graphics card or bundled with an ATI card.

The new systems take a big step toward improving Apple's competitive position, but it is only a start. Aggressive promotions, upgrades, and price cuts are likely this fall, and the lineup could be quite different by the start of next year. For now, though, the 604 remains limited to systems aimed at graphics professionals and priced at $4,000 and up. Putting the CPU on a daughtercard will allow Apple to switch the midrange 7500 to a 604 processor with virtually no effort, giving it a significant speed boost. This transition is presumably awaiting lower prices and better availability of 604 processors, which could come as early as this fall.

Nvidia Gains Sega Software

Moving to close its software gap, Nvidia has announced that Sega will port several of its popular games to the Nvidia multimedia chip *(see **090904.PDF**)*. Sega did not reveal specific titles but said that they would be 3D games from its 32-bit Saturn platform *(see **090704.PDF**)*. The Nvidia versions are planned to be in stores in time for the holiday selling season this fall.

Sega had previously announced plans to port its most popular title, Sonic the Hedgehog, to Windows-based PCs. This 2D program requires a 100-MHz (or better) NSP-enabled Pentium PC to match the performance of Sega's 16-bit Genesis system. Sega says PCs without the Nvidia chip do not have the horsepower to run its 3D games at the performance level of its Saturn system; the Nvidia chip enables a 75-MHz Pentium machine to support the 3D software with adequate performance.

Nvidia's chip, which is also sold by SGS-Thomson, provides realistic 3D images but uses a unique algorithm to produce them. Thus, software must be modified to support the design. Sega, however, says that it will stick with the standard flat triangles for its initial 3D games but may use Nvidia's NURBS model in the future. The game vendor says it was drawn to Nvidia's design because of the combination of high-performance video and audio as well as its digital joystick, all of which are needed for a quality gaming experience.

The Sega deal ensures that popular games will be available for the Nvidia platform despite its software quirks, giving the device a big boost. By writing directly to the hardware, Sega gains maximum performance but minimum flexibility, locking itself into the Nvidia interface. With 3D programming interfaces from Microsoft and others still in flux, Nvidia could grab a significant software base before its competitors can catch up.

Cirrus Introduces Docking Chip Set

Providing a standard solution for notebook docking stations, Cirrus Logic's PicoPower division has announced the Vesuvius system-logic chip set and the Nile PCI-to-PCI bridge chip. A key feature of these products is support for hot docking, which PicoPower intends to include in all its future notebook chip sets.

Most docking stations today support either cold docking or warm docking. Cold docking requires that the notebook be powered off before inserting it into or removing it from a docking station. Warm docking requires the notebook to be in a power-managed state prior to insertion or removal. The PicoPower chip set allows a user to insert a powered-up notebook into a powered-up docking station; the assembled system can then automatically reconfigure itself to handle the change in peripherals, providing true plug-and-play capability.

The chips take advantage of PCI's hot-insertion support to deliver this capability. The bridge chip allows the docking station to act as a PCI device that plugs into the PCI bus in the notebook system. The notebook can operate this bus at 3.3 V and use it for internal devices. The docking station has its own PCI bus, which can run at 5 V, that supports network connections, disk interfaces, video cards, and other expansion devices

Vesuvius is composed of three chips—a system controller (PT86C521) and two data-path chips (PT86C522/523)—that connect the 66-MHz Pentium processor bus to a 33-MHz PCI bus and provide a bridge between PCI and ISA to support ISA bus peripherals. Nile is a single chip (PT80C524) that provides a PCI-to-PCI bridge. It acts as an expansion bridge between the 32-bit PCI buses in the system and the dock.

Vesuvius is available in two 208-pin and one 176-pin very thin quad flat packs (VQFPs) or three 208-pin plastic QFPs. Nile uses a 160-pin PQFP. Pricing for the Vesuvius set is $45, while Nile goes for $18, both in volume quantities. Samples for both products are now available, with production slated for 4Q95.

Digital Announces Fastest Workstations

Previously available only in servers, Digital's 21164 processor is now shipping in workstations with list prices starting at $29,300. The new systems utilize the 21164 to deliver industry-leading performance. For example, the AlphaStation 600 Model 5/266, which uses a 266-MHz 21164 and a 2M cache, is rated at 288 SPECint92 and 428 SPECfp92, well beyond the performance of any

other shipping workstation. With 32M of RAM, a 1G hard drive, a 17" color monitor, and a 4× CD-ROM drive, the new system sells for $29,300 with Windows NT or $31,800 with Digital Unix or VMS.

While the 5/266 is available today, Digital plans to offer a 300-MHz version in 4Q95. This system will deliver 334 SPECint92 and 503 SPECfp92 using 4M of cache. It is priced at $44,995 with 64M of memory, a 21" monitor, and the same hard drive and CD-ROM. Both of the AlphaStation 600 systems use a PCI expansion bus.

The new high-end systems extend Digital's workstation performance lead to new levels. The 266-MHz system is aggressively priced compared with recent high-end systems from HP *(see **0908MSB.PDF**)* and others. Whether this lead will provide any market share gains is not clear; Digital's previous systems also dominated the market in performance but not in sales. The delay in shipments of the Model 5/300 indicates that the company is having problems producing the 21164 at its peak clock speed and needs to work out the kinks on that part.

Although $29,300 is a reasonable price by workstation standards, it is far too high for the Windows NT market. Deskstation offers a 21164 system for $15,000 *(see **0905MSB.PDF**)*, but even this price is roughly three times greater than that of a high-end Pentium PC. Few NT buyers are willing to spend this much for a system, even if it does offer more than twice the Pentium's performance. Digital does offer Alpha systems at prices as low as $4,995, but these systems use slower processors that are much closer to Pentium performance levels.

ARM Signs Its Ninth Licensee

Advanced RISC Machines (ARM) of the U.K. has licensed its ARM7 core to European Silicon Structures (ES2). The French ASIC vendor is ARM's ninth licensee to date and the only one in Europe with ASIC expertise. ES2 addresses small- and medium-volume markets, primarily universities and small businesses. The company will build its new ARM designs in its 0.8-micron, two-layer-metal CMOS process. The agreement expands ARM's presence in Europe, where GEC Plessey now dominates.

Atmel, the San Jose-based maker of EEPROM and flash memory devices, recently bought nearly 75% of ES2. Not coincidentally, ES2 was recently expelled from Jessi (the Joint European Submicron Silicon Initiative) because of its American ownership. The collaborative European research group still includes Siemens, Philips, SGS-Thomson, Temic, Alcatel, and fellow ARM licensee GEC Plessey. Evidently, ES2's previous owners felt that Atmel's cash was more, valuable than the know-how gained through Jessi. ♦

