THE EDITOR'S VIEW

# Desktop Market Will Open—Slowly

## Intel, PowerPC Have Best Chance to Succeed at End of Decade

With all the recent ballyhoo about PowerPC and other RISC architectures, it is important to keep in mind that widespread adoption of these processors on the desktop, if it comes at all, will not happen in 1994 or even 1995. Despite efforts by the RISC vendors to deliver low-cost hardware, they continue to be stymied by a lack of software. In the long run, however, the tide may turn.

While RISC vendors have placed much of their hope on Windows NT, Microsoft's portable operating system requires too much memory for a volume desktop product today *(see **0713ED.PDF**)*. Even if RISC processors were given away, the cost of 24M of memory and a 240M hard disk would make these systems uncompetitive with Pentium PCs running Windows 3.1 in 4M of memory. For the near term, NT will be useful only for servers and high-end desktops; the volume will belong to Windows 3.1 and, in 1995, Windows 4.0 (Chicago), blocking the RISC vendors from threatening the x86 dynasty.

The two other highest-volume operating systems today are Apple's Macintosh OS and IBM's OS/2. Apple, of course, is preparing to move its entire product line to PowerPC by porting the Mac OS to that processor. These RISC-based Macintoshes will begin to appear this spring; if the transition is successful, sales of these systems should reach a few million units by 1996. These sales will come mainly from Apple's installed base, however, resulting in little threat to the x86.

IBM plans to ship PowerPC systems with an OS/2 interface (on top of Workplace OS) this summer. Sales of this platform will build more slowly; IBM's customers will continue to have the choice of competitive x86 platforms as well as the new RISC systems. Ultimately, these systems could achieve volumes comparable to the Macintosh platform or even better.

It is the appearance of PowerPC in these two critical platforms that has sparked the recent interest in this architecture. Although sales of a few million processors are hardly noticeable compared with Intel's projected 1994 shipments of over 40 million processors, they dwarf the sales of any desktop RISC chip today.

The real action will come around 1997 or 1998. At that time, NT 3.1 (Cairo 2) should be shipping, delivering a solid, mature OS like today's Windows 3.1. At the same time, the cost of processors and memory will have reached the point that even low-end systems have Pentium-class performance and 16M of memory minimum. Thus, NT should finally become a viable, high-volume replacement for Windows.

In the meantime, Intel's P6, possibly packaged in a multichip module, will still be an expensive processor. P7 will have just recently debuted, executing x86 binaries at about 5–6×the speed of a 60-MHz Pentium. At the same time, the PowerPC 640 (or whatever it's called) and other high-end RISC chips should reach 10–12×the performance of today's Pentium. Even the PowerPC 620, which by that time will be priced about the same as today's 486DX, should deliver 3–4×current Pentium performance, significantly outperforming whatever low-cost Pentiums are available in that timeframe. We can be sure, however, that Intel will not sit still if such a performance gap develops.

It is possible that, given sufficient investment, Intel will find a way to increase performance at a rate that prevents RISC vendors from widening their lead. Techniques such as predecoding instructions as they enter the cache could result in a processor that executes native RISC-like (or VLIW) instructions while maintaining x86 compatibility *(see **0706ED.PDF**)*; P7 is rumored to be such a design. In this scenario, the performance of x86 binaries would lag, but applications using the new native instruction set could keep pace with other CPUs.

If x86 performance continues to lag, PC users will be forced eventually to migrate to some new instruction set to improve performance, the same situation that Macintosh users face today. Yet these users still will have a huge body of existing x86 software that they need to access. The processor that is most successful in this transition could be the one that provides the best x86 emulation, allowing users to make a smooth shift to a new architecture, either an existing RISC design or something new from Intel.

If x86 emulation proves important, it augurs well for Intel, which knows more about the x86 architecture than any other company. Yet Intel is likely to stick with its current hand for one round too many, leaving an opportunity for other vendors to combine RISC performance with outstanding x86 compatibility, perhaps through some combination of software and hardware enhancements. IBM, which also knows a thing or two about x86, has been rumored to be combining a PowerPC CPU with some sort of hardware to execute x86 code; such a move could prove critical in the battle for microprocessor dominance at the end of the decade. ♦