

THE EDITOR'S VIEW

Embedded Products Drive MIPS Success

But Prognosis for General-Purpose Processors Is Less Clear

Silicon Graphics (SGI) foresees a bright future, as evidenced by its plans to hire 3,000 new employees. Much of this growth, as well as that of the company's MIPS architecture, is being driven by emerging video products and other consumer applications. In many markets for general-purpose systems, the MIPS architecture is a second-tier player with an uncertain future. Over time, consumer devices will have a growing influence on MIPS processor designs, perhaps even more so than SGI's general-purpose systems.

The MIPS architecture is used today in a wide range of applications, perhaps more than any other RISC architecture. Chips such as IDT's R3041 sell for less than \$15 and appear in low-cost printers and other embedded applications. Sony's PlayStation, Nintendo's Ultra64, and the new Killer Instinct arcade game all use MIPS processors. Devices like the R4100 (*see 090403.PDF*) are likely to appear in PDAs soon.

At the other end of the spectrum, MIPS processors are used in multiprocessor systems with supercomputer-class performance, fault-tolerant Tandem systems, and other servers from vendors such as Pyramid. Silicon Graphics uses MIPS chips throughout its workstation line. Several companies, including NEC, build MIPS-based systems for the Windows NT market.

It is this latter set of markets where MIPS is weak. The server business is dominated by behemoths HP, IBM, Sun, and Digital, using machines based on their in-house processors. SGI has little experience or market penetration with servers; a recent foray into larger systems has focused on the small scientific market.

The multisourced MIPS architecture appeals to server vendors that can't afford an in-house design, but these companies are second-tier players that have up and down periods. Pyramid, in a down period, was recently purchased by Siemens-Nixdorf. NEC's recent deal with HP (*see 0903MSB.PDF*) could foreshadow an eventual move away from MIPS.

MIPS was the first RISC with a Windows NT port, but it has been losing mindshare to Alpha and PowerPC. Most NT systems shipped to date use Pentium processors (*see 0809ED.PDF*); for users who demand high performance, the top choice is Alpha. PowerPC's most compelling advantage is Motorola's huge war chest. If Apple, IBM, and others ship NT-compatible machines as part of their common hardware strategy (*see 081602.PDF*), the NT-on-RISC battle could be over by 1996, leaving MIPS among the vanquished.

MIPS's problems in the NT market stem from the lack of a strong backer, such as Motorola, and a lack of compelling performance. SGI seems completely uninterested in the NT market, a program it inherited when it purchased MIPS in 1992. This lack of interest will probably leave MIPS out of the volume PC market.

Silicon Graphics workstations are popular for video and high-end graphics work, but the company remains the number four workstation vendor. An increase in video authoring and similar tasks should provide some growth in this niche, even with the malaise in the overall workstation market. SGI's turf is more easily defensible than other vendors' against incursion by PCs.

The company has high hopes for selling its large parallel systems into the video server market. A video server is a very expensive embedded application: consumers don't care what processor the cable company uses as long as it delivers the appropriate interactive services. With partner Time-Warner, SGI has an experimental video server running in the Orlando (Fla.) trial and hopes to leverage this opportunity into a robust business.

At the other end of the cable, the set-top box provides the potential for much greater volumes, albeit at a much lower price point. SGI is also building the set-top units in Orlando, and the success of MIPS in video-game consoles augurs well for its prospects on the set top. Another potentially hot consumer device is the PDA; if, as expected, General Magic ports Magic Cap to MIPS, it will open another set of doors.

Today, about 90% of all MIPS processors go into embedded applications, leaving just 10% for general-purpose systems. If MIPS scores some big design wins for set-top, video server, and PDA systems, this ratio could shift even further toward embedded applications, with the tail beginning to wag the dog.

MIPS created the business model of sharing CPU development costs among several partners. Now, competitors such as HP and IBM are doing the same, but with much larger potential volumes. To remain competitive, SGI must continue to share its costs with partners IDT, NEC, and Toshiba, but these companies are becoming more interested in embedded processors. Even if SGI has to move its systems to a more popular architecture at some point, the MIPS architecture will thrive in video

