

# MICROPROCESSOR REPORT

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## MIPS and Silicon Graphics Merge

### MIPS Technology, Inc. Subsidiary to Take Over Licensing

By Michael Slater

In a surprise development, MIPS Computer Systems and Silicon Graphics, Inc. announced a definitive agreement to merge the two companies. The boards of both companies have ratified the plan, which must now pass SEC scrutiny, be approved by the shareholders, and meet other legal requirements, but the companies expect the merger to be completed in June.

While the companies are calling it a merger, it appears to be better described as an acquisition. The combined company will carry the SGI name, and chip development and technology licensing will be handled by an SGI subsidiary called MIPS Technology, Inc. (MTI). MIPS shareholders will receive 0.61 shares of SGI stock for each share of MIPS stock, and prior SGI stockholders will own 76.5% of the combined company. As another indication of SGI's dominance in the deal, MIPS CEO Robert Miller was the only representative of MIPS at the press conference, while SGI had half a dozen representatives. Miller and two others from MIPS will join the SGI board.

MIPS Technology, Inc. will be headed by Miller, and it will handle licensing of MIPS technology to the semiconductor partners and other architecture licensees. MTI will handle licensing of the ARC system designs that MIPS has created, and it will also take over licensing of SGI's GL graphics library and some graphics chips. Although SGI said at the announcement that it hadn't been determined whether chip design would be done at SGI or MTI, sources at MIPS say the chip design group will be part of MTI.

From a microprocessor perspective, the outcome should be positive; SGI CEO Edward McCracken said that funding for technology development will be significantly increased. SGI has been developing its own R4000 derivative with a high-performance floating-point unit (rumored to include vector capabilities), and

McCracken said this chip will be offered as a MIPS standard. SGI declined to provide any information about this future high-end chip.

The major concern for users of MIPS chips is the potential loss of vendor-independence, but SGI is sensitive to this concern and it seems unlikely that SGI would jeopardize the architecture's open nature. The formation of MTI is intended to distance SGI from the technology licensing arm to minimize such complaints. An advisory board will be established to give MIPS licensees an oversight function; SGI emphasized the importance of keeping the architecture "vendor-neutral." It is interesting to note that this concern was rarely heard about MIPS, which was also in the systems business—a testimony to the non-threatening (i.e., not very successful) nature of MIPS' own systems business.

*Continued on page 6*

### In This Issue

MIPS and Silicon Graphics Merge .....	1
At A Glance .....	2
Apple's Macintosh Strategy .....	3
Most Significant Bits.....	4
AMD Awarded 386 Rights, \$15 Million Damages .....	7
Intel Sues C&T for Patent Infringement.....	11
Intel's 386 Patents Appear to be Avoidable .....	13
Ross Previews Pinnacle SPARC Design ... ..	15
HP Reveals Superscalar PA-RISC Implementation	17
Microprocessors Displace DRAMs at Forefront of ISSCC .....	18
CISCs are Not RISCs, and Not Converging Either	21
Literature Watch .....	26
Recent IC Announcements .....	27
Resources .....	28

## MIPS/SGI Merger

*Continued from front page*

### Motivations

The real motivations of the two companies are not entirely clear. From the MIPS side, its weak financial situation and continuing image problem were surely major factors. ACE has been widely viewed as being in a state of collapse, even though its key elements—the R4000 processor, ARC system designs, and Windows NT—are proceeding reasonably well. Compaq's breakup with SGI and DEC's promotion of Alpha raised doubts about these companies' commitment to ACE, however, and DEC has pulled back from its decision to turn its OSF/1 development over to SCO. MIPS has suffered from a string of executive and engineering-management defections that further hurt the company's image; most recently, MIPS VP Jim Billmaier, who had spearheaded the ACE effort, left MIPS to join SunSoft, and MIPS President Chuck Boesenberg left last month to head a small software company. MIPS has also been stung by the defections of several system makers, including Bull, Kubota-Pacific, and Convex. By joining up with SGI, MIPS gains a respected brand name, additional sales and distribution capability for its systems, and a stable financial picture. With a much larger systems business, it will be easier to find the resources needed to invest in next-generation chip designs.

MIPS has had something of a split personality, with the well-respected chip-design and licensing operation being relatively small, financially, compared with its lackluster systems business. The company's staffing and overhead meant that MIPS bet its survival on the success of the system side of the business. The chip-design side, however, is where MIPS has contributed the most value to the industry, and splitting this out into a separate subsidiary makes sense. Once that is done, it seems natural to merge the MIPS systems business with a more successful system company. That this became attractive is, of course, an indication of MIPS' failure to build a viable systems business of its own.

SGI's primary motivation is presumably to ensure the future of the MIPS design operation and to gain more influence over the direction of MIPS' chip-design efforts. MIPS had shifted its focus to high-volume, low-cost systems, and as a result, it wasn't designing the high-end chips SGI wanted. This forced SGI to take on their own CPU design, based on the R4000 core, but SGI probably felt that this effort would be better done under the MIPS umbrella. If SGI extended the instruction set, for example, it would make its version of the R4000 proprietary. In an earlier age, this would be seen as an advantage, but SGI seems to be a true believer in the open systems philosophy. Now, the SGI extensions will

become part of a future MIPS standard. SGI now joins its larger competitors in having control over its microprocessor design.

It is interesting to note that SGI's frustrations with MIPS's focus on high volume, instead of high performance, are echoed by DEC and are part of the motivation behind DEC's development of Alpha. SGI, in contrast, decided to create its own derivative implementation of the R4000, and, ultimately, to buy MIPS and gain control of the design team. The difference in approach is due to a variety of factors, not the least of which is that MIPS and SGI executives have had long personal relationships. DEC also has more resources to invest in its own architecture—as well as a group of architects who have probably been saying “we can do better”—and it has the additional burden of VAX compatibility.

SGI also gains an entry into the low-end systems business. SGI is very successful in its niche, but the company has been seeking broader markets for its 3-D graphics technology. With the collapse of the Compaq deal, SGI was once again on its own in this endeavor. MIPS has invested heavily in developing ASICs and system designs for ARC-standard systems (the MIPS-based hardware standard within the ACE initiative), and it has offered this design for licensing. SGI could have simply licensed the MIPS design, of course, but now it also has access to all the engineering staff that created those designs. In addition, many of the existing MIPS system products are non-overlapping with SGI's, and the merged product line will provide a more comprehensive offering that should make the combined company a stronger system player than the two companies by themselves. SGI's business has been predominately in the technical computing market and strongest in the mid-range, for example, while MIPS' has been primarily commercial and is strong in high-end servers. Nevertheless, the systems business aspects don't seem substantial enough to justify the acquisition.

### Conclusions

In part, the merger is the result of the forces described in the editorials in our previous two issues: a high-end system company needs a microprocessor design group that can justify its activities based on system profits, not just chip profits (or chip royalties). In striving for high volume, MIPS wasn't focused on maximum absolute performance, but on price/performance, and this wasn't satisfactory for SGI.

Both companies are known for their outstanding engineering organizations, and the combination of the two should create a powerhouse company. One challenge will be to hold on to this talent—and justify the salary burden of many highly-paid experts—as the two companies are merged.

*Continued on page 10*

In commenting on why he dismissed AMD's three-quarter-billion-dollar claim for loss of goodwill, Phelps notes that AMD's losses and the company's decline in value were not due entirely to the delayed production of the 80C286 and the 386:

"In 1985 only about 10% of AMD's sales were Intel products, including microprocessors transferred under the Contract. The rest of its income in 1985 came from sales of bipolar products (50%), NMOS memories (25%), Telecom products (10%), and miscellaneous products (5%). Tremendous technical change affected the semiconductor industry in the 1984/85/86 time period. NMOS and bipolar technologies gave way to CMOS; EPROM memory products were lost to the Japanese (and AMD was heavily into EPROMs); AMD stumbled in designing VLSI circuits; and AMD was slow to realize the impact of the 1984 chip recession. It was heavily investing in R&D in products which had no market value; it was heavily invested in additional capital plants for bipolar (which had no future) and the depreciation of which torpedoed its balance sheets; and it hung on too long to a 'no lay-off' policy which, while admirable in AMD as an employer, was disastrous to AMD as a business entity. There is absolutely no question but what all of these factors operating together caused the decline in value."

Phelps agrees with AMD, however, that its losses due to Intel's refusal to allow AMD to get the 386 were "immeasurable," and this is what led him to award the limited license to Intel's 386. He writes, "These intellectual property rights are at this time just as immeasurable as is AMD's loss in the covenant case."

### Conclusions

The "holy-water license" to the 386 design may help AMD lift the veil of uncertainty that has surrounded its Am386, but the fact that Intel contests the validity of this award largely negates its value until it can be ratified by the courts. It does not reduce the long-term importance of the 287 microcode case, because AMD is depending on this copyright license for its 486 design as well. It does, however, make it seem very unlikely that Intel will succeed in getting its claimed \$600 million damages from AMD, or that Intel will be able to force AMD to withdraw the chip or modify its design.

If AMD wins the copyright case, then it probably doesn't need the "holy-water license." The only regard in which it might still be useful is in defusing Intel's claim that one of the PLAs in the 386 is protected by copyright, but is not microcode.

In a worst-case scenario in which the license award is overturned by the court and AMD loses the copyright

case, AMD would have to replace the 386 microcode with a clean-room version. This is not fundamentally very difficult, but it would make it harder for AMD to ensure compatibility. AMD hopes to use its "genuine Intel microcode" claim to give it an advantage over other 386-compatible processors, which will be faster on a cycle-by-cycle basis.

This case creates no precedents of use to other makers of 386-compatible processors, since it is essentially a contract dispute. Intel's recently filed patent infringement suit against C&T (see p. 11) is more indicative of the troubles other companies will face.

For all the time and effort that has gone into this arbitration (which began before *Microprocessor Report* began publication nearly five years ago!), the outcome is rather insignificant. The legal fees are surely far greater than the damages awards, so the old saying—only the lawyers win—is as true as ever. Of course, Intel's efforts may all be justified—at least from a financial viewpoint—by the degree to which they delayed AMD's entry into the market, placed an additional burden on AMD's management, and kept prospective AMD customers wary. ♦

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## SGI/MIPS Merger

*Continued from page 6*

To the degree that SGI is motivated by a desire to make low-end MIPS-based systems a high-volume alternative to Intel-based systems, the new company is considerably riskier than the old SGI. As the unchallenged leader in high-performance graphics computers, SGI was in a relatively safe, comfortable position. In attempting to take on the Intel-based PC standard in mainstream business computing markets, it has taken on the role of underdog. In a worst-case scenario, a failure of the low-end ARC systems could drag down SGI's profitable graphics workstation business.

MIPS and SGI were both founded in the early '80s by Stanford professors, using outgrowths of university research; both companies were venture funded, and both went public. While MIPS has had a more widespread impact on the computing world, SGI has had the more successful financial model. SGI has benefited from a consistent focus on meeting a user need—visual computing systems—while MIPS has struggled with its business model. First it was a fabless semiconductor vendor, then it was a technology developer and licensor with a small systems business, and in its latest stage it placed an increasing emphasis on building a high-volume systems business. It is sad to see the end of the only independent company founded as a RISC microprocessor developer, but hopefully it will live on in an incarnation that is a stronger business. ♦