

The Ongoing RISC vs. CISC Debate

Over the Years, Many Have Argued This Point



Michael Slater, 1988: RISC architecture is here to stay. Many of the architectural features associated with RISC will influence CISC processor design as well. However, CISC processors will be around for a long time. The massive existing CISC software base will keep many customers uninterested in RISC for some time.

Many of the architectural features used in RISC processors can also be used in CISC designs. Harvard architectures, stack caches, and large register files can all be used to advantage in CISC processors as well as in RISC processors. We will likely see today's CISC processors taking on several of the architectural features now associated with RISC, and RISC processors adding features that are generally associated with CISC. The term RISC, already a cause for confusion, may thus become almost meaningless.

Nick Tredennick, 1988: RISC I think is a fad. ... Piltown Man, which was essentially a human skull put together with an orangutan jaw, was believed in by the anthropologists at the time for a period of more than 40 years. And I think we're looking at the same sort of thing here.

If RISCs succeed, it will be on the strength of their implementations and in spite of the supporting theoretical base. RISCs are kind of like the pet rocks of architecture.

... Intel is going to make more 386s between coffee break and lunch than all the SPARC guys are going to make all year.

Michael Slater, 1989: Because the Unix software base is relatively portable and RISC processors offer better price/performance, they will dominate the Unix workstation market. RISC processors will also thrive as network servers, where top performance is essential. DOS emulators will provide users of RISC workstations with access to DOS applications, and will thus broaden their appeal.

However, the majority of desktop systems sold will continue to be Intel-based. Many users will be satisfied with the power that a 386 or 486 will provide, and this

factor, combined with the tremendous inertia that keeps users working with technically obsolete operating systems, will make it tough for RISC processors to become a major force in the PC market.

Keith Diefendorf, 1990: What will the typical desktop computer microprocessor look like in 1995? It's either going to be some superscalar RISC machine, or it's going to be an x86—and we will be stuck with that forever. I think the technical choice is really now clear. Regardless of the graph you just saw [Intel's plot showing converging RISC/CISC performance], the microprocessors that Motorola intends to deliver will indeed maintain that gap. The only thing standing in the way of a RISC processor taking over the PC business is, of course, the issue of software.

John Wharton, 1992: RISC was once seen as the start of Intel's downfall. While RISC certainly does now dominate the workstation market once owned by the 68K, Motorola's marketing and production skills may deserve equal credit for this. In terms of displacing other merchant-market micros in computers, RISC has utterly failed.

Linley Gwennap, 1992: RISC has seized several key markets. First to switch was the workstation market. ...

Next to fall were CISC minicomputers. The two major holdouts in this area are traditionalists DEC and IBM. Yet even these behemoths are starting to move quickly in the RISC direction. DEC has announced its intention to move its entire VAX product line to Alpha by mid-decade. ... It is only a matter of time before IBM ports the AS/400 operating system to POWER.

... Over the next decade, RISC will make additional inroads into the low-cost embedded market, the high-end mainframe market, and the personal computer market.

Mike Johnson, 1993: The x86 got in on the ground floor. With a new architecture, your only hope is to bomb the price and hope you get market share before you go bankrupt. But this strategy is out of the question against the x86 suppliers, because their pockets are too deep.

No company or consortium has the resources or

MICROPROCESSOR REPORT
THE INSIDERS' GUIDE TO MICROPROCESSOR HARDWARE

RISC Ambushed by Pentium Pro
PowerPC Stumbles, RISC Vendors Lose Momentum in 1995

By Eddy Cheng

Last time we covered the oft-mentioned prediction that the RISC processor market of 1995 and other a portion of the covered year. See our cover story *Hardware* (page 23).

The past year was expected to be an opportunity for the RISC processor vendors to particular the PowerPC vendor. We had predicted that the introduction of the 601 would result in a significant increase of market share for the RISC processor vendors. However, the Pentium Pro's performance in the market was a surprise. The Pentium Pro's performance in the market was a surprise. The Pentium Pro's performance in the market was a surprise.

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expertise required to topple the x86: not IBM, Digital, SGI, Apple, Motorola, or anyone else. It's not in the interests of users to change from an open, competitive standard that serves them well to a limited, closed solution that serves only RISC proponents. Getting a little more performance is not good enough to make it happen.

Keith Diefendorf, 1993: The industry is tired of Intel dominance, and we will move toward portable software to get out from under that. So I think, over time, the Intel architecture simply falls further and further behind. And it's over. I don't think there is really any doubt whether the x86 will be replaced or not.

Brian Case, 1995: Over the past year, it has become obvious to me that the transition to decoupled superscalar implementations has put the x86 on a much more level playing field than it has been in the past. When implementation technology was not dense enough to permit these sophisticated superscalar organizations, RISCs had a clear advantage. The advantage was especially profound in the 1980s when it looked, at least to me, as if CISCs were on their deathbeds.

Now, we can implement microarchitectures that extract parallelism from instruction streams and schedule low-level operations in a near-optimal fashion. RISC instruction sets do have advantages for encoding parallelism and simplifying the hardware that extracts it, but the x86 instruction set can encode the same algorithms, if less elegantly. ...

So the x86 is here to stay, at least for the next few years, thanks to advances in implementation technology. RISCs are better—but not by enough—and the x86 is supported by insurmountable market forces. I might not like it, but I can get just as much work done with an x86 as with a RISC, and cheaper to boot.

Linley Gwennap, 1997: None of the RISC workstation vendors will admit it publicly, but all are positioning themselves to succeed in a world where Intel processors have taken over the final vestiges of the desktop RISC market. Even Apple, the last bastion of the RISC PC, has indicated that it, too, can survive without RISC. While RISC desktops will continue to generate significant revenues and profits for at least the next few years, their decline is inevitable. ♦