Compaq, Intel Fight Digital Brain Drain

Alpha, StrongArm Technology May Suffer Under New Ownership

Buying a technology company is tricky: the key assets go out the door every night, and you never know if they will all walk in again the next morning. Digital's fate provides a good example. After Compaq and Intel carved up Digital like a Thanksgiving turkey last year, both felt satisfied with their portions. But like giblets that fell on the floor, the CPU designers who walked out on their new employers may turn out to have been the best parts of the bird.

Digital has been bleeding CPU designers (as well as many other employees) for the past few years as the company spiraled down toward its ultimate demise. The pace accelerated with last November's announcement that Intel would purchase some of Digital's assets (see MPR 11/17/97, p. 1). As a result, the Alpha and StrongArm teams suffered significant losses.

For example, over the past few years, the Alpha team has been hurt by the loss of key members, including Dirk Meyer, now chief architect of AMD's K7 (see MPR 10/26/98, p. 1); Jim Keller, now heading AMD's K8 design; and Dan Leibholz, now one of two lead architects for Sun's UltraSparc-5. Dick Sites, the co-inventor of Alpha, who had assisted the CPU design team from his post at Digital's Western Research Lab, also left the company during this period.

Compaq's acquisition of Alpha (see MPR 2/16/98, p. 4) seems to have stabilized the situation, but the team appears shorthanded. The 21364 design (see MPR 10/26/98, p. 12) uses the existing 21264 core as is; the current team appears reluctant to modify even its physical design. Although this strategy could keep the Alpha line competitive through at least 2001, the question is whether the next-generation core, code-named Araña, can match the success of the three previous Alpha CPU cores. The Araña team has some experienced architects, but it is running on fewer cylinders than previous efforts.

Intel fared more poorly in its acquisition of Digital's StrongArm products. The company's first mistake was failing to immediately endorse its new product line; for three months, StrongArm twisted in the wind amid speculation that Intel would kill the product line.

The culture clash between Digital and Intel was also problematic. Many at Digital felt Intel was the evil empire and refused to transfer. Furthermore, Intel's compensation structure, heavily weighted toward bonuses and stock, forced many StrongArm designers to take a cut in base pay.

As a result, the StrongArm team was totally decimated. None of the lead designers of the original StrongArm-110, including Dan Dobberpuhl, Greg Hoeppner, Liam Madden, and Rich Witek, has transferred to Intel. Witek and his Austin-based team had begun work on a second StrongArm core, but they quit *en masse* after the Intel takeover, subsequently surfacing at Cadence.

The timing of the StrongArm transition was not as fortuitous as it was for Alpha. Instead of having a new core ready for release, StrongArm was caught between the original SA-110, now showing its age after first shipping in 1996, and a new core being developed in Austin. The loss of Witek's team forced Intel to start from scratch on a next-generation core, which now isn't expected to ship before 2000. Furthermore, the SA-1500 media processor (see MPR 12/8/97, p. 12) is well behind original projections of 1H98 sampling.

Intel has countered by establishing its "second" StrongArm design team in Chandler, Arizona, staffed by former i960 engineers. (We don't know where Intel's first team is, since the Digital designers have left.) The microprocessor giant recently started a third StrongArm design team in Austin under former Somerset manager Mark McDermott.

What Intel, and possibly Compaq, is likely to discover is that buying an instruction set doesn't guarantee future performance. The Alpha instruction set is much like any other desktop RISC, and StrongArm uses the same ARM instruction set licensed by thirty other companies. Although Intel is the only company other than ARM with a license to develop ARM-based CPU cores, it must still compete with ARM itself, as well as with a slew of other embedded RISCs.

What made Digital's processors so fast were their logical designs and, probably more important, their physical implementations. Digital's designers knew how to make things go fast and, in StrongArm's case, could do it without using much power.

The i960 processors designed in Chandler lag their competition in price/performance, and that line has never had a low-power device. It may be unrealistic to expect these designers to suddenly produce world-class low-power products just because they have switched to the ARM instruction set. Compaq has retained at least some of the key Alpha designers, so it should fare better in advancing its new product line. In the long run, the skill of these designers, not their chosen instruction set, will determine the technical strength of their products. ■