Intel's Two-Track Strategy Rerouted

Simple Plan for Alternating Processor Generations Complicated by Merced

When Intel launched the P6 in 1995, it proudly pointed out that only two years had elapsed since the debut of the P5, just half the time it took to deploy previous generations. Intel hadn't actually cut the time to develop an x86 chip in half, but by starting a second x86 design team, located in Oregon, the company could alternate development efforts and introduce a new processor generation every two years, making it difficult for competitors to keep pace.

Well, ladies and gentlemen, we are well into 1997 and no new processor generation is in sight. In fact, it is likely to be 1999 before a true seventh-generation core emerges. On the other hand, the P6 core will be tweaked and extended in more ways than was the P5 core, providing enough improvement to keep the PC market moving forward but not enough to lock out the competition in the near future.

Intel's simple two-track strategy called for the original P7 to be developed by its Santa Clara (Calif.) team for a 1997 debut, and another x86 processor to come from the Oregon team in 1999. This plan was derailed when the P7 was merged with HP's VLIW research to create Merced, pushing the development schedule out to 1998. More recently, Merced's schedule was delayed again when the design became bloated beyond the capacity of even the largest 0.25-micron die; the chip has now been retargeted to a 0.18-micron process, pushing its production date into 1999.

As a result, we expect Intel to release two new generations in 1999: the IA-64 Merced and the x86 chip from Oregon, now known as Willamette. Firing from both barrels at once may seem like overkill, but because of the radically different nature of Merced, this strategy makes sense. We expect Merced to sell initially for $1,500 to $2,000, appealing mainly to workstation and server makers. Willamette, on the other hand, should debut around $800, positioning it for high-end PCs. Like previous Intel processors, both will come down in price over time, but clearly Willamette will reach the PC mainstream long before Merced.

This plan gives Intel plenty of new devices and lots of performance upside in 1999, but in the meantime, the P6 is left holding the bag. Without a new processor core, Intel will not be able to increase the performance of its high-end parts at the 60% annual rate seen in previous years.

Much of the pain, however, is already past. After introducing the 200-MHz Pentium Pro in 4Q95 with better integer performance than any RISC processor, Intel's high-end performance was essentially flat for a year and a half. This lull let the RISC vendors catch up to, and in several cases surpass, Intel's best performance. Although Intel has improved its high end recently with Pentium II, the x86 maker will not be able to outrun the best RISC chips until it ships Merced in 1999. This shortfall gives the RISC vendors a bit more breathing room, although their time is clearly running out.

Competitors such as AMD and Cyrix also benefit from this situation. If Intel could actually deploy a new core this year, it could quickly follow Pentium II with an even faster device while AMD and Cyrix remained limited by their K6 and M2 cores and Socket 7 pinouts. Instead, if these alternative vendors can deliver on their roadmaps, they have a shot at staying close to Intel's high-end performance in 1998.

Intel probably won't be hurt too much, however. Its 0.25-micron process, rolling out next year, should boost the clock speed of the P6 core to 400 MHz and beyond. The 0.25-micron version of Pentium II, code-named Deschutes, is also said to have a few new tricks compared with the current Klamath version.

To pick up the slack between these parts and the future Willamette, Intel is also developing a device known as Katmai. We see this processor, due in late 1998, playing the same role as the P55C: extending the life of the current processor family with larger caches and new multimedia instructions. Katmai will be the first processor to incorporate MMX2, an extension of MMX aimed largely at accelerating 3D graphics, a critical application neglected in the original MMX. We believe this combination of features will allow Intel to charge a premium price for Katmai, even if it appears at essentially the same clock speeds as Deschutes.

Distinguishing processor generations will become more difficult over time. From an engineering perspective, we look for a significant (at least 30%) increase in core performance along with a significantly new bus. From a marketing standpoint, a new generation should have a new name: if it isn't called Pentium III, it's probably not a new generation.

The simple two-track strategy has been replaced by a more amorphous mass of processor-design teams, with various groups working on P6 derivatives such as Deschutes and Katmai as well as Willamette and Merced. In addition, some Intel architects are already looking at both x86 and IA-64 processors that will appear beyond the year 2000. Keeping up with these efforts, for both Intel's competitors and its customers, will be more complicated than ever. M