

THE PUBLISHER'S VIEW

Coming Next Year: 586 vs. 586

CPU Proliferation Creates Need for Benchmarks To Sort Them Out

Not so long ago, the name—or, more likely, the number—for a microprocessor was a technical issue of little importance. Beyond providing an association with the supplier, microprocessor designations were chosen to reflect the technical features of the chip.

The emergence of personal computers as consumer items has brought a new set of priorities for microprocessor names. Intel is investing hundreds of millions of dollars to establish the Pentium name, and the Intel name itself, as household words. At the same time, a proliferation of differing microprocessor designs from half a dozen vendors has made the naming challenge more complex than ever before.

The x86 naming scheme used to be simple. From the 8086 to the 486, each number described a specific device. The first confusion came with Chips and Technologies' Super386 and Cyrix's 486SLC: two similar 386/486 hybrids. C&T chose the more technically accurate name, while Cyrix picked the better marketing name—and C&T is now a footnote in microprocessor history.

With Pentium, Intel abandoned its prior scheme. This decision was driven by Intel's inability to protect the 386 designation as a trademark. Focusing on the end-user's perception rather than the engineer's concern with details, Intel uses the same name for the P54C version of Pentium as for the original P5 version, even though the two chips have different pinouts and features. To distinguish among the varying versions of Pentium, Intel—but almost no one else—uses the chip's performance rating, based on the company's iCOMP metric.

Intel dumped the numbers from the 486 scheme with the IntelDX4—the chip that everyone expected to be called the 486DX3. Now AMD is going to use the 486DX4 designation for its clock-tripled, 100-MHz, 8K-cache part. Although this chip has half as much cache as Intel's DX4, AMD claims that the performance difference is only about 5%, and that computer makers using the chip want to call them DX4 systems.

Intel's abandonment of the x86 naming scheme hasn't kept its competitors from sticking with it. NexGen was first out with a chip called the 586—more precisely, the Nx586. This chip is slightly faster than Pentium at the same clock rate, but it lacks an on-chip FPU and requires different system-logic chips.

AMD and Cyrix surely have eyed the 586 designation for their next-generation chips, the K5 and M1. They haven't yet said what they will call them, however; Am586 and Cx586 may not provide enough differentia-

tion. Unlike the Nx586, these two chips will have FPUs, and they will be pin-compatible with Pentium.

Based on the design techniques used—such as register renaming and out-of-order execution—the Nx586, K5, and M1 all go beyond Pentium. In some ways, they may resemble Intel's P6 more than Pentium. Nevertheless, none of them qualify as a 686, because they don't come close to doubling Pentium performance and fall short of P6's expected performance.

The 586 name won't refer to a particular pin configuration, feature set, or microarchitecture. What it does refer to is a performance level, what we have called Pentium-class performance: 60–100 SPECint92 today, with floating-point scores modestly lower than integer.

From the computer buyer's point of view, Pentium and all three "586" chips will be viewed as one category. There will, however, be significant performance differences among these chips. Both AMD and Cyrix expect to have about 30% better performance than Pentium at the same clock rate (though AMD's design appears more aggressive). NexGen's edge is smaller, perhaps 5–10%. The 586, or Pentium-class, name will be used for parts covering a wide range in performance.

Now that users will have a choice of microprocessors, some reasonable way of selecting among them is needed. Since clock rate hides any microarchitectural advantages, microprocessor vendors all want to move away from using it as a designation of processor speed. Intel is using iCOMP, but other vendors don't want to be tied to an Intel-controlled metric. NexGen decided to use Pentium itself as the metric, with suffixes of P90 and P100 indicating 90- and 100-MHz Pentium performance.

Cyrix and AMD have banded together to agree on Ziff-Davis's new CPUmark₁₆, a scaled and renamed version of the PC Bench processor test, as their standard indicator of x86 performance. This is one of the better synthetic CPU benchmarks, and there is a good chance that it will become widely used for characterizing various x86 processors. It will be followed with a new version in 1995, designed to represent 32-bit Windows 95 applications.

It is inevitable that processor names are going to be driven more by consumer marketing than by technical factors, and they won't tell the whole story. In this new era of processor competitiveness, a decent benchmark is needed to quantify the differences among them. ♦

