x86 Positioning May Disappoint

AMD, Cyrix, Centaur Lag on Windows NT, FP, MMX Applications

As a new generation of x86 microprocessors has arrived, along with new applications, positioning them has become a lot more complex—and user disappointments seem likely. Intel's competitors fare best on Winstone 97 running under Windows 95 but fall short on applications using MMX or floating-point instructions. (For details on these processors, see MPR 6/2/97, p. 12, for the 6x86MX; MPR 6/2/97, p. 1, for the C6; and MPR 3/31/97, p. 1, for the K6.)

AMD decided, with the K6, to forgo the PR rating it used for the K5. According to the company's benchmarks, the PR rating was the same as the clock speed and therefore unneeded. Cyrix's 6x86MX, on the other hand, performs far better at a given clock speed—but its clock speed is more limited. It is therefore essential for Cyrix to continue to position its processor based on the PR rating, not on clock speed.

The 6x86MX's PR ratings are not on the same scale as the original PR ratings, however. At 150 MHz, for example, the 6x86 is rated as a PR200, while the 6x86MX—which is faster at a given clock speed—is rated as only a PR166. This is because the new chip's PR rating is relative to the P55C, while the original 6x86's rating is relative to the P54C. Adding to the potential confusion, the 6x86MX-PR233 rating is relative to Pentium II, not P55C.

Whether these ratings hold up in independent tests remains to be seen. Because these chips are not pin-compatible with Pentium II, it is not possible to test them in an identical system, leaving room for variation in the system choice. So far, published reviews of commercial systems suggest that K6 performance falls a bit short of AMD's claims.

Intel-relative performance appears to fall off as the test environment deviates in any way from integer business applications running under Windows 95. AMD hasn't been very forthcoming with its performance data, choosing to publish only Winstone 97 Business results. Cyrix provided much more performance data as part of the 6x86MX launch.

Intel's competitors are fortunate that the most widely used benchmark is the one on which they perform best. This is not entirely coincidental: Winstone 97 Business consists of popular business applications, and that is the workload for which the processor designers optimized the chips. Intel, on the other hand, devoted more silicon to speeding up FP and implementing a dual-issue MMX unit, whereas the competitors all have slower FPUs and single-issue MMX units.

Unfortunately, there are no widely accepted measures for MMX or floating-point performance. The Intel Media Benchmark (IMB) is the tool Intel uses for comparing within its processor line, but Intel's competitors refuse to use a benchmark designed by Intel. The only good solution today for measuring MMX performance is to use scripts to drive MMX applications, but such testing is highly subject to distortion—intentional or accidental—depending on the application, data set, and scripts chosen.

Ziff-Davis recently released its 3D Winbench benchmark (see MPR 6/2/97, p. 18), which measures the performance of the processor and graphics card together. This benchmark could be a useful tool for comparing floating-point performance as it applies to 3D, assuming of course that the graphics card is held constant. (It can also be used to test MMX 3D rendering if there is no 3D graphics chip.) Some of Intel's competitors assert that the scene complexity in this benchmark—which was derived from code supplied by Intel—is well beyond that of today's applications. Even if this is true, it won't be for long, and attacks on the benchmark seem like weak attempts to defend the limited FP abilities of the competitors' chips.

The lackluster FP performance of Intel's competitors may be rendered moot by a shift to 3D accelerators that perform geometry as well as rendering. Combining a low-cost processor with a good 3D accelerator could provide better performance at a lower total cost than an Intel processor with a less expensive accelerator. Today, Direct3D does not facilitate geometry acceleration, but this will change.

Independent of the technical issues, Intel's massive advertising campaigns will succeed, to a significant degree, in creating a perception that future applications will disappoint if your processor doesn't have fast FP and MMX. Intel argues for forward-looking benchmarks, like IMB, which are inherently speculative but may provide a better measure of performance over the life of the system. Benchmarks such as Winstone, on the other hand, are inherently backward-looking, since they are based on applications popular when the benchmark is created.

Buyers of systems using the K6, 6x86MX, or C6 processors will find their systems fall short of the rated performance if the applications they care about depend heavily on MMX or FP code. In the long run, Intel's competitors will need to match the performance profile of Intel's processors more closely—and all the vendors will introduce enhanced versions next year in an attempt to do so. In the meantime, they should be open about their chips' performance variability, or they could create a lot of unhappy customers. M

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