

**Next Year's Hot Box - Today!**  
**AMD ain't Number-2 Anymore (Maybe)**

BY  
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*SPECIAL TO*  
*CAD SYSTEMS*

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Advanced Micro Devices' (AMD) new Athlon processor is fast. AMD has coupled this next-generation processor with support for an advanced architecture aimed at reducing the system-to-CPU bottleneck. The result is a system that jumps ahead of Intel-inside boxes at a price that makes owning the latest-and-greatest attractive.

Most people know AMD as the purveyor of processors for lower-cost systems. The company has been in the x86 business for a long time, having brought to market superior implementations of the 486 and Pentium architectures. The company's K6, K6-2 and K6-III processors have tracked Intel's Pentium-branded offerings pretty closely.

The Athlon (as in "pentathlon" and "decathlon") is a deliberate move to jump ahead of Intel. The company's description of the processor and support architectures makes clear the extent to which it has adopted the design elements hitherto associated with the processors used in high-end proprietary workstations. To get the best possible performance, AMD licensed the Digital Equipment Corp. (DEC) Alpha EV6 system-bus technology. This bus was designed to couple DEC's screaming

Alpha processors to a system; AMD's initial implementation, at twice the speed of the bus used by Intel's Pentium III processors, means that the fast Athlon processor is not constrained by narrow-bandwidth connection to the rest of the system.

The system AMD provided for testing is a pre-production reference machine; the processor inside was the 600MHz model (AMD will introduce 500MHz and 550MHz models as well), still marked with the "K7" code name and "engineering sample". All the various control-logic integrated circuits (controllers for the universal serial bus, the IDE controllers and the like) were from AMD. The Ethernet interface card was a dual-purpose LynkSys card also supporting a phone-wire network - again, using an AMD controller. The system sported 128mb of system memory, an 18gb hard disk and a DVD-ROM drive, and Diamond's Viper nVidia RIVA-based AGP display adapter. Both Windows 98 and Windows NT rel. 4 were on the hard disk and were used to verify AMD's claims.

Aside from the Athlon-specific elements, all the parts were standard off-the-shelf products - the kind of parts that are commonly found in both brand-name and quality white-box microcomputers. One important element: The system sports three good-size muffin fans; there is a lot of heat to dissipate. The fans did the job well; the system in its standard minitower case never seemed to run hot even after six or eight hours tucked in to the knee-hole under the test-bench.

The system is a screamer.

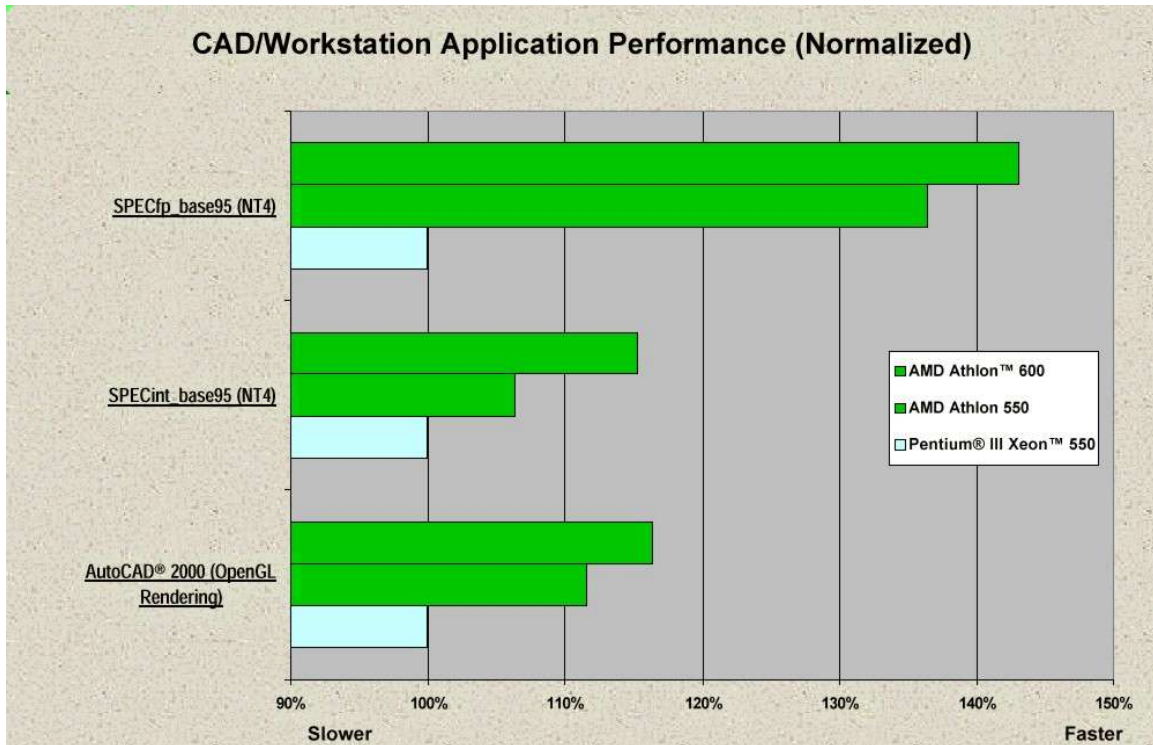
For design professionals, the key elements are straight math processing - integer math and floating point calculations. Strong

performance in these areas translates directly into faster transitions in walk-throughs, faster rendering of design elements, faster transition to photo-realism, faster results in simulations and other modeling chores, and so on. The standard benchmark software for assessing performance in these two crucial areas comes from Standard Performance Evaluation Corp, the SPECfp and SPECint programs.

Normally, one expects to see a difference in performance only if these numbers pass a noticeable-difference threshold of about 7 percent. The 600MHz Athlon showed about 18 percent improvement over a 550MHz Pentium III on SPECint and a rather dramatic 51 percent improvement on SPECfp, using otherwise comparable systems. The slightly greater processor speed does not appear enough to account for these differences; the significant elements are the improved processor and system-integration architectures.

Looking at math-intensive applications demonstrated the case even more effectively.

First, I played with a sample AutoCAD drawing supplied by AMD: Running the current version of AutoCAD under WinNT, this drawing consisted of three toruses and a cube with the AMD logo. The fairly complex geometries in this image rendered quickly in real time. More important, a simple animation, swinging the donuts around the cube in various patterns, moved smoothly through its evolutions without a hitch.



The chart shows math performance in Windows for both 550MHz and 600MHz Athlon processors, compared with a 550MHz Pentium III. Note also noticeably better OpenGL rendering in an AutoCAD environment.

For a more challenging test, I used ViaGrafix's new ViaDraw software. This is a very simple illustration program which sports a quick-3D capability I like, including the ability to execute radial sweeps. I drew a nasty complex profile, with lots of points, and swept the image into a 3D solid.



A simple 3D object created in Viagrafix's ViaDraw precision drawing program. The wireframe is very complex - lots of points.

Drawing and rendering times were about 10 to 15 percent faster than on my production Pentium II Intergraph system. But when I started playing with the image - rotating it, moving it around, moving it from one environment to another - things that stretched the capacity of last year's hot system, waiting times dropped. Effectively, this system eliminated waiting time altogether. Things that might take half a minute on my production system, took less than ten seconds.

Along the way, I noticed that I spent a lot less time waiting for software to load. Complex drawing software involves loading not just one program, but a series of support libraries, all of which are integrated more or less on the fly to create the new environment. A number of elements play in this: system memory, hard disk access speeds and processor speeds all work together. I take the faster program initialization as a further indicator of just how carefully AMD has thought through the integration issues, getting beyond the merely-hot-processor mindset that tends to be the centerpiece of new systems announcements.

My last formal test used 3Scan from Geometrix. 3Scan takes photographic images and generated 3D models from them. Using a canned image of TinkyWinky (*sans* purse...), I created a model which I then rotated and spun around and so on, all in real time.



*TinkyWinky's photo, scanned and rendered as a 3D model, rotating and spinning in real time.*

Generally, 3Scan processes ran up to 15 percent faster in the Athlon environment.

In addition, I lived with the system. I used it for ordinary day-to-day computing. I found the system rock-solid for all the usual chores one does on the machine. Internet access, performance in a networked environment, running Office 2000 - all that kind of thing - ran without a hitch, generally faster. This machine delivered the snap I associate with a technical workstation - say, an Alpha-based system or an SGI workstation.

As this is being written (mid-July), AMD expects its OEM customers to be shipping systems in time for the Fall back-to-school rush; processors started shipping in late-June. In addition to its own optimized support chipsets, it has partnerships with VIA and Acer, due to ship support logic early next year. Optimized drivers and hardware are either already shipping or will shortly be available from major hardware vendors. My own tests indicate that there are no obvious problems with major software.

In short, AMD has done a very good job launching a very solid new product that offers exceptional performance. The initial target price for Athlon systems fits nicely with the other part of the AMD story: value. The Athlon is expected to appear in systems starting as low as US\$1300. (using the 500MHz processor) and ranging into the US\$2000.+ area for systems incorporating the 600MHz version. A next-generation Athlon, possibly coupled with a speedier-still implementation of the Alpha EV6 system bus, will be targeted to more costly systems.

The possible conclusions are interesting: First, I have begun rethinking my acceptance of the Intel-inside line. AMD has long since proved capable of delivering a quality x86 processor at better-than-Intel prices; the company has even compelled Intel to compete in that arena. Even with its success, Intel-based systems usually sell at a premium over AMD-based systems; it has not been clear that the premium price represented any greater value.

Second, AMD has demonstrated its ability to deliver a forward-thinking design, retaining compatibility, but delivering noticeably better performance in an environment that involves no compromises.

The only argument against an AMD-based system arises from the company's recent financial difficulties. The competition with Intel has not been easy to sustain. There have been some manufacturing difficulties along the way, which have hurt shipment schedules. But these problems have less impact on end-users than they do OEM customers. End-users deal with system-builders; reliable system-builders support their products.

The bottom-line appears to be that AMD Athlon systems represent an opportunity to get *next year's* hot box, offering workstation performance, now, at an attractive price.

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