

AMD's Opteron Processor Has Strengths Beyond the 64-Bit Hype

Advanced Micro Devices (AMD) stressed 64-bit computing as a benefit of its new Opteron processors. The marketing may be inappropriate, but the processor will appeal in certain environments.

Event: On 22 April 2003, AMD announced a new range of processors named Opteron. Models for up to two-way servers are available now from \$283 each in lots of 1,000.

First Take: AMD's Opteron introduces an enhanced x86 architecture by adding a uniform 64-bit address space and offering a few other advances, such as a larger register set (which may spur more performance gains than 64-bit addressing). AMD promotes the processor under the flag of 64-bit computing. In reality, 64-bit subsystems have existed for years. Intel's 20-year old floating-point arithmetic format calculates to 64 bits of precision, and MMX introduced 64-bit integer instructions. Opteron's flat 64-bit addressing can pay off for handling large amounts of storage — both memory and filespace. Even here, though, things can be tricky. The x86 architecture supports up to 64 GB of memory through a paging mechanism. Windows provides basic support for paging. However, paging has performance challenges, and a flat address space can boost performance — substantially in a few applications. AMD's Web site reflects the challenge through benchmarks that, in several tests, show Opteron yielding first place to other architectures, despite AMD's ability to choose which benchmarks to publish.

Despite the 64-bit hype, Opteron is a credible entry in the server space. AMD's influx of engineers from Digital Equipment brought key understanding in system bandwidth and integrity, two attributes of server processors that distinguish them from desktop processors. Opteron's integrated memory controller and hypertransport interface give it outstanding system bandwidth, which augurs well for performance as clock speed advances.

Opteron will most likely succeed in server applications in which the processor is a significant portion of the cost of the machine. For this reason, Fujitsu and IBM positioned Opteron in large parallel systems, and Gartner expects Opteron to appear in low-cost Linux servers. Opteron must demonstrate compelling performance and compelling price/performance to threaten Intel's mainstream server business.

Opteron addresses a limited audience. Gartner recommends considering Opteron for:

- 64-bit Linux environments, where price-performance is critical
- Windows terminal servers running on 64-bit Windows, in which Opteron's mixed 32- and 64-bit modes might deliver performance gains
- Windows applications where Opteron demonstrates best-of-class price/performance

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Analytical Sources: Martin Reynolds and John Enck, Gartner Research

Recommended Reading and Related Research

- “Intel Remains Well Positioned Despite Tepid First Quarter Results” — Intel’s revenue and profit were flat in the first quarter but its product strategy remains sound. **By Martin Reynolds**
- “The AMD Opteron Processor: Strengths and Challenges” — AMD’s technology provides an interesting mix of 32-bit and 64-bit support, but AMD will need others to help it succeed. **By John Enck**

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