

# AMD Details Native Quad-core Design Features

February 12 2007

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AMD today unveiled more industry-defining architectural features for its upcoming native Quad-Core AMD Opteron processors (codenamed “Barcelona”) during a presentation to the International Solid State Circuits Conference (ISSCC).

In addition to the estimated 40-percent performance advantage native Quad-Core AMD Opteron processors can offer over the competition in benchmark testing, AMD’s redesigned microarchitecture will enable new power- and thermal-management techniques, strengthening the industry-leading performance-per-watt AMD Opteron processors currently deliver today. Among the new features are enhancements to AMD PowerNow! technology for dynamic adjustment of individual core frequencies.

“AMD has always focused on delivering increased levels of performance without making compromises in power efficiency,” said Randy Allen, corporate vice president, Server and Workstation Division, AMD. “Barcelona’ will build on this value proposition while delivering industry-changing dynamics to the x86 server market, much like the original AMD Opteron processor did in 2003. New power management features, unique to the x86 market, combined with industry-leading performance and stability, make it clear why AMD remains the smarter choice for enterprises.”

AMD is taking a multi-pronged approach to enabling reduced system-level power consumption for exceptional performance and low energy

costs. Enhancements to AMD PowerNow! technology will enable systems based on native Quad-Core AMD Opteron processors to dynamically adjust frequencies at the individual core level for further power consumption reductions.

Another new power management enhancement leverages AMD's Direct Connect Architecture and integrated memory controller by enabling "Barcelona" processor cores to reduce voltage levels even while the memory controller runs at full speed. This enables the memory controller to service external memory requests independent from core p-state transitions, thus enabling p-state opportunities which can lead to additional power savings.

The system memory interface also includes a feature that powers down memory logic when not in use. AMD has also made extensive use of "clock gating" in the "Barcelona" design to enable automatic shut-down of areas of logic not being utilized for further power savings.

"Today's IT system purchasers must weigh performance-per-watt as well as raw performance as they make their buying decisions," noted Nathan Brookwood, Research Fellow at Insight 64. "By doubling the number of cores, adding a shared third level cache and applying a variety of other extensive CPU design enhancements, AMD's 'Barcelona' designers clearly have addressed the numerator in the performance-per-watt equation. Today's ISSCC disclosures reveal 'Barcelona' also includes innovations such as the ability to vary each CPU core's frequency independently, along with a number of proven energy-saving techniques like 'clock-gating' that address the denominator in the equation. The combination of these new performance and power-saving features should drive a dramatic improvement in the already strong performance-per-watt AMD Opteron processor-based systems offer today."

Upcoming native Quad-Core AMD Opteron processors are designed for

the same power infrastructure AMD customers depend on today - 68, 95 and 120 Watt thermal envelopes.

While special attention was paid to the power-saving design features in native Quad-Core AMD Opteron processors, equal emphasis was placed on delivering industry-leading performance. Quad-Core AMD Opteron processors are packed with core and cache enhancements designed to improve performance on a range of server and workstation applications. Cache-sensitive transactional applications such as Web, database and email servers can benefit from the addition of a 2MB shared L3 cache. Simulations conducted in AMD laboratories indicate that certain database applications will see performance improvements up to 70 percent and certain floating point applications will experience performance gains of up to 40 percent over platforms powered by current dual-core AMD Opteron processors. High-performance computing (HPC) applications can benefit tremendously from a doubling of Barcelona's floating-point execution pipeline to 128-bit width, which includes an AMD-only doubling of instruction and data delivery capabilities. Finally, through enhancements to AMD Virtualization (AMD-V), including Nested Paging, virtualization customers can enjoy additional application performance improvements over non AMD-V driven applications.

Quad-Core AMD Opteron Processors are expected to be available in mid-2007.

Source: AMD

Citation: AMD Details Native Quad-core Design Features (2007, February 12) retrieved 28 June 2024 from <https://phys.org/news/2007-02-amd-native-quad-core-features.html>

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