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EVENT FLASH

Sun Launches CoolThreads Servers, Based on Niagara CMT Microprocessor

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IN THIS EVENT FLASH

This IDC Flash analyzes the impact of Sun's launch of its T1000 and T2000 servers, which are based on the Niagara chip multithreaded (CMT) microprocessor for thread-intensive workloads. Niagara is one of a pair of CMT designs being developed by Sun and fabricated by Sun's longtime semiconductor partner, Texas Instruments. The new Niagara-based servers are aimed at head-to-head competition with rack-dense servers based on x86 microprocessors for the Web and application-serving tier of computing.

SITUATION OVERVIEW

On December 6, 2005, Sun Microsystems unveiled the Niagara microprocessor (UltraSPARC T1), which has been under development for two years, intended by Sun to be a leapfrog technology that will compete with other widely deployed engines for rack-dense servers, including Intel's Xeon microprocessor and IBM's POWER microprocessor. Niagara was designed to dissipate less heat and to use less power than other microprocessors — and now Sun is promoting a new metric, which it calls SWaP (an acronym for space, watts, and performance), as a way to compare microprocessors in terms of their heat dissipation and space requirements per unit of computing power delivered. Sun believes that Niagara-based rack-dense systems will be attractive to segments of its installed base of UltraSPARC-based rack-optimized servers — as well as to prospective customers looking for servers that run "cooler" than many of the rack-optimized server models found in tier 1 server farms today. To gain more customers outside its base, Sun could leverage Java-enabled workloads, which would move easily, without porting, from other server platforms made by other vendors.

To reach this point, Sun has invested deeply in R&D, and it made the decision in 2004 to skip production of a generation of SPARC deliverables (the Millennium project for scalable servers) in order to focus more attention and resources on producing the Niagara and Rock CMT processors, working together with TI. (Sun will work with Fujitsu Ltd. to develop the next-generation SPARC64 V6 microprocessor — an implementation of V9 SPARC specifications — for scalable APL-generation servers that will be sold by Sun and Fujitsu worldwide in 2006.) IDC notes that Niagara is also a SPARC V9 design, ensuring binary compatibility with the midrange and high-end APL servers due in 2006 and thus application compatibility. Niagara-based servers, which will ship in 4Q05, are aimed at thread-intensive workloads, such as Web, Java, and application server workloads, while Rock is aimed at compute-intensive workloads, such as business-processing workloads, database, and business intelligence.

The UltraSPARC T1 processor contains up to 8 cores and can manage up to 32 individual, and separate, processing threads. Multicore, multithread processors can achieve higher throughput because they provide a better balance between processor clock speeds and memory access latencies. Without multithreading, processor clock cycles on fast microprocessors are often wasted while the processor waits for data to arrive from memory. The UltraSPARC T1 processor consumes less electrical power than the earlier UltraSPARC IIIi processor. Moreover, a Sun Fire T2000 single-socket server outperforms a 2-socket server using UltraSPARC IIIi processors by a factor of 7, according to Sun's prelaunch benchmark results. The system attributes — lower power, less heat to dissipate, and higher compute density — comprise a powerful combination of factors that should attract the attention of datacenter managers, application designers, and systems architects.

Highlights of the December 6 announcement include the following:

- Each Niagara microprocessor supports up to 32 independent threads and up to eight cores. Threads run in "single-thread" mode but run concurrently, pushing throughput of thread-intensive workloads to very high levels, compared with current UltraSPARC designs.
- Niagara microprocessors operate within a heat envelope of 70W (watts).
- Niagara microprocessors are based on the SPARC 9 (ninth generation) of SPARC technology.
- The T1000 1u system is based on a six- or eight-core Niagara design, with each core operating at 1.0GHz. The system, which ships with 2GB of memory in its entry-level configuration, four 1GbE I/O ports, and no internal disks, is priced from $3,495.
- The T2000 2u system is based on a four-, six-, or eight-core Niagara design, with each core operating at 1.0GHz or 1.2GHz. (1.2GHz is available on eight core only initially). The system, which ships with 8GB

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of memory in its entry-level configuration, four 1GbE Network ports, and two internal disks, is priced from $7,795.

- The Sun Fire T1000 COOLTHREADS and Sun Fire T2000 COOLTHREADS servers run the Solaris 10 operating system and are binary compatible with previous Sun UltraSPARC processors. As a result, ISVs and customers can move Solaris-compatible application software, custom code, or ISV packaged code to these new platforms without investing in migration and recompilation activities.
- Sun will continue to push on its brand promise to "Share" by open sourcing the UltraSPARC T1 processor design in March of 2006.
- Sun will offer its customers a no-cost 60-day trial period as part of its "CoolThreads Try and Buy" program.
- Sun is introducing its Full Protection Plan to provide support services. The plan offers four tiers of support within its "Systems-Ready Plan." Customers of the top two tiers can upgrade to its "Business-Ready Plan," which includes installation services. Customers of either support plan receive a discount on server hardware.

In summary, the T1000 and T2000 are rack-dense 1u and 2u units, respectively, that are shipped with the Solaris operating system. Both systems can be purchased without support services or with either of the Full Protection Plans. The combination of the new specifications, the included services, and the aggressive pricing is intended to compete closely with rack-dense servers shipped by IBM, HP, and Dell, among others worldwide, that are shipped to support Web infrastructure and IT infrastructure workloads — both of which are ithread-intensive workloads. The ability to pack many of these Niagara-based servers together in a standard 19in. deep industry rack, with low heat dissipation and reduced power consumption characteristics, is aimed at attracting customers who are looking to avoid high utility bills for power and "hot spots" in the datacenter where rack-dense servers generate excessive heat.

As server density has been increasing in recent years, power consumption and heating have grown as well. The main culprit is the microprocessor, which in turn drives the need for larger power supplies and more in-server cooling — all of which increases the power and cooling overhead of the overall datacenter. CMT processor design, which is being instantiated in Sun's Niagara and forthcoming Rock processors, acts as a multiplier by supporting multiple streams of work — or threads — simultaneously. CMT reduces the "wait time" that is associated with nonproductive processor clock cycles when processors await data from memory. By allowing the processor to support multiple threads at once, the throughput of the entire system is improved. (Note: Sun's first CMT-branded server processor was the UltraSPARC IV dual-core processor.)

As the T1 COOLTHREADS systems are brand-new, it is early to assess just how much heat is generated by 40u racks full of the new Niagara-based servers. However, if Sun's descriptions of power and cooling requirements are underscored by customer deployments, then service providers, telecommunications companies, and search-engine companies (e.g., Google and Yahoo!) — all of which are hungry for energy-efficient rack-dense servers — will find the Niagara servers to be attractive entrants in the thin-server market space. At the same time, Sun will need to clearly differentiate the value proposition of the new Galaxy line of AMD-Opteron-based x86-64 servers from that of the Niagara servers. While Galaxy is a general-purpose server line intended to support a broad spectrum of computing workloads and operating environments (Solaris 10, Linux distributions, and Microsoft Windows), the differentiation between Galaxy and the Niagara-based T1000 and T2000 servers will need to be made crystal clear to Sun's current and prospective customers.

Sun has introduced the Full Protection Plan, consisting of a System-Ready Plan and a Business-Ready Plan, to support these systems. Within the System-Ready Plan, Sun provides four tiers of support: Bronze, Silver, Gold, and Platinum. The Bronze-level plan is free for the first year and starts at $499 per year in years two and three for the T1000 and $588 per year in years two and three for the T2000. Purchasing the System-Ready Plan reduces the cost of the T1000 server hardware from $3,495 to $2,995 and reduces the cost of the T2000 hardware from $8,295 to $7,795. The Business-Ready Plan is available to customers of the System-Ready Gold and Platinum programs and includes the installation of the servers. The T1000 with the Business-Ready Platinum Plan has a total cost of $7,013, and the T2000 with the Business-Ready Platinum Plan has a total cost of $12,501. These support plans are priced very aggressively, and IDC expects that customers will likely purchase at least the Bronze tier of its System-Ready Plan with their server hardware.

FUTURE OUTLOOK

Successful deployment of CMT processors in Sun servers could provide Sun with a competitive edge, both for its current customers, who expect improved price/performance on a regular basis, and for new and prospective customers, who are seeking a solution to support Java and Web-based workloads. However, we expect IBM and Intel to respond in an aggressive manner to Sun's challenge in terms of the processing power delivered within a "heat" envelope, as expressed by Sun's proposed SWaP metric.As part of the announcement, Sun has pushed hard for IT managers to look at the new line of servers based on their compact form factor, their low power consumption, and their relative high performance (achieved by the CMT attributes). The SWaP metric is defined as performance/(space x power). For SWaP, performance is measured by an appropriate benchmark, space is measured in rack units (RUs), and power is measured in watts. The higher the SWaP metric's value, the better. The new dimensions of competition will ensure a vibrant and energetic round of close competition, which is sure to benefit IT customers in terms of price and price/performance — and now price/performance/heat envelope. IDC believes that this is a novel approach to benchmarking and will be interested to see how Sun and its competitors integrate this into ongoing RFPs.