



Zinc Whiskers

BY BRUCE MYATT

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Going Beyond the Cloud

On to ultra-low power servers and next generation processors

Are you ready for this change in your power, space, and cooling demand? Congratulations are in order to our global data center community! We have improved our technologies, our facilities, and our operations at a rate of change never before imagined.

Just four short years from the release of the U.S. Environmental Protection Agency's (EPA) Report to Congress on Data Center Energy Efficiency, we say with confidence that we can now efficiently manage our IT with virtualized software, EnergyStar servers, and consolidated and automated network operations; we can even close down some of our least efficient spaces altogether by moving into containerized and cloud computing environments. We can efficiently provide power, space, and cooling with aisle enclosures and economizers, with broader temperature and humidity ranges, with modular facilities designs, and with a variety of much more efficient MEP equipment.

ing the volume of equipment and space, microelectronics continues to create higher-density spaces with more highly controlled environments and containers. The newest lines of servers and processors coming onto the market today will change our rack and server requirements and our power, space, and cooling needs more profoundly than will the cloud alone.

SeaMicro's Ultra Low-Power Server

SeaMicro Company, a Silicon Valley-based server manufacturer, just unveiled a new ultra low-power server that uses only one quarter of the power, space, and cooling of other servers on the market. This impressive new technology received a \$9.3 million award grant from the Department of Energy (DOE) as an innovative energy-saving IT technology.

According to its June 14th press release, SeaMicro built a new x86 server based on chips normally used in mobile devices and small laptops. The company claims that it uses only 25 percent of the power and space used by standard servers having comparable capabilities.

One way SeaMicro managed to achieve such a dramatic reduction in power draw was by focusing on increasing the energy efficiency of server components other than the CPU, all of which consume two-thirds of the total power consumed by the server.

The new machine uses SeaMicro's CPU I/O virtualization, enabling it to eliminate 90 percent of non-CPU components from the motherboard and to shrink the motherboard "from the size of a pizza box to the size of a credit card." It offers a throughput of 1.28 terabits per second and 512 "mini-motherboards" integrated into one system. SeaMicro's Dynamic Compute Allocation Technology combines CPU management and load balancing, ensuring that the active CPU's work in the most energy-efficient utilization ranges.

SeaMicro's SM1000 specs include:

- 2,048 CPUs per standard rack
- 512 1.6-GHz Intel Atom processors
- 1 terabyte of DRAM
- 0-64 SATA solid state or hard disk drives
- 8-64 Gigabit Ethernet uplinks or 2-16 10-Gigabit Ethernet uplinks
- 17.5 inches tall (The entire system is 10 rack units tall)

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These are all exceptional achievements, and we are very proud of it all. We took these steps with great fanfare, government grants, achievement awards, magazine headlines, professional recognition, changes in codes and standards, and new energy-efficient product lines of IT and MEP equipment alike.

Now we have only to get everyone on board to implement the new technologies and best practices that we worked so hard to develop. Right? Sure, except for two things: Moore's Law of exponential change in IT advances and Murphy's Law of IT. While we have been working hard to make data centers and IT so much better, so has the microelectronics industry!

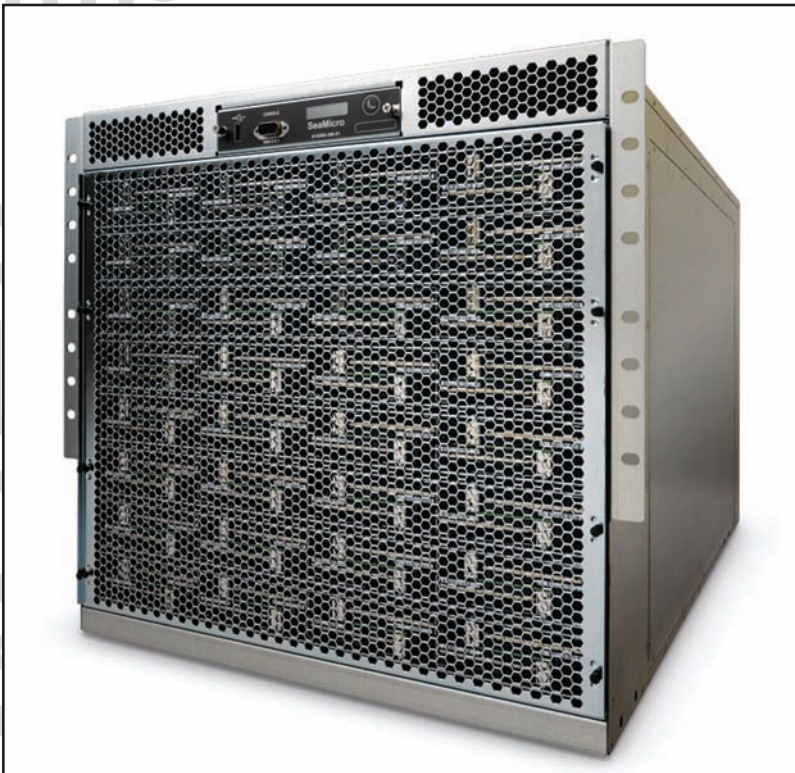
While cloud computing promises to continue reduc-

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The system will be available in the US on July 30, at base-configuration list price of \$139,000.

Tilera's 100-Core Processors

Silicon Valley-based start-up Tilera announced that it would make its new 512-core server available in September in a June 23rd press release. The server fits in a 2U space and is powered by Tilera's 64-core processors that offer up to 1.3 trillion operations per second, with I/O bandwidth of 176 Gbps. Tilera claims that the machine can replace eight Intel Xeon 5000-class dual-socket servers. The server can have up to 64 DIMM slots, and up to 10,000 cores in an 8-kW rack with each server node drawing between 35 and 50 watts. To conserve space and power, the server uses shared fans and power supplies.



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Tilera also announced a new 100-core server processor. Tilera claims that its Tile Gx100 processor provides “ten times better compute efficiency compared to Intel’s next-generation Westmere processors.” The 100-core chip will draw up to 55 watts at full performance, while the 16-core version will draw around 10 watts. While Tilera is not limiting its new series of processors to a narrow range of applications, its marketing will be targeted at enterprise networking, cloud computing, multimedia, and wireless infrastructure providers.

AMD and Intel

AMD recently announced that its new Opteron 4000 Series platform doubles the number of servers that it can operate as its previous platform on the same energy budget and that it provides four- and six-core performance at less than six watts per core using 24 percent less power per core than the previous generation. Server makers, including Acer Group, Dell, HP, SGI, Supermicro, and ZT Systems are expected to start shipping machines powered by the new AMD processors. According to AMD, the first machines would be available on June 30, 2010.

Not to be announced, Intel announced that its 48-core chip is currently under development, promising big gains in energy efficiency. Intel said that the chip would use from 25 to 125 watts. Further efficiencies are gained by cramming 48 processing cores next to each other and interconnecting them by a high-speed network, eliminating the need for data transport among full systems. Intel, HP, Microsoft, and Yahoo! researchers have already been working with the prototype chip, exploring new hardware and software architectures supporting next-generation client plus cloud applications.

Changes to Data Centers

With servers and processors that draw around half of the power they draw today we could find ourselves with a lot of power, space, and cooling capacity on our hands in short order—maybe, right after the next technology refresh for some of us. And, the process of developing power demand efficiencies and space reduction will most certainly continue into the future, allowing these changes to find a home in all of our enterprise and internet data centers over the next two to three years. I sure hope that we are smart enough to turn down the air conditioning this time.

Critical Facilities Round Table

In February and June of 2010, Critical Facilities Round Table (CFRT) members chaired, presented, and attended The Green Data Center Conference held at the University of California at San Diego (UCSD) Supercomputer Facility in San Diego, CA, to learn about the newest financial, operations, and technical solutions in the industry. CFRT is a non-profit organization based in the Silicon Valley that is dedicated to the open sharing of information and solutions amongst our members made up of critical facilities owners and operators. Please visit our Web site at www.cfroundtable.org or contact us at 415-748-0515 for more information. ■

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