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Power Surge

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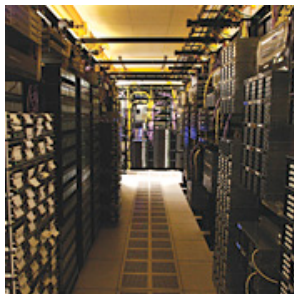
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That trend explains why Yahoo keeps its data centers spacious, with a relatively low density of machines on the floor. "We max out on the power long before we max out on the square footage," Rabbe says.

Relief?

Power-efficient computers promise some relief. NewEnergy Associates, which develops software and provides consulting to electric and gas companies, has begun replacing its power-hungry systems with newer servers from Sun Microsystems equipped with Advanced Micro Devices processors optimized for performance per watt. The company has found it can replace seven older servers with one dual-processor Sun Fire X4200 server and use virtual machines to retire even more servers. The result is an 84% reduction in heat generation.

More companies need to take similar steps to replace the thousands of inexpensive but inefficient servers that populate their data centers. "With the advent of cheap computing, people started saying, 'Hey I can get all these CPUs for only \$10,000, so I'll try things I never considered before,'" says Neal Tisdale, VP of software development at NewEnergy. Heating problems escalated when companies installed large numbers of servers during what Tisdale calls the "gigahertz arms race." Server manufacturers engaged in "real silliness by building and shipping machines optimized to win benchmarks but not for operational efficiency," he says.



Yahoo's power-hungry data center

Multicore processors and virtualization offer the greatest hope for electricity-sucking, heat-generating data centers. Dual-core processors that AMD and Intel have introduced over the past two years decrease the total power required by the processing cores while increasing computational output by placing two cores in the same physical footprint (see story, p. "[Chip Speed Vs. Power Demand](#)").

AMD's Opteron processors come in three heat grades, letting customers chose between raw performance and the most optimum performance per watt. Intel's high-volume Xeon is rated at 110 watts, while a low-voltage, single-core version is available at 55 watts.

Intel plans to introduce a mass market 95-watt Xeon this quarter, as well as a 33-watt device based on 32-bit technology developed for its mobile PC platform. On Intel's road map for the second half of the year is the Woodcrest processor, which the company says will provide a nearly 300% performance-per-watt improvement over the current Xeon.

Chips In Action

The Tokyo Institute of Technology used Sun Galaxy servers with more than 5,000 of AMD's dual-core Opteron processors to create, at 100 teraflops, the largest supercomputer in Japan. If the college had been forced to use single-core processors, the data center would have needed to be twice the size, and it would have generated almost twice the heat, says Satoshi Matsuoka, professor in charge of research infrastructure at the institute's global scientific information and computing center.

Microsoft

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Tommy Hilfiger
case study.

When Dr. Jeffrey Skolnick joined the Georgia Institute of Technology last year as director of the Center for the Study of Systems Biology, he understood that a planned \$8.5 million supercomputer, to be used in calculations of genome-mapping algorithms, would have to be built with tight budget restrictions on space and cooling. Skolnick was initially told he would need a data center with a 3-foot raised floor that would require hundreds of tons of air conditioning. "If that was the case, this was going to be a nonstarter," he says.

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