Google awards $1 million for research effort to slash energy consumption in Internet data centers

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Google Inc. has awarded a two-year, $1 million research grant aimed at slashing energy usage in large Internet data centers to a team of computer scientists at the University of California at Santa Barbara (UCSB), Rutgers University, the University of Michigan and the University of Virginia. The company may also award an additional $500,000 for a third year subject to program review.

The grant is the largest that Google this week awarded in the area of computing energy efficiency, and is part of $5.7 million that the company awarded to 12 university projects in areas of key interest to the company and the computing research community. Energy efficiency is a key concern for Internet companies because data centers can consume large amounts of power.

"Data centers have to be built to handle the highest anticipated demand," said Ricardo Bianchini, computer science professor in the Rutgers School of Arts and Sciences. "But most of the time, they are only running between 20 and 50 percent of capacity. Trouble is, the computer servers in these centers consume about the same amount of energy whether their workload is low or high."

The team will explore ways to create low power modes in servers, allowing parts of the computer to be turned off while other parts remain accessible. The goal is to allow less active servers to move their

processing loads to other servers and essentially go to sleep. But information on the sleeping servers' memories must still be instantly accessible.

In current computer designs, data requests go through a memory controller that is part of the central processing unit, or CPU. If that CPU is asleep, it cannot provide that access. One proposal is to redesign CPUs with a separate power feed to the memory controller, allowing it to perform the needed memory management functions while the rest of the CPU stays asleep.

The goal of such redesigns would be to conserve 40 to 50 percent of the power that servers now consume.

The team members are all affiliated with UCSB's Greenscale Center for Energy-Efficient Computing.

"Greenscale will provide critical infrastructure to the project with the planned construction of the Greenscale Experimental Datacenter, a state-of-the-art miniature data center where systems researchers can conduct radical experiments not possible in production data centers," said Fred Chong, professor of computer science at UCSB and the center's director.

"My group has been studying aspects of 'green' computing since 2000, especially from a data center point-of-view," said Bianchini. "We were the first group to argue that energy consumption was a serious issue for servers, not just for battery operated electronics."

Provided by Rutgers University

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