Sun Microsystems' Donation Aids Multiprocessor Research

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Sun Microsystems Laboratories has donated over USD 500,000 in computer equipment to computer scientists at the University of Rochester in support of collaborative efforts to make high-speed computers run faster. Michael Scott, professor of computer science at the University, will use a newly donated 16-processor SunFire 6800 machine to **develop synchronization algorithms that allow the processors to coordinate their activities efficiently**, loosening a bottleneck that has plagued multiprocessor machines since their invention.

"One of the ironies of computing is that when you add more processors, they start to get in each other's way and slow things down," says Scott. "The goal of our research is to get these multiprocessor machines to share information in ways that are both correct and fast. A lot of companies use multiprocessors to manage huge databases, but even desktop computers are starting to go multi-processor now, making synchronization more important than ever."

Different processors of a multiple-processor machine often need to read the same section of memory. If one processor needs to update that memory, synchronization can ensure that no other processor sees data in an inconsistent, mid-write state, which could lead to serious errors. Conventionally, the memory would be "locked" until the writer finishes its update, but this has the potential to slow down the entire system if the writer is delayed for any reason.

Scott and his students are working with colleagues in the Scalable Synchronization group at Sun Labs, Boston, headed by staff engineer Mark Moir. Much of their collaboration addresses an alternative to locking, known as software transactional memory (STM). Once considered little more than a curiosity, STM has recently seen a burst of new activity, largely due to innovations pioneered by Moir's group. In effect, STM allows processors to access shared memory concurrently, make tentative, provisional updates, and then finalize those updates "all at once," so long as they don't conflict with other processors. Bill Scherer, a doctoral student working under Scott's direction, is pursuing a thesis in "contention management" mechanisms to minimize the frequency and cost of conflicts.

"Really fast transactional memory is sort of the Holy Grail of multiprocessor designers," says Scott. "I'm looking forward to working with Sun Microsystems on the software to finally make this a reality." The Rochester team is also pursuing a variety of advanced locking mechanisms.

In addition to the 16-processor SunFire 6800, Scott received an 8-processor SunFire 880 from the Scalable Synchronization group at Sun Microsystems Laboratories in the fall of 2002. The new machine is valued at approximately $430,000, and the earlier computer at $120,000.

The original press release can be found [here](#).