New Company Offers ‘Help Desk’ for Supercomputing

Everyone wants his or her computer to operate faster. Now, even operators of the fastest supercomputers can increase processing speed and efficiency by calling the “help desk” at Paratools, a new company spun off from research done at the University of Oregon.

To get the speed and power needed to perform complex tasks such as weather simulation, mainframe computers process information in parallel. They use as many as 64,000 central processing units (CPUs), the brains of the computer. Today’s personal computer, by comparison, processes information sequentially and typically uses just one CPU.

“Ironically, when multiple CPUs are used, the efficiency of each CPU declines,” says Allen Malony, professor of computer and information science at the University of Oregon, who is one of the principals of Paratools. His partner, Sameer Shende, is a postdoctoral research associate at the university’s Neuroinformatics Center.

Shende says the loss of efficiency is like the difference between the productivity of one person versus a team of people. “Ten people produce more, but not ten times more, because someone has to supervise them and sometimes individuals must stop work while they wait for others to complete their portion of the task,” he says.

To identify where and why the supercomputer inefficiencies are occurring, Malony and Shende use the Tuning and Analysis Utilities (TAU) performance system, software they developed jointly with the Los Alamos National Laboratory and the Center for Applied Mathematics at Germany’s Research Centre Julich.

Although the University of Oregon holds the copyright for the TAU system codes, the system is considered an “open source” program since it was initially developed for the U.S. Department of Energy. Through Paratools, Malony and Shende will provide consulting expertise on how to use the TAU system and analyze its results.

Shende says the public’s unquenchable thirst for ever-faster computers is likely to broaden the demand for their services in the future. He estimates that personal computers with multiple CPUs will be on the market within five years.

Read more: http://www.cs.uoregon.edu/research/tau/home.php

Finding New ‘Eyes’ to Observe Brain Activity

A discovery that could help physicians “see” electrical activity in the brain more clearly and open the way for improved medical care for epilepsy and other brain disorders has been developed by scientists at the University of Oregon’s Neuroinformatics Center. The research was the genesis for a new Eugene-based company, Cerebral Data Systems.

University of Oregon psychologist Don Tucker says signals of electrical activity in the human brain become distorted when they pass through the skull, much like light does when it passes through frosted glass. Measurements of brain activity obtained from electrodes attached to the skull, such as an EEG (electroencephalograph), produce “a smeared picture of brain activity,” according to Tucker.

Such distortion hinders treatments that require precision in locating brain electrical activity.

Now, three university scientists have developed a computational algorithm to eliminate the distortion and translate data generated by an EEG into a three-dimensional “functional image” that could be used by a physician or diagnostician to make a medical decision.

Process codevelopers are Allen Malony, director of the Neuroinformatics Center (NIC); Sergei Turovets, an NIC computational physicist; and Adnan Salman, a University of Oregon doctoral degree student in computational science. The university has filed for a preliminary patent on the process.

“This new computational advance gives us a window on the brain that could be a breakthrough in the precision of localizing the brain’s electrical activity,” says Tucker.

“An epileptic seizure is like a storm in the brain,” he says. “Electrical charges spread so quickly that it’s not obvious where they start.” He says surgical techniques exist that could be used to remedy epileptic seizures, if the epicenter could be determined.

For strokes, fast action is essential. “Physicians only have a narrow window of time to determine the location of a stroke and administer clot-busting chemicals,” he says.

The company’s principals—Tucker, Malony, and attorney Ann Bunnenberg—anticipate wide applications for the process. “Cerebral Data Systems can provide the data remotely and is working to identify telemedicine applications that could lead to hundreds of job opportunities,” Tucker says.

Read more: http://www.uoregon.edu/newscenter/20.6.05-CerebralData.html