Computers

Staying on top in supercomputing

To stay ahead of the rest of the world in supercomputing capability, the United States should add to current levels of support at least $1.5 billion over the next five years, says a recent report summarizing the recommendations of a panel of experts familiar with high-performance computing. The panel proposes that the funds be used to "accelerate the creation of innovative hardware and software, effective mathematical techniques, and new university curricula that will attract and educate students in computational science and engineering." The report, "A National Computing Initiative," was sponsored by the Society for Industrial and Applied Mathematics (SIAM), based in Philadelphia.

The SIAM report is the first major study since 1982 (SN: 5/14/83, p.309) to look at the state of supercomputing in the United States. Whereas the 1982 report focused on researchers' access to supercomputing facilities and eventually led to the establishment of five National Supercomputer Centers (SN: 3/2/85, p.135), the SIAM findings respond to several new issues. One concern is that the rapidly growing applications of supercomputing have already outpaced the power of currently available supercomputers. Another concern is that software development is seriously lagging behind other innovations. Obstacles such as the lack of strong, carefully designed courses in computational science and engineering also stand in the way of innovative supercomputing use.

Supercomputer users—economists, scientists and engineers—are "creating a demand for faster hardware, better architecture and more creative software," says Harold J. Raveché of the Rensselaer Polytechnic Institute in Troy, N.Y., "and that's going to drive our industries." Raveché chaired the SIAM workshop that led to the report. "There are a series of applications, which could have a profound effect on manufacturing and design, electronics, and so on," he says, "that are now waiting for this computational power."

Speeding to a chess championship

A relative newcomer has captured the North American Computer Chess Championship held last month in Dallas. Chiptest, developed by graduate student Feng-hsiung Hsu of Carnegie-Mellon University in Pittsburgh, in its second year of competition, won all four of its games, defeating both second-place finishers, current world champion CRAY BLITZ (SN: 6/21/86, p.391) and Sun Phoenix. Last year's North American champion, Belle, this time apparently suffering from physical infirmities such as deteriorating integrated-circuit chips, placed well down the list of 13 contenders.

Chiptest, using custom-designed chips, counts mainly on speed to carry it through its games. It has relatively little built-in chess knowledge. "It's a high-speed clone of the Belle program," says Tony Marsland, presently at the University of North Carolina in Chapel Hill and organizer of a computer-chess workshop held in conjunction with the tournament.

Missing from the competition was Hitech, the 1985 champion developed by Hans Berliner of Carnegie-Mellon University (SN: 10/26/85, p.260). "We don't play in these computer tournaments anymore," says Berliner, "because there's no computer program within 200 [chess] points of us." Instead, after a period of development, "we've been playing against tough human competition," he says. Recently, Hitech won the Pennsylvania state chess championship.

"I think that games between computers are decided on issues that frequently don't have very much to do with chess," says Berliner. For example, one program may happen to have the speed to look one move farther ahead than its opponent, and that decides the game. Speed, he says, isn't enough to beat the highest-ranked human players.

Earth Sciences

Richard Monastersky reports from Phoenix at the annual meeting of the Geological Society of America

Radon roundup results

The federal government has estimated that 20 percent of the homes in the United States have excessive amounts of radon—a radioactive gas that can seep into homes from certain types of rock and soil and, in high concentrations, can cause lung cancer. In an effort to develop a means of predicting what areas might have a radon problem, Douglas G. Mose of George Mason University in Fairfax, Va., and his colleagues are studying the relationship between geology and radon levels in Fairfax County and in Montgomery County, Md.

The researchers conducted their survey by randomly sending indoor radon detectors and a set of instructions to more than 1,500 homes. They found that homes built over highly sheared rock and uranium-rich granites are more prone to having indoor radon concentrations above 4 picocuries per liter, which is the "action level" set by the Environmental Protection Agency. Houses overlying low-grade metamorphic rocks, especially the common rocks known as schists, also have high indoor radon counts. The agency recommends that indoor radon should be below the action level.

Radon enters houses through sump pump openings, porous building materials and foundation cracks. Its concentrations in a house can depend on the daily weather and the season.

Mose found that soil studies could also help pinpoint problem areas. The survey showed that permeable soils with high radon concentrations are highly correlated with excessive indoor radon levels.

The survey cross-tested two types of indoor monitors to gauge how each measured the average radon levels in a home. One type, which features activated charcoal, is widely used by many state and local testing programs. But Mose found that the charcoal monitors "are extremely poor in their ability to measure the annual radon level in the home." These devices can sample only for a three-day period. Alpha-track monitors, which sample for three months, yielded a much more accurate average of the fluctuating radon levels, says Mose.

Prehistoric Cameroon-style lake events

In 1986, a large cloud of carbon dioxide burst out of Lake Nyos in Cameroon and swept down a hillside into a populated valley, killing 1,746 people (SN: 6/20/87, p.388). Two years earlier, a similar but less damaging event had occurred at another crater lake in Cameroon. In the earth's 4½-billion-year history, is it possible that the Cameroon disasters are the only examples of this type of phenomenon?

Geologists don't think so. In fact, James D. White and Richard Fisher of the University of California at Santa Barbara report that an ancient crater lake in northeast Arizona may have behaved in a fashion similar to the Cameroonian lakes. Most scientists believe that carbon dioxide enters these crater lakes from volcanic chambers of molten rock, located far below the lake bottoms. Over thousands of quiescent years, the gas concentrations increase in the bottom of the lakes. Finally, a rock slide or some other disrupting event overturns the stratified sections of the lake, releasing the dissolved gas.

A cloud will dissipate without leaving any permanent marks in the rock record. But at the Arizona lake, White and Fisher think they have discovered evidence of the huge waves that would accompany a gas release. They found large dunes of coarse-grained sediment, 5 million to 6 million years old, near the sides of the dry lakebed; preserved in the dunes are patterns of strong water currents that flowed in many directions. Flash floods or waves generated by earthquakes could not account for such strong waves, says White. These formations do not on their own prove that a Cameroon-style overturn occurred in the lake, but such evidence will help scientists identify other possible sites of previous lake overturn.