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Supercomputer applications awarded prizes

Argonne researchers have won two Gordon Bell Prizes for developing software that can solve difficult problems at high speed on supercomputers.

The prizes were awarded at SC99, an annual conference aimed at advancing the science and application of high-performance computing and communications technology. This year's conference was held in Portland, Ore.

The Gordon Bell Prize recognizes outstanding achievements in the application of parallel processing to practical scientific and engineering problems. The prize was established in 1988 by Gordon H. Bell, one of the designers of DEC Vax computer systems.

Both Argonne winners were in a new "Special" category created this year. They were judged on the high quality of their algorithms and libraries, as well as on the speed of their applications.

William Gropp, Barry Smith, and Dinesh Kaushik of Argonne's Mathematics and Computer Science Division, together with W. Kyle Anderson of NASA Langley Research Center and David Keyes of Lawrence Livermore National Laboratory, ICASE and Old Dominion University, received $1,000 for their work. The team applied an unstructured mesh technique to computational fluid dynamics problems. Their code achieved a sustained performance of 227 Gflops (billions of floating-point operations per second) on a computer with more than 6,000 processors.

Paul Fischer and Henry Tufo of the Mathematics and Computer Science (MCS) Division also won $1,000 for developing and applying spectral element algorithms to incompressible fluid flow applications. The code developed by Fischer and Tufo achieved a performance of 380 Gflops on a computer with 4,096 processors.

Argonne's participation in both projects was funded by the U.S. Department of Energy's Mathematical, Information, and Computational Sciences Division, which has long supported the development of high-quality algorithms and software.

The winning runs were performed on the "ASCI Red" computer, located at Sandia National Laboratories as part of the Department of Energy's Accelerated Strategic Computing Initiative.

High-flying code

The Argonne-Old Dominion-LLNL-ICASE-NASA team showed that a class of simulations previously believed to be extremely difficult to run on a parallel computer can obtain -- within a factor of four or five -- the theoretical peak performance of the world's fastest computers.

The team simulated airflow over an airplane wing. The simulations were run on various high-end computers, including the SGI-Cray Origin2000 and IBM SP2 at Argonne.

The researchers created a code that implements a highly efficient algorithm that can be "ported," or used on a wide range of high-end machines.

Their code also demonstrated that such performance can be obtained from a general purpose "library" of parallel code modules written in standard high-level computer language, such as Fortran, C, or C++. In the past, writing high-performance code has often required special attention to hardware features of the computer and has been specific to one particular scientific application, so the code is not reusable.

The winning software can be applied to many related applications, such as combustion, radiation transport, atmosphere and ocean modeling, petroleum reservoir modeling and semiconductor device simulation.

Fluid flow

Argonne's other winning team in the Special category this year consisted of Paul Fischer (MCS) and Henry Tufo, a University of Chicago postdoctoral scientist working in MCS.

Their entry, "Terascale Spectral Element Algorithms and Implementations," focused on high-performance simulations of incompressible flows using block-structured grids. The researchers have developed a parallel spectral element code for modeling unsteady flow.

The spectral element method uses a block-structured approach in which the flow region is modeled with relatively few deformable computational bricks, or "elements." Flow variables, such as velocity and pressure, are represented on a grid within each element.

Because the data are locally structured, they can be accessed without the look-up tables required for unstructured grids, reducing time-consuming memory references. The software also provides accurate representations of smooth functions, reducing the number of overall points required for a given error tolerance. The Argonne team used the ASCI-Red machine to simulate hairpin vortices in the wake of a roughness element.

The code can also be used in other applications, such as atmospheric simulations, heat transfer and arterial blood flow.

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Hannum to oversee security; Cohen takes ESH/QA reins

William H. Hannum has been appointed Argonne's security advisor. Hannum will oversee all of the laboratory's security-related functions, coordinate development of security policy, and advise the laboratory director on strategic planning on security issues.

The new position is a response to a greatly increased level of concern about security matters in the DOE system, said Interim Laboratory Director Yoon Chang, and will assure that Argonne's response to security concerns and issues is well coordinated, effective and efficient.

Adam B. Cohen has been appointed director of environment, safety and health/quality assurance (ESH/QA) oversight. Cohen has served as facility manager and regulatory compliance officer for the Alpha-Gamma Hot Cell Facility, and has supported the Advanced Photon Source in ESH/QA matters. He has extensive experience with U.S. Department of Energy operational and programmatic ESH/QA requirements.

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Shutdown to affect ANL-East services, access

The Christmas-New Year closing at both Argonne-East and Argonne-West begins Friday, Dec. 24, and continues through Monday, Jan. 3.

Only employees required to properly maintain the laboratory's facilities will be scheduled to work.

Paychecks: Monthly paid checks will be distributed or deposited on Thursday, Dec. 23.

Biweekly paid employees will receive their payroll checks or deposits for the two weeks ending Sunday, Jan. 2, on Thursday, Dec. 23, based on actual timecards submitted to the Payroll Department. The deadline for all timecards, including those of employees who were expected to work on the weekend, was Dec. 17. Pay for any adjustments, such as overtime, not included on Dec. 19 timecards will be made on the next regularly scheduled pay date: Jan. 14, 2000.

There will be no early pickups of the Dec. 23 payroll check. Accordingly, employees who will not be available to pick up their checks on Dec. 23 are encouraged to call the Paymaster's Office (ext. 2-6893) to have their checks mailed to their home addresses.

Site access at Argonne-East: North Gate will be open 24 hours a day through the holiday break. West Gate will be closed Dec. 25 and Jan. 1, but will otherwise operate on its normal schedule -- 6:15 a.m. to 7:10 p.m. on weekdays. East Gate will be closed Wednesday, Dec. 24 through Monday, Jan. 3.

The Argonne Information Center (AIC) will be closed through the holiday break. Security should be advised of visitors expected during this period. Call ext. 2-5755 by Thursday, Dec. 23.

During the break, employees can contact the protective force at ext. 2-5730 to register a visitor.

Deliveries, shipments: No deliveries can be accepted at the laboratory during the holiday break. Commercial package delivery companies will hold all shipments until Tuesday, Jan. 4.

Employees expecting shipments to arrive during the break should make arrangements to have the items delivered off site. Federal Express will collect items in on-site drop boxes once a day, except for Christmas day and New Year's day, when there will be no pickup. For more information, call ext. 2-2934 or ext. 2-2930.

The BTI-World Travel Partners (WTP) on-site travel office in Argonne-East's Building 201 and Argonne-West's Building 710 will be closed. Business travelers with trips scheduled during the holiday break or immediately after the laboratory reopens should pick up their tickets and travel papers before 5 p.m. Thursday, Dec. 23.

To make arrangements or change travel arrangements during the holiday break, business travelers should call BTI-WTP at (800) 355-8313, from

8:30 a.m. to 5 p.m.

On weekends, Saturday, Dec. 25, Saturday, Jan. 1, and after 5 p.m., call (800) 888-8225. Employees should identify themselves as Argonne business travelers.

Travel authorizations for trips starting Dec. 24 through Jan. 6 should be submitted to the Travel Office by noon Thursday, Dec. 23. "Verbal approvals" should be avoided on Dec. 23.

- The Argonne Credit Union will be closed Dec. 24, 25, 31, and Jan 1.

- Argonne-East's Building 213 Cafeteria and the Argonne-West Cafeteria will be closed Friday, Dec. 24, through Monday, Jan. 3.

- Guest House: The Guest house restaurant will be open for lunch on Dec. 23; food service will end at 1:30 p.m. The front desk will be open until 4:40 p.m. The restaurant and Guest House will be closed from Dec. 24 through Dec. 26. The Guest House will reopen, and the front desk will be staffed from Dec. 27 through Dec. 31; there will be no food service.

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Security: Lock up before leaving for shutdown

Argonne-East employees should secure their valuable equipment during the holiday shutdown to help avoid theft, according to Dave Metta, Manager of Argonne's Security Department.

The majority of items reported missing to the Security Department are easily transportable and have a high resale value: computer equipment, small electronic devices, and hand and power tools.

The holiday shutdown, from Friday, Dec. 24, through Monday, Jan. 3, provides an increased opportunity for theft because there are few employees on site, reducing the chance of detection and apprehension, said Metta.

"The laboratory's first line of defense against criminal activity is employee awareness and reporting," Metta said. "Protective force personnel can't be everywhere all the time." Security depends on employees observing and reporting suspicious and criminal activity.

"Reasonable, common-sense deterrents" are the second line of defense, he said. In general, and especially during the shutdown period, employees should:

- Lock buildings, office doors, desks, filing cabinets and storage areas. Check double-doors: some have a brass bolt-lever on the upper and lower inside edge of the left door in addition to the key lock on the right.

- Secure all keys and attractive, valuable and easily transportable items. Locking cable "tie-downs" should be used on all computer equipment.

- Remove valuable items from places where they'll be unattended: docks, hallways, wire mesh storage areas, "or other areas that don't provide six-sided, lockable protection," Metta said. These items should be stored in areas where they can't be seen by passers-by.

- To report crimes in progress, call 911. Report suspicious activity to the protective force at ext. 2-5731 or ext. 2-5730.

Additional building patrols and other preventive measures will be in place during the shutdown. "But for these efforts to be truly effective, we need the assistance and involvement of each and every employee," Metta said.

For more information on property protection, call ext. 2-5737.

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Laboratory prepares for Y2K "Millennium bug"

While their colleagues are popping champagne corks and toasting the arrival of 2000, some Argonne-East employees will be at work guarding the laboratory's communications and other systems against the "Y2K bug."

On Thursday, Dec. 23, all systems that do not need to operate over the holiday break will be shut down, said Paul Krystosek (ECT). The Electronics and Communications Technologies Division will conduct final tests of both primary and backup communication systems, with cell phones and Motorola satellite phones ready.

On Friday, Dec. 31, ECT and the U.S. Department of Energy will monitor the federal communications network for any news of Y2K problems. Others will check news and Web sites worldwide. ECT will also field a team at Argonne to verify the proper operation of certain systems and will be on call to handle emergencies.

On Saturday, Jan. 1, 2000, ECT will monitor and inspect networks, computers, telephones and communication systems, while Plant Facilities and

Services inspects building systems. On Jan. 1-3, ECT will activate and further test systems in preparation for the first day of work.

Computer problems are a possibility because when many programs were written years ago, programmers had no idea their work would still be in use as the century drew to an end. To save memory, which at that time was expensive, dates were often coded in two-digit format; when the clock rolls over from "99" to "00," computers may interpret the date as 1900 and crash. A second area of concern is leap years, since those years include an extra day. 2000 is a leap year, a fact that may not have been factored in when programs where written.

For more information, visit these Y2K Web sites at theComputer Protection Program Office or the Year 2000 Test Center.

FY 2000 was "dry run"

The millennium is already here for some employees of the laboratory: fiscal year 2000 arrived on Oct. 30, giving Argonne's computer experts a "dry run" for the main event.

At Argonne-East, most of the information stored on mainframe computers -- thought to be more vulnerable to Y2K problems -- has been moved to UNIX and NT servers. This transfer helped prevent glitches in the system on Oct. 1, said John Volmer (ECT).

Volmer headed up a team from ECT that designed and set up Argonne-East's Y2K Test Center in Building 201.

Testing of potentially vulnerable software began Sept. 14, 1998; all testing was completed by the end of March 1999. Because Argonne's computers are not standardized, the center was an elaborate undertaking.

Only one minor application failed, but it was an obsolete program that was going to be discontinued anyway, Volmer said. The testing raised the confidence in the systems, and helped dispel any concerns about Y2K disruption at Argonne-East.

-- *Linda Jakubowski*

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Herzenberg to speak on new book

Caroline Herzenberg (DIS) will speak on her book "Their Day in the Sun: Women of the Manhattan Project" at the First Friday Forum meeting on Friday, Jan. 7, from noon to 1 p.m. in Argonne-East's Building 201, Room 190. The book, written by Herzenberg (DIS) and Ball State University physics professor Ruth Howes, chronicles the unsung contributions of women to one of the most intensive scientific projects in history. Sponsored by Argonne's Women in Science and Technology program, the presentation is open to all.

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Talk to cover small business subcontract program

Deborah Clayton (ITD) will discuss Thursday, Jan. 6, a U.S. Department of Energy program that allows small businesses to subcontract with organizations like Argonne to conduct research.

DOE's funding for the FY2000 Small Business Innovation Research/Small Business Technology Transfer Program is about $85 million. SBIR subcontracts can be as much as $408,000 and STTR contracts can be as much as $360,000.

Employees are welcome to bring their lunches to Clayton's talk, which will be held in Argonne-East's Building 213 Cafeteria, Dining Room B, beginning at 12:15 p.m.

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Pioneers offer cards

The Argonne Pioneers will be selling special "millennium" playing cards the week of Dec. 20, from 11 a.m. to 1:30 p.m. in Argonne-East's Building 213 Cafeteria.

Each two-deck package costs $10. The cards feature authors, composers and scientists and other historical figures.

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Next issue will be Jan. 10

This will be the last *Argonne News* of 1999.The World Wide Web version will be updated Tuesday, Jan. 4. The next paper issue will be published Monday, Jan. 10.

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Office software classes offered

Office computer software classes will be offered in January and February by Electronics and Computing Technologies.

Unless otherwise noted, classes will be held in Argonne-East's Building 221, Room A142, are limited to 10 participants and cost $135. Class schedules and complete information are available online via the Argonnet or the ECT home page. For more information about enrollment, call Diane Cavazos (ECT) at ext. 2-7153 or send e-mail to dkcavazos@anl.gov.

- Basic Excel Skills (ECT340) -- Monday, Jan. 10, 8:30 a.m. _ 11:30 a.m. Prerequisite: Windows 95.

- Basic Word Skills (ECT338) -- Monday, Jan. 10, 1:30 p.m. _ 4:30 p.m. Prerequisite: Windows 95.

- Microsoft Outlook 98 (ECT362) -- Tuesday, Jan. 11, 8:30 a.m. _ 4:30 p.m. Cost: $195.

- Excel Improving Worksheet Appearance (ECT341) -- Wednesday, Jan. 12, 8:30 a.m. _ 11:30 a.m. Prerequisite: Windows 95, Basic Excel 97 skills.

- Word Applying Formatting (ECT339) -- Wednesday, Jan. 12, 1:30 p.m. _ 4:30 p.m. Prerequisite: Windows 95, Basic Word 97 skills.

- Introduction PowerPoint 97 (ECT342) -- Thursday, Jan. 13, 8:30 a.m. _ 11:30 a.m. Prerequisite: Windows 95.

- Intermediate PowerPoint 97 (ECT343) -- Thursday, Jan. 13, 1:30 p.m. _ 4:30 p.m. Prerequisites: Introduction to Windows 95 and Introduction to PowerPoint 97.

- MS Project (ECT352) -- This is a two-day class. First session: Tuesday, Feb. 22, 8:30 a.m. _ 4:30 p.m. Second session: Tuesday, Feb. 29, 8:30 a.m. _ 4:30 p.m. Cancellation notice required by Feb. 14. Prerequisite: Windows 95. Cost: $390.

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