

Leadership Computing Facility wins High Performance Computing Challenge



The Argonne Leadership Computing Facility's (ALCF) Intrepid, a 40-rack IBM Blue Gene/P capable of a peak-performance of 557 Teraflops (557 trillion calculations per second), was named a winner of the annual High Performance Computing (HPC) Challenge Award at the SuperComputing 08 Conference in Austin, Texas. Argonne's score of 103 GUPS (Giga Updates per Second) for Global RandomAccess was almost three times faster than last year's winner.

By Eleanor Taylor

Argonne was named a winner of the annual High Performance Computing (HPC) Challenge Award at the SuperComputing 08 Conference in Austin, Texas.

"It is an honor to be recognized as a winner of the HPC Challenge," said Pete Beckman, director of Argonne's Leadership Computing Facility (ALCF). "This award proves that energy efficiency and computational power are not mutually exclusive. We can still push performance boundaries and deliver stellar results while using a fraction of the power typically needed for supercomputers."

Argonne was the clear winner in two of the four categories awarded in the HPC Challenge best performance benchmark competition, which were run using 32 racks of Argonne's Blue Gene/P.

Argonne's score of 103 GUPS (Giga Updates per Second) for Global RandomAccess was almost three times faster than last year's winner. Global RandomAccess measures memory performance and stresses traditional system bottlenecks that are directly correlated to application performance.

Argonne also won the Global FFT category, which measures the floating point rate of execution of double precision complex one-dimensional Discrete

Fourier Transform, which is used to efficiently transform one function into another, scoring 5080 Gflops.

The HPC Challenge is a suite of tests that examine the performance of high-end architectures using kernels with memory access patterns considered more challenging than those of the High Performance LINPACK benchmark used in determining the Top500 list and is sponsored by DARPA High Productivity Computing Systems Program and IDC. The goal of the competition is to focus the HPC community's attention on developing a broad set of HPC hardware and HPC software capabilities that are necessary to productively use HPC systems.

"The HPC Challenge provides an important benchmark for accelerating petascale computation for breakthrough science and engineering and will be an important measure as we begin to work towards the exascale," Beckman added.

The ALCF is home to DOE's Intrepid, a 40-rack IBM Blue Gene/P capable of a peak-performance of 557 Teraflops (557 trillion calculations per second). The Blue Gene/P features a low-power system-on-a-chip architecture and a scalable communications fabric that enables science applications to spend more time computing and less time moving data between CPUs, both reducing power demands and lowering

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Rollout of Laboratory Management System changing the way laboratory does business

The Laboratory Management System (LMS) will be launched Tuesday, Dec. 2, with the debut of a revised Web site. Over the next two months, all employees will have an opportunity to gain experience with the system, report concerns, suggest improvements, and provide process owners and their teams with opportunities to make any necessary tweaks.

The LMS web site will be a single source where all employees can locate policies and procedures. The Web site will provide employees with a variety of helpful information about the LMS, including an overview, FAQs, a glossary of terms, and education, along with statements of purpose and descriptions of scope for all the laboratory's 17 core processes. Of primary interest to many employees will be the 50 new process procedures, reflecting the effort of the process teams over the past year. Employees will also see how core processes are aligned to legacy policies and procedures, prime contract clauses, Argonne committees, and Performance Evaluation and Measurement Plan (PEMP) measurements and process objectives.

Finally, the site will include a feedback mechanism. Employees are encouraged to ask questions and raise issues on any aspect of LMS, from how it works as a system to improvement of the Web interface. All employee questions will receive an answer, and responses to questions frequently asked by employees will be added to the site's FAQ page. Furthermore, progress on open issues will be described and tracked via a link to the issues management system.

Education for specific LMS processes will be made available and announced on the Web site according to a posted schedule; the announcements will identify the audience and availability.

Lab-wide effort

Hundreds of people from the programmatic and operations sides of the lab have been working on the LMS initiative for more than 14 months. The new LMS will improve communication, clarify roles and responsibilities and allow areas where efficiencies can be achieved to be identified. For the

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What would a positive safety culture at the lab feel like?



Richardson

Steve Richardson, deputy laboratory director for operations

We have been talking about how we need to improve our safety culture at Argonne. One technique for accomplishing that task is to begin to visualize that culture, and how it would affect our day-to-day work. Here are my thoughts.

Overall injury statistics at the laboratory would improve drastically. Every incident would be a learning opportunity to find out how to avoid the next injury. Zero incidents would be seen as attainable. Our low injury statistics would be a subject of pride for all laboratory employees.

We would be tenacious in finding safety hazards and mitigating them before an injury happens — success in finding hazards would be viewed just as posi-

tively as major scientific breakthroughs. This tenacity would flow over to our personal lives where we would be setting examples for our families and loved ones on appropriate safety behaviors.

We would not be motivated by meeting DOE requirements, but instead by keeping ourselves and our coworkers, facility users and visitors injury-free. Safety would be easily recognized as one of our paramount values.

The lab would have a culture of openness where anyone could raise a safety issue with the natural expectation of having it resolved professionally and quickly.

We could compare our performance with other laboratories and see a distinct difference — a positive difference — between Argonne and others.

Safety improvement suggestions would be plentiful and seen as an effective means to leverage the observation skills of all site employees.

There would be a continuous stream of requests for assistance from outside

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ARGONNE NATIONAL LABORATORY IS MANAGED BY UCHICAGO ARGONNE, LLC FOR THE U.S. DEPARTMENT OF ENERGY



The fifth annual Young Artists Expo, which took place Nov. 21, was sponsored by the Argonne Child Development Center and helped to raise money for the Bright Horizons Foundation for Children. The organization creates “Bright Spaces,” which are safe, educational, stimulating playrooms for homeless children or other children in need. The expo featured original pieces of art created by children who attend the center, as well as their teachers.

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first time in Argonne’s history, all the laboratory’s core processes will be documented, as opposed to having *ad hoc*, undocumented procedures in areas such as contract management, environment, and asset management. This documentation will provide new clarity to Argonne’s business environment.

Another key change is how decisions will be made on the ways the laboratory conducts business. A governance core process will rely upon those impacted by a new change to come together to understand the issue, create a solution, and balance the cost of the solution with the value it provides. Solutions will go through a rigorous review process, will follow a resource-loaded implementation plan, and will be tracked through iCatch.

The presentation of policies and procedures will be very different for employees, as they will no longer be grouped into manuals. On both the revised LMS web site, and the web site that today houses Argonne’s policies and procedures, employees will find instructional messages to guide them to the policies and procedures they are seeking. ▀

inside.anl.gov/lms/

ALCF

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operating costs.

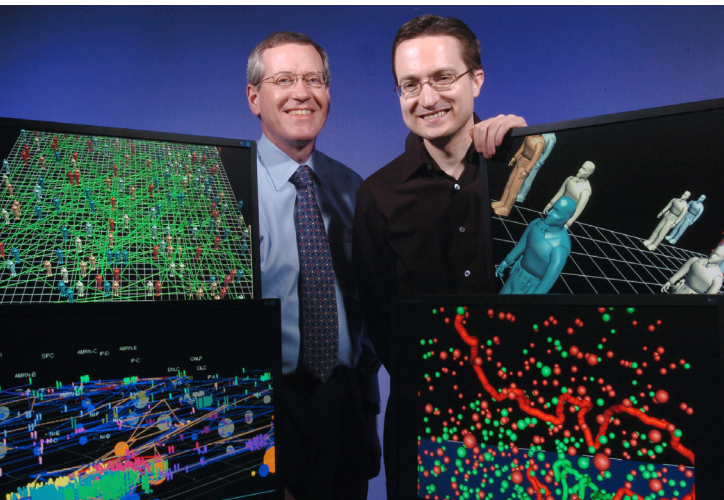
As part of DOE's Innovative and Novel Computational Impact on Theory and Experiment program, the ALCF provides in-depth expertise and assistance in using ALCF systems and optimizing applications to help researchers from all different scientific disciplines to scale successfully to an unprecedented number of processors to solve some of our nation's most pressing technology challenges.

The ALCF is a leadership-class computing facility that enables the research and development community to make innovative and high-impact science and engineering breakthroughs. Through the ALCF, researchers conduct computationally intensive projects on the largest possible scale. Argonne operates the ALCF for the DOE Office of Science as part of the larger DOE Leadership Computing Facility strategy. DOE leads the world in providing the most capable civilian supercomputers for science. ▀

www.alcf.anl.gov/

www.hpcchallenge.org/

Agent-based computer models could anticipate future economic crisis



Argonne systems scientists Charles Macal (left) and Michael North showcase several of their agent-based models. Photo by George Joch.

By Jared Sagoff

As the stock market continues its dive, economists and business columnists have spilled a lot of ink assigning responsibility for the ongoing financial calamity. Although hindsight might be clear as day, researchers at Argonne are trying to create new economic models that will provide policymakers with more realistic pictures of different types of markets so they can better avert future economic catastrophe.

Traditional economic models rely heavily on “equilibrium theory,” which holds that markets are influenced by countervailing balanced forces. Because these models assume away the decision-making processes of individual consumers or investors, they do not represent the market’s true internal dynamics, said Charles Macal, an Argonne systems scientist.

“The traditional models don’t represent individuals in the economy, or else

they’re all represented the same way as completely rational agents,” Macal said. “Because they ignore many other aspects of behavior that influence how people make decisions in real life, these models can’t always accurately predict the dynamics of the market.”

Macal and his Argonne colleagues have created a new set of simulations called “agent-based models” to better anticipate how markets behave. These new models rely on information gleaned in part from surveys that ask respondents about the factors that influence the way they make decisions. By gaining a more precise understanding of the behavior patterns of individual actors in a market, for example, how willing they are to accept risk, how strongly they value the future or how much time and effort they are able to spend making decisions, researchers and economists can better predict and avoid meltdowns.

Agent-based models separately calculate likely decisions for each individual actor in a model, then take the results of these decisions and see what impact they have on other agents. By doing so, they have the potential to foresee a panic, a protracted “hot streak,” herd mentality or a number of other market phenomena that pure rational-actor models would tend to miss.

Macal and other Argonne researchers have valuable experience creating these agent-based models. At the request of the Illinois Commerce Commission, Macal’s group generated a model of the Illinois electrical power market. As Illinois pre-

pared to deregulate the electrical power industry in early 2007, policymakers in Springfield asked Argonne's Decision and Information Sciences Division to examine the likely effects of differential electricity pricing around the state and other issues associated with deregulation.

The model of the Illinois power network contained more than 180 plants and 350 generators, which supplied electricity to customers grouped into 30 “load zones.” In all, the model contained thousands of points where producers and consumers interacted with each other and the power grid.

Because these agents have limited time, money and information, they cannot always reach the “optimal” solution dictated by traditional models, Macal said. “The old models assume that the entire system would always be trying to minimize its total cost,” he said. “Obviously, in a deregulated market, that’s not going to be the case.”

The Illinois Commerce Commission wanted to make sure that if they deregulated the power market, individual producers of electricity would not be able to manipulate the market during times of high demand by withholding capacity or charging excessive rates. The Argonne model found that during certain times of heavy load such a situation could emerge, which led to the recommendation that independent monitors maintain some oversight of the power market.

The ability to produce such detailed simulations relies on the availability of high-performance computers that can handle the computational challenges of mathematically representing an enormous number of individual actors. “Just five years ago, we couldn’t model more than a couple dozen agents,” Macal said. “Now, we can do a couple million.”

Macal’s expertise in behavioral economics and agent-based modeling attracted the attention of Procter and Gamble (P&G), one of the world’s largest producers of consumer products. P&G asked Macal to use models similar to those he used for the Illinois Commerce Commission to anticipate likely trends in consumer behavior. Macal’s group used information from P&G’s consumer surveys to create simulated shoppers who would react to changes in their marketing strategies and advertising campaigns.

In his efforts to further expand the reach of agent-based modeling, Macal plans to examine how and why Americans use different sources of energy, from coal to natural gas to nuclear to solar. Although it might seem like a pipe dream to address a question with so many variables, Macal believes that he can at least shed some light on the country’s patterns of energy production and consumption.

“At this point, there’s no real framework to understand how all of the pieces of the energy puzzle fit together,” he said. “These models will improve the quality of the information that policymakers and organizations use to make decisions.” ▀

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organizations to assist them with solving some their difficult safety issues.

Our DOE program sponsors would want to grow our science programs based on our productivity and reputation for doing the work safely.

Work for others sponsors would want to take advantage of our safety performance and send their projects to our scientists.

Does this match your vision of Argonne? ▀

Beckman named director of LCF



Beckman

Pete Beckman has been named director of the Leadership Computing Facility (LCF). The LCF operates the Argonne Leadership Computing Facility (ALCF). The ALCF is home to one of the world's fastest computers for open science, the Blue Gene/P, and is part of DOE's effort to provide leadership-class computing resources to the scientific community.

Beckman has worked in systems software for parallel computing, operating systems, and Grid computing for 20 years. His career began at Indiana University, where he helped create the Extreme Computing Laboratory. In 1997, he joined the Advanced Computing Laboratory at Los Alamos National Laboratory, where he founded the ACL's Linux cluster team. Beckman also worked in industry, founding a research laboratory in 2000 in Santa Fe sponsored by Turbolinux, Inc., which developed the world's first dynamic provision-

ing system for large clusters and data centers. The following year, he became vice president of Turbolinux's worldwide engineering efforts.

Beckman joined Argonne's Mathematics and Computer Science Division in 2002. As director of engineering for the TeraGrid, he designed and deployed the world's most advanced Grid system for linking production high-performance computing for the National Science Foundation. After the TeraGrid became fully operational, he started research teams focusing on petascale high-performance operating systems, fault tolerance, system software and the SPRUCE urgent computing framework, which supports running critical high-performance applications at many of the nation's super-computing centers. Beckman also leads Argonne's exascale computing strategic initiative and has previously served as the ALCF's chief architect and project director.

As director of the LCF, Beckman will work with a community dedicated to solving the world's most challenging and important computational science problems. ▀

The greening of Building 366



The inside of Building 366 before (top) the new energy efficient lighting was installed and after (bottom).

Building 366 received an environmentally green makeover of its lighting system this month, which provides significantly increased intensity using a fraction of the energy. Originally built in the mid-1960s, the highbay used the technology of the time, a mix of mercury vapor and incandescent lighting. The new system uses multivapor (metal halide) lamps that produce approximately twice the lumen output per watt of their mercury-based counterparts. Another technology change is the use of more efficient reflectors focusing light output to the best advantage.

In the case of Building 366, the designer, Eugene Kendall (FMS), chose to illuminate ceiling and wall surfaces in addition to the work plane. "Lighting is relative," Kendall said. "The old

Project statistics:

- Overall cost of project: \$46,400
- Annual operating cost savings: \$16,125
- Annual energy savings: 210,000 KW
- Payback: approximately three years
- Lighting level: increased 264 percent
- Contractor installation time: six days

system left you with a dingy cave-like feeling. By illuminating the light colored walls and ceiling we used reflected light in the design. We created a more uniform, open and inviting space while eliminating unwanted shadow detail."

Building Manager Ken Wood (HEP) agrees. "It's difficult to compare the before and after lighting situations," Wood said. "We're very satisfied with the new system. It's truly remarkable. The contractor did a nice job, too. He was in and out with minimal disruption."

The project had a number of issues. The FMS project manager, Connie Ashbaugh, recalls, "We effectively had to rewire the entire ceiling of the facility while it was occupied and fully functional," Ashbaugh said. "Our biggest concern was safety with a working height up to 45 feet above the floor. This was a team effort and we couldn't have been so successful without the knowledge and field supervision of Chris Girard and Harry Cavett (FMS)." As an unanticipated benefit, several unsafe fixture mounts were discovered and changed. ▀

Besançon named chief financial officer

Michael Besançon has been appointed Argonne's chief financial officer, and will direct the laboratory's Financial Management Division (OCF).

Previously, Besançon was associate dean for administration, finance and planning at Northwestern University's McCormick School of Engineering and Applied Science. As the chief financial officer and chief operating officer, he managed a \$110 million combined research and operations budget, human resources and training for 150 staff, strategic planning, marketing, space and information technology.

From 1997-2000, Besançon was professor of naval science and commanding officer Naval Reserve Officer Training Corps, Chicago Consortium. He was the executive in charge of a 150-person officer education organization and operating units at Northwestern University and the Illinois Institute of Technology, and taught courses in leadership, ethics, military law and marine navigation.

Prior to those positions, Besançon served in the U.S. Navy in a variety of posts, most recently as including director of plans and policy for the Navy's Alaskan Command. ▀

Two mentoring opportunities available for Argonne scientists, engineers

Science Chicago is seeking volunteers for Find-A-Scientist. Science Chicago asks for help from scientists and engineers in sparking excitement and enthusiasm for the study of and pursuit of careers in science, engineering and technology.

The program, based on elements of match.com, facebook.com and linkedin.com, assembles a diverse group of volunteer scientists, engineers and technologists, then invites educators from all over the Chicago region to check it out.

Created in an effort to help connect educators and scientists, engineers and technologists, the Web-based Find-A-Scientist gives volunteer scientists their own Web pages on www.sciencechicago.com. On this page, they can share a photo, educational and career backgrounds, their inspiration for becoming a scientist or engineer and what kind of volunteer work most interests them.

Volunteers can commit as much or as little time as their schedules allow, but the important job is to get themselves listed on Find-A-Scientist and find out how eager educators are to network with professionals.

Learn more online at www.sciencechicago.com/content/find-a-scientist. Another opportunity is through the

National Society of Black Physicists (NSBP) to mentor the next generation of physicists.

NSBP seeks physicists working at Argonne to mentor students and young professional members. This mentoring program is a chance for Argonne's physicists to make a big difference in the life of a student or young professional and to perhaps develop a candidate for opportunities in the organization, all in as little as 10 minutes a week.

Under this program, physicists can mentor undergraduate and graduate students, postdocs and untenured faculty. Mentoring relationships through MentorNet last at least eight months, but many go on well after that.

Hundreds of physics students, postdocs and untenured professors are already in the MentorNet database looking for a mentor.

MentorNet's research-based programs provide real-world information, encouragement, advice and access to networks for students, particularly for those underrepresented in engineering and science fields. Several U.S. Department of Energy labs are already MentorNet sponsors.

To sign up, see NSBP's Web site at www.nsbp.org/en/cms/?3190. ▀



Musical salute to veterans

The Argonne Choral Group performed a short musical salute to veterans Nov. 18 in the Building 362 Auditorium. The performance featured patriotic songs including the national anthem and a medley of the songs for the five service branches. For more information about the Argonne Choral Group, contact Patrick Garner (NE) at ext. 2-4872.

In memoriam

Norman Nelson, a retired instrument maker with 35 years of service in CS, died May 24. His daughter, Kristine Eaton, survives him.

E.N. Pettitt, a retired executive director with 33 years of service in TIS, died July 1. His children, David, Kenneth and Ann Ernst and his brother Jay Pettitt, Jr. and sister Elizabeth Gazlay, survive him.

William J. Riordan, a retired conventional facilities engineering manager with 28 years of service in APO, died Sept. 16. His wife, Antoinette, survives him.

William Seng, a retired maintenance mechanic with 30 years of service in FMS, died Sept. 30. His nieces, Kathy Hemenway and Carolyn Sallay, survive him.

Michael Slawecki, a retired electrical engineer with 43 years of service in CMT, died June 26. His wife, Shirley, survives him.

Albert D. Stein, a retired engineering assistant with 41 years of service in CHM, died Aug. 1. His wife, Janice, survives him.

John C. Tezak, a retired senior tech-

nician with 37 years of service in NE, died April 7.

Richard Valentin, a retired associate division director with 38 years of service in ET, died June 10. His wife, Anne, survives him.

Robert Vogt, a retired senior technician with 24 years of service in MSD, died May 11. His wife, Evelyn, survives him.

Edwin Weber, a retired controller with 33 years of service in CON, died June 25. His wife, Doris, and son Bill, survive him. ▀

Employees receive SPOT awards

The SPOT Award recognizes employees’ contribution to safety and quality at the laboratory. The award recognizes employees “on-the-spot” who exhibit good safety behavior or initiative.

Bob Wiedmeyer (TSD) was assisting at a conference in the Building 402 Auditorium when he noticed some of the international speakers were using a Class IIIa laser pointer marked “danger” during their presentations. Wiedmeyer knew that Class IIIa lasers were not to be used

outside of controlled laser areas. Wiedmeyer advised them of the lab procedure and provided them with a Class II laser pointer for use during the rest of the conference.

Employees also receiving SPOT Awards include:

- **Debbie Ritchie** (TSD)
- **Bruce Herdt** (NE)
- **Jim Parker** (OCF/PRO)
- **Richard Combs** (OTT)
- **Kathy Eggers** (EVS)
- **Bobby Herrera** (ES)
- **Larry Boing** (NE)

Any authorized manager or supervisor may give a Spot Award to an employee when safe behavior or initiative is displayed, which gives the employee immediate recognition. For more information about SPOT awards, reference the HR Policy and Procedure Manual chapter 6100.3 titled “Safety and Quality Awards Procedure.” ▀

Pick up SPOT awards Wednesdays

SPOT awards can be picked up at the Paymaster’s Office in Building 201 on Wednesday afternoons from 2 - 3 p.m.

In preparation for calendar year-end payroll processing, the last day to pick up SPOT awards for 2008 will be

Wednesday, Dec. 10. Normal distribution of SPOT awards will resume after the shutdown beginning Wednesday, Jan. 7. Questions regarding SPOT award distribution should be directed to ext. 2-7111. ▀

New classified ad application launched

The classified ads have moved to a new Web-based application that will allow employees to enter their own ads and remove them immediately when their items have been sold.

The Web page will be constantly updated, and ads will appear shortly after they’re entered — no more waiting two weeks for the next *Argonne News*. They will appear on the Web site for as long as three weeks.

Ads posted online as of the *Argonne News* deadline will appear in the next issue of the newsletter. Ads will still be accepted via fax at ext. 2-5274 and drop off in Building 201.

More information, including rules and instructions, is online at the new classified ad Web application. ▀

inside.anl.gov/news/classifieds/index.html