

Dr. James Hack Appointed to Direct NCCS at Oak Ridge

Dr. James J. Hack, a senior scientist at the National Center for Atmospheric Research (NCAR) in Boulder, CO, has been appointed Director of the National Center for Computational Sciences (NCCS), a leadership computing facility at Oak Ridge National Laboratory (ORNL).

"We are thrilled that Jim Hack is joining us to lead America's premier open computing facility," says Dr. Thom Mason, director of ORNL. "Jim is a global leader in climate research and has devoted his career to gaining insight into Earth's atmosphere, where dynamics are complex and a lot is at stake. He is well suited to lead the NCCS in addressing the grand scientific challenges of this century, which include climate but also extend to fields such as biology, chemistry, physics, and even computation itself. This research supports endeavors such as developing renewable energy and gaining a better understanding of our universe."

NCCS supercomputers provided more than one-third of the simulation data jointly contributed by the DOE and the National Science Foundation (NSF) to the most recent assessment report of the United Nations' Intergovernmental Panel on Climate Change, the group that shared the 2007 Nobel peace Prize with Al Gore. Dr. Hack was one of the principal developers of the model that was run on the NCCS supercomputers.

"Jim brings to the NCCS a depth of experience wresting great science from the world's most powerful machines," Dr. Thomas Zacharia said. "The goal of supercomputing is deep insight, and with Jim's leadership the nation's top researchers will make the most of petascale computing."

Dr. Hack, with Leadership Computing Facility Project Director Arthur "Buddy" Bland, will identify major high-performance computing



Figure 1. Dr. James (Jim) Hack has been selected to direct NCCS.

needs from scientific and hardware perspectives and put forth strategies to meet those needs as machines evolve to the petascale and beyond.

Dr. Hack also will lead the Climate Change Initiative at ORNL, directing a team of scientists and engineers across the laboratory in advancing the state of the art in Earth system discovery and policy through enhanced scientific understanding, Earth system modeling, and computational and observational programs.

"ORNL is in an incredibly unique position to substantially advance the most challenging

of scientific problems and I'm deeply honored to have been selected to play a leadership role in the laboratory's vision," Dr. Hack said. "The opportunity to help direct, advance, and articulate the value of nonlinear science is an exciting new step in my professional career. Overall, ORNL enjoys tremendous scientific momentum right now, where I see this as a time for significant scientific discoveries and advancement. I'm looking forward to being able to contribute to such an exceptional program in computational science and the important scientific insights it will reveal."

Dr. Hack headed the Climate Modeling Section at NCAR, a center sponsored by the NSF, and serves as deputy director of NCAR's Climate and Global Dynamics Division. He served as an adjunct professor in Electrical and Computer Engineering at the University of Colorado-Boulder and is the author or co-author of 98 scientific or technical publications.

After receiving his Ph.D. in Atmospheric Dynamics from Colorado State University in 1980, Dr. Hack became a research staff member at the IBM Thomas J. Watson Research Center, where he focused on mapping scientific algorithms to high-performance computing architectures. He moved to NCAR in 1984, where he led the development of the NCAR global atmospheric model, currently called the Community Atmosphere Model (CAM). He has worked on all aspects of large-scale global modeling, including development and evaluation of numerical methods, development of analysis frameworks, and implementation of global models on high-performance computer systems.

Further Information

<http://nccs.gov/>

Communication and Collaboration

Workshop Focuses on Terascale, Petascale Science

Forty of the leading research scientists from national laboratories and universities came together at the Scientific Impact and Opportunities of Computing workshop to discuss how current systems in the 100 teraflops range—as well as the anticipated petascale systems—can deliver the biggest scientific punch over the coming 12 to 18 months.

The workshop, held January 9–12, 2008, focused on how these systems can advance research in nanoscience, superconductivity, combustion, energy storage, and geosciences,

and also explored research opportunities in each field.

Participants discussed the role of supercomputing in nonmagnetic research to enhance data storage, solve electron exchange problems in superconductivity, simulate combustion from the atomistic to the device, and help scientists understand nanoscale phenomena in materials and chemical sciences that underpin the energy storage research field. The workshop closed with a discussion of the importance of supercomputing in the multi-scale aspects of geosciences research.

Each session's conclusions will be summarized in a report conveying the many potential scientific breakthroughs this kind of computing offers.

"The outcome of this workshop will be a much greater understanding of the impact and opportunities of computing in producing today's science," said ORNL's Dr. Jeff Nichols, one of the workshop organizers. "In addition we hope to be able to anticipate the computational experiments that will be performed upon delivery and acceptance of new computer hardware."

Institute for Advanced Architectures

New Joint Institute to Tackle Exascale Computing Challenges

In an effort to address the hardware and software challenges posed by exascale computing, Sandia National Laboratories (SNL) and Oak Ridge National Laboratory (ORNL) have founded the Institute for Advanced Architectures. The move to multi-core systems and the increased use of accelerators has necessitated such an Institute, according to Dr. Sudip Dosanjh, who is leading the project at SNL. While multi-core chips can perform more calculations, they are limited by the speed at which data move between processors and memory.

As the number of threads increases, and with multi-core systems running multiple threads, applications could potentially run hundreds of millions of threads on an exascale supercomputer. These unprecedented levels of scalability are driving advances in system software, tools, and algorithms.

"In order to continue to make progress in running scientific applications at these scales, we need to address our ability to maintain the balance between the hardware and the software," said Dr. Jeff Nichols, who is heading the Institute at ORNL. "There are huge software and programming challenges and our goal is to do the critical R&D to close some of the gaps."

Many scientific applications are currently limited by the speed memory can be accessed. To address this problem, the Institute sponsored the Memory Opportunities for High-Performance Computing workshop in January. The invitation-only meeting, originally planned for 25, had nearly 50 participants from national labs, DOE, the National Science Foundation, the National Security Agency, the Defense Advanced Research Projects Agency (DARPA), as well as leading manufacturers of processors and supercomputing systems. Fred Johnson from the DOE Office of Science and Bob Meisner from National Nuclear Security Administration (NNSA) served on the program committee.

The two labs intend to build on their long history of collaboration to foster a multidisciplinary approach by working with many industry and academic partners including SNL's Computer Science Research Institute and ORNL's relationships with the University of Tennessee-Knoxville and Georgia Tech University.

Calendar

Meetings for Computational Community

Communications, discussions, and interactions are important components of successful collaborations, and the collaborative partnerships that symbolize SciDAC projects promote multiple discussion forums.

One of the most visible interdisciplinary meetings for the elite computational science community and SciDAC researchers is the annual SciDAC Conference. SciDAC 2008 will be held in Seattle, WA, July 13–17 ("SciDAC 2008 Conference Set for Seattle," below). The meeting will feature technical presentations, posters, and opportunities for expanding collaborations. More information is available at:

<http://hpcrd.lbl.gov/SciDAC08/>

In conjunction with the annual meeting, the SciDAC Outreach Center is hosting a day of tutorials. SciDAC researchers will present a multi-tracked set of tutorials on computing, data, and algorithm topics to students, industry partners, and other interested parties. The tutorials will be held Friday July 18 in Redmond, WA and transportation from Seattle hotels will be arranged. Agendas and registration information will be posted at:

<http://outreach.scidac.gov/SciDAC08/tutorials>

Members of the SciDAC Institute for Ultra-Scale Visualization will present a Mini-Symposium on Ultra-Scale Parallel Visualization on March 14 during the 2008 SIAM Conference on Parallel Processing for Scientific Computing in Atlanta, GA. Further details are available at:

http://meetings.siam.org/sess/dsp_programsess.cfm?SESSIONCODE=6770

Annual Meeting

SciDAC 2008 Conference Set for Seattle

The SciDAC community will hold its annual conference at Seattle's Fairmont Olympic Hotel, July 13–17, 2008. The meeting will feature presentations by plenary speakers and SciDAC researchers.

Among other things, the conference aims to expand its outreach in an effort to include more presentations by researchers from Asia and Europe, as well as to recruit several students from DOE's Computational Science Graduate Fellowship program to present their research.

"From the outset, SciDAC was designed to increase the role of advanced computing in all areas of scientific research across broad communities and we are developing a conference program that we hope will reflect that," said Dr. Rick Stevens, associate laboratory director for Computing and Life Sciences at Argonne National Laboratory, and general chair of the 2008 SciDAC Conference. "We are also planning a number of evening events aimed at

The Center for Technology for Advanced Scientific Component Software (TASCS) is an active participant in the Common Component Architecture (CCA) Forum, which holds quarterly meetings that are open to the public. The next meetings will be held April 24–25 in Salishan, OR, and July 24–25 in the Washington, DC area. More information can be found at:

<http://www.cca-forum.org/meetings/>

TASCS members are also involved in the organization of the COMPARCH Federated Events on Component-Based Software Engineering and Software Architecture to be held October 14–17 in Karlsruhe, Germany. Group members are especially involved in planning the Component-Based High-Performance Computing workshop. More details are available at: <http://comparch2008.ipd.uka.de/>

The Center for Scalable Application Development Software (CScADS) will hold its Summer 2008 Workshops this July in Snowbird, UT. These are the second of an annual series of workshops that aim to engage the community in the challenges of leadership computing and foster interdisciplinary collaborations. The workshops will explore topics such as: Automatic Tuning for Petascale Systems; Leadership-Class Machines, Petascale Applications, and Performance Strategies; Performance Tools for Petascale Computing; and Scientific Data Analysis and Visualization for Petascale Computing. More information about the workshops can be found at:

<http://cscads.rice.edu/workshops/summer08/>

bringing attendees together, getting them talking, and laying the groundwork for increased collaboration," he said.

Currently in the planning stage, "Movie Night," will showcase researchers' latest scientific visualizations and culminate in the presentation of the first-ever OASCRs—awards for the best entries in a number of categories.

Scheduled for an encore in Seattle are two evenings of poster presentations, which proved extremely popular at the 2007 SciDAC Conference in Boston. About 20 research posters will be presented each night to spur discussions about new ideas for solving scientific problems.

In conjunction with the SciDAC 2008 conference, the SciDAC Outreach Center will hold daylong tutorials at the Microsoft Research Facility on Friday, July 18.

Further Information

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