



May 24-30, 2009

LSU-led Black Hole Simulation Wins First Prize at International Competition

A team of 13 LSU researchers and students, led by faculty at the LSU Center for Computation & Technology, or CCT, conducted a presentation and demonstration that won first prize at the SCALE 2009 challenge at CCGrid09, a premier conference for cluster and Grid computing.

The SCALE 2009 competition, which took place in Shanghai, China, involved researchers demonstrating real-world problem solving using scalable computing, in which scientists use computer systems that can easily adapt, or scale up, to provide greater performance and computing power and give them greater capability to solve complex problems.

The CCT-led demonstration showcased a scalable, interactive system to simulate and visualize black holes to study the physics of gravitational waves. This complex process involves many challenges that scientists are only now able to address with modern cyberinfrastructure, including scalable computing systems.

“We were honored to receive first prize in this competition, particularly since we had many challenges leading up to our demonstration,” said LSU Department of Computer Science and CCT Professor Gabrielle Allen, who led the demonstration team. “Travel restrictions prevented all but one member of our team from attending the competition in person, so we produced a video of our demonstration that was shown in Shanghai. The rest of our team communicated from LSU during the competition using Skype and live chat to describe the process and answer questions. The fact LSU’s entry won first prize in spite of these obstacles is a good reflection on the quality of scientific research our group was able to demonstrate, and we are grateful for this recognition from our international peers and collaborators.”

The CCT entry addressed the scalable computing challenges of the competition, including automatically generating simulation code, developing programs and software components to provide fast data transfer across the Louisiana Optical Network Initiative, or LONI, parallelize the rendering process that transforms scientific data into images and building interactive, tangible devices that allow observers to engage directly with the scientific data as it is visualized live.

The CCT demonstration also tested the team's ability to effectively use high-performance computing machines concurrently, running applications on thousands of computing cores at once while using multiple, distributed resources of different types (computation, storage, networks, graphics) for a single application.

Numerical simulations are the only practical way to study black hole systems, but this requires a complex system of mathematical equations describing effects that span a wide range of length- and time-scales. To address this challenge, the CCT demonstration used Cactus Software Framework, an open-source environment that allows teams of researchers from different fields in different locations to work together at modeling the black hole collisions, solving Einstein's Equations. Cactus allowed the researchers to automate a process that would be too time-consuming and error-prone for scientists to perform by hand.

The demonstration involved collaboration with LONI and the Texas Advanced Computing Center in Austin, where the black hole simulation was run on 2,048 cores of the Ranger machine.

The CCT team was able to demonstrate live interaction with the simulation using a Web interface for application-level monitoring, debugging, and profiling. The simulation integrated social networking sites into the scientific process, using a new Cactus application an LSU undergraduate student co-developed to announce runtime information to Twitter and provide real-time images of the gravitational field through Flickr.

The demonstration showed live, interactive images of the black hole data using a scientific visualization system distributed across LONI. The CCT group built tangible interaction devices, which they provided on the show floor in Shanghai, allowing observers to interact in real-time with the visualization process.

The team came in first among the five international, short-listed entries for the competition.

"It was a great experience for us to be able to demonstrate University research to our international peers at a venue across the world, so we can show them the groundbreaking processes taking place through work at LSU that are advancing opportunities for the global scientific community," said CCT Interim Director Stephen David Beck, Ph.D.

To see the video of the CCT demonstration, please visit <http://preview.cactuscode.org/media/videos/>.

Pats on the Back:

- Xin (Shane) Li has received an award from the Board of Regents for his RCS proposal titled "Volumetric Mapping and Parameterization for Digital Media, Shape Modeling and Scientific Simulation." The award is for \$124,500 over 3 years.

- Thomas Sterling has received a supplement to his NSF award titled "A System Architecture Point Design Study for Exascale Computing." The supplement is for \$16,000.
- Shantenu Jha has received an award from the University of Southampton titled "OMIISAGA-II: Working with e-Scientists to Bridge the Gap between Applications and Distributed Infrastructure." The award is for \$339,685 over 18 months.
- Georgios Veronis received an award from the Board of Regents for his RCS proposal titled "Nanoscale plasmonic devices for enhancement of nonlinear optical effects and sensing." The award is for \$120,132 over 3 years.
- Jorge Pullin received an award from the Alfred P. Sloan Foundation for his proposal titled "Support for recruitment of minority students in physics and astronomy." The award is for \$2,000 over 34 months.
- Jorge Pullin also received an award from NSF for his proposal titled "Travel support for US researchers to attend the 12th Marcel Grossmann meeting." The award is for \$30,000 over 12 months.

Upcoming Lectures:

- John Quackenbush, from the Dana-Farber Cancer Institute and the Harvard School of Public Health, will be lecturing on "Information-integration approaches to biological discovery in high-dimension data" hosted by the Louisiana Biomedical Research Network. The lecture will take place Thursday, May 28, at 3 p.m. in the Life Sciences Annex Auditorium Room A101.
- Jianguo Liu, from Colorado State University, will lecture on "The Enriched Galerkin (EG) Method for Local Conservation" as a part of the Computational Mathematics Seminar Series. The lecture will take place on Monday, June 15 at 11 a.m. in Johnston 338.

Please Note:

- The John Lennon Educational Tour Bus will visit the LSU campus Thursday, June 4. This visit is a joint initiative of CCT and the AVATAR Initiative. The bus is a mobile music and audio recording studio that visits college campuses, schools and community organizations across the United States each year to give students a chance to produce their own songs and music videos, experimenting with audiovisual technology. The bus showcases Apple hardware and software, digital media authoring tools, including Final Cut Studio and Logic studio for HD video, and music production. The John Lennon Educational Tour Bus will be parked on the south end of the Parade Ground, on the Union side. The bus will be open from 9 a.m. to 5 p.m. Students, faculty and community members are invited to come

experience the bus and use the equipment inside to produce their own digital media projects. There is no cost for this activity.

- Professor Thomas Sterling will host the second Beowulf Boot Camp for high school students on the LSU campus June 15-19. Please visit <http://www.cct.lsu.edu/BeowulfSummerCamp> to see a schedule of planned lessons.
- The next ALL CCT meeting will take place Wednesday, June 17 at 1:30 p.m. in Johnston 338. Vice Chancellor Brooks Keel and Provost Astrid Merget will attend this meeting to address the University's budget situation.

- **Deadlines open for SC09 in Portland, Oregon:**

POSTERS/DOCTORAL SHOWCASE/BOFs/CHALLENGE

Due: Monday, July 27, 2009

Notification: Monday, August 17, 2009

SHOWCASE/BOFs/CHALLENGE

Due: Monday, July 27, 2009

Notification: Monday, August 17, 2009

DISRUPTIVE TECHNOLOGIES

Due: Monday, July 27, 2009

Notification: Monday, August 17, 200

STUDENT VOLUNTEERS/BROADER ENGAGEMENT

Applications Due: Monday, August 3, 2009

Notificatio: Monday, September 7, 2009

EDUCATION PROGRAM

Applications for the on-site program due: Monday, June 1, 2009

- Please note two Cactus tutorials offered in the coming months. No prior knowledge of Cactus is required and material will be available on the Cactus Web site.

2.) May 27 in Baton Rouge, LA:

A two-hour beginner's tutorial as part of the LSU/LONI HPC training courses, to be announced at <http://www.hpc.lsu.edu/training/>. It will introduce the Cactus framework and how to use it on the LSU/LONI HPC systems.

3.) June 22 in Arlington, VA:

A half-day tutorial as part of TeraGrid '09

http://www.teragrid.org/tg09/index.php?option=com_content&task=view&id=55. This will be a hands-on tutorial introducing Cactus, building applications, running simulations, and visualizing output.

- If you have any news for the CCT Weekly, please e-mail PR Manager Kristen Sunde directly at ksunde@cct.lsu.edu.

Upcoming Grant Deadlines:

Note: Please see the CCT deadline Web site, as many NSF deadlines are listed here:

<http://www.cct.lsu.edu/about/grants/deadlines/events.php>

- Faculty Early Career Development (CAREER) Program

July 22 2009 10:00 am

At Most \$ 400,000.00

Full Proposal Deadlines by Discipline: July 21, 2009 - BIO, CISE, EHR July 22, 2009 -
ENG July 23, 2009

<http://www.nsf.gov/pubs/2008/nsf08557/nsf08557.htm>

- Information and Intelligent Systems (IIS): Core Programs

August 30 2009 10:00 am

At Most \$ 3,000,000.00 available

http://www.nsf.gov/pubs/2009/nsf09557/nsf09557.htm?govDel=USNSF_25

- Computing and Communication Foundations (CCF): Core Programs

August 30 2009 10:00 am

At Most \$ 3,000,000.00 available

http://www.nsf.gov/pubs/2009/nsf09555/nsf09555.htm?govDel=USNSF_25

- CISE Cross-Cutting Programs: FY 2010

August 30 2009 10:00 am

At Least \$ 3,000,000.00 available

http://www.nsf.gov/pubs/2009/nsf09558/nsf09558.htm?govDel=USNSF_25