



## CCT Weekly June 24- June 30, 2012

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### LSU CCT Receives Half Million NSF Grant for GPU Cluster

Multi-core CPUs are the processors of choice in all modern computing platforms. However, GPUs (graphics processing unit) are becoming cost-effective, and have proven themselves to be very powerful general-purpose processors in their own right. The interest in using GPUs for scientific and engineering applications has been accelerating at a ferocious rate over the last few years, and today GPUs can now be found in many of the world's fastest machines on the Top500 supercomputer list.

Honggao Liu, deputy director of the LSU Center for Computation & Technology (CCT), recently received \$539,999 from the National Science Foundation (NSF) for "Shelob," a project for computer science research, education, training, and development for Louisiana. Shelob will be a GPU cluster—a system composed of multiple server nodes—commonly called a Beowulf cluster, but each node will include GPUs to add additional processing power. The Shelob cluster will include at least 24 compute nodes, one head/control node, and 100 terabytes of scratch disk storage. The nodes will communicate with each other over an FDR (Fourteen Data Rate) InfiniBand network fabric at a data rate of 56Gb/s. Each node will have at least 64GB of memory, dual 8-core Intel Sandy Bridge processors, and three next-generation NVIDIA "Kepler" GPUs. The Shelob cluster will be used primarily to develop a large set of open source GPU-enhanced research applications.

Over the last decade, science and engineering disciplines have undergone a profound transformation and now require serious cyberinfrastructure (computers, networks, and other support) to make major advances. During this time, Louisiana has made great strides modernizing its educational and research facilities through comprehensive investments in cyberinfrastructure. The Louisiana Optical Network Initiative (LONI) and the LA-SIGMA (Louisiana Alliance for Simulation-Guided Materials Applications) project are products of this statewide investment. High Performance Computing (HPC), the heart of advanced cyberinfrastructure, has evolved drastically since the launch of the LONI initiative.

"The purchase of a Kepler GPU-accelerated cluster will allow the state to take the next step in supercomputing and produce a workforce ready for the new generation of parallel supercomputers. The cluster will be the centerpiece of an effort to transform computational sciences education and research throughout Louisiana," said Liu.

"The payoff from this project will be significant. Hundreds of researchers throughout Louisiana will use the Shelob cluster to develop a new generation of codes. These codes need to be ready for the next generation of GPU-accelerated national leadership supercomputers which will come on-line over the next couple of years. To use these new supercomputers, researchers will need to write GPU-enhanced massively parallel codes. The Shelob cluster will be used to train a new generation of researchers to program using CUDA, OpenCL, and the PGI Accelerator compiler. Even a new programming tool, the Pluto compiler, is being prepared for this new breed of supercomputer."

"We propose to transform computer and computational science research and education throughout Louisiana by graduating our users from the current massively parallel paradigm to a GPU-enabled parallel paradigm."

The Shelob project incorporates training and education at all levels, from a Beowulf Boot Camp for high school students to more than 20 annual CCT workshops and computational science distance learning courses for students. It will also be used in the CCT Research Experience for Undergraduates (REU) and the LA-SIGMA Research Experience for Teachers (RET) programs.

The Shelob project team, led by Liu, will use the Shelob cluster to advance GPU-enabled open source software. Team members include esteemed investigators from large multi-institutional projects, including Cactus, Pluto, STEIJAR and LA-SIGMA. They include from LSU: Mark Jarrell, principal investigator for the LONI Institute, LA-SIGMA, professor of physics and CCT; Hartmut Kaiser, team lead of the CCT STEIJAR group, adjunct assistant professor of computer science; Steven Brandt, team lead of the CCT Cactus Computational Framework, adjunct professor of computer science; and J. (Ram) Ramanujam, professor of electrical and computing engineering and CCT. Other senior personnel from LSU include Q. Jim Chen, Peter Diener, Randall Hall, David Koppelman, Xin Li, Frank Loeffler, James Lupo, Juana Moreno, Ravi Paruchuri, Jian Tao, Bhupender Thakur, and Mayank Tyagi.

"Together, this team will enable new discovery on the next generation of supercomputers," said Liu.

For more information about the LSU Center for Computation & Technology, visit [www.cct.lsu.edu](http://www.cct.lsu.edu)

### Pats on the Back:

► Thanks to everyone who helped make the Alice in Computation Land Camp a success last week!

### CCT in the News:

#### LSU CCT Named 2012 CUDA Research Center by NVIDIA

Source: [LSU Office of Communications & University Relations](#)

#### NSF Awards Louisiana State University with Funding for GPU Cluster

Source: [HPCwire](#)

### Lectures This Week:

#### THURSDAY --

There will be a lecture on "[An Efficient Spectral Element Model for Submerged Bendable Cylinders Relevant to Wave Attenuation](#)" by Don Liu, Louisiana Tech University. The lecture will take place Thursday, June 28 at 2:30 PM in 338 Johnston Hall.

### Please Note:

- ▶ Reminder: The University is still in a spending freeze. State appropriated funds included in the University's FY 2011-12 Operating Budget identified with a zero "0" in the sixth digit of the account number are subject to the spending freeze. Start-up and cost sharing accounts are exempt. Please contact Theresa Markey ([tmarkey@cct.lsu.edu](mailto:tmarkey@cct.lsu.edu)) with any questions/concerns.
- ▶ The LSU Center for Computation & Technology will host the **LSU iOS App Boot Camp** for its second year, **July 30-August 10, 2012**, (10 day camp; not including weekends), on the LSU Campus. This educational experience will offer LSU undergraduate students the opportunity to gain knowledge while enhancing their entrepreneurial spirit. Participants will work in groups to create their own functional iOS app and have it loaded on their personal device by end of camp. Post-camp programs to expand and hone new skills will also be available. Registration and more information can be found at: <https://www.cct.lsu.edu/ios-abc>
- ▶ The Virtual School of Computational Science and Engineering (VSCSE) is excited to announce three Summer School courses for 2012. The VSCSE provides courses and learning resources to help computational science students use emerging petascale computing resources to address real domain science problems. The summer courses for 2012 are:
  - ▶ **Programming Heterogeneous Parallel Computing Systems (July 10 - 13, 2012)**--\*\*located at LSU CCT
  - ▶ **Science Cloud Summer School (July 30 - August 3, 2012)**--\*\*located at LSU CCT
  - ▶ **Proven Algorithmic Techniques for Many-core Processors (August 13 - 17, 2012)**

These courses will be delivered to a number of sites nationwide using high definition video conferencing technologies, allowing students to travel to a number of convenient locations where they will be able to work with a cohort of fellow computational scientists, have access to local experts and interact virtually with course instructors. Registration fees for these courses are \$100\* and help the host sites offset their hospitality and facility costs.

Please visit <http://www.vscse.org/summerschool/2012/> for more information and the full site list or <http://hub.vscse.org> to register today!
- ▶ Student Volunteer applications opened April 1, 2012 and will be available at the SC12 Submissions site: <http://submissions.supercomputing.org/>. Applications close on July 31, 2012. International attendees who will require a travel visa are strongly encouraged to apply as early as possible. **For more information** on the Student Volunteer program and other student-related programs at SC12, visit: <http://sc12.supercomputing.org/content/student-volunteers>. **Contact:** [student-vols@info.supercomputing.org](mailto:student-vols@info.supercomputing.org)
- ▶ Prior approval is required for Special Meal Requests. Employees who make meal purchases without prior approvals may find that they must cover the cost of any monies spent for an unapproved event out of pocket. Dine-in restaurant meals are not allowed on LaCarte credit cards. Please contact Susie McGlone ([susie@cct.lsu.edu](mailto:susie@cct.lsu.edu)) prior to any special meal with visitor(s) to file the appropriate request for approval. Prior approval could take up to two weeks, so please plan accordingly.
- ▶ Please remember to send your news concerning grants, awards, conferences, or other pertinent information to CCT Event Coordinator Jennifer Fontenot at [jennifer@cct.lsu.edu](mailto:jennifer@cct.lsu.edu)
- ▶ Follow CCT with social media to access photos and see news, events or updated information. These pages are public; you do not need an account to view the information.
  - ▶ [Facebook group](#) : LSU Center for Computation & Technology
  - ▶ [Twitter](#) : LSUCCT
  - ▶ [YouTube channel](#) : LSUCCT

#### Interest groups:

- ▶ **MAG (Mobile App-Art-Action Group):** Everyone interested in the potential for Mobile Apps is invited to come and add their vision for these revolutionary devices. For more information visit: <http://www.cct.lsu.edu/MAG>
  - ▶ Contact: Jesse Allison ([jallison@lsu.edu](mailto:jallison@lsu.edu))
- ▶ **GPU:** meets weekly (Thursdays @ 12:30 pm in 338 Johnston) and encourages participation from anyone who would like to join in the discussions. Join the mailing list: [lasigma-gpu@loni.org](mailto:lasigma-gpu@loni.org)
  - ▶ Contact: Zhifeng Yun ([zyun@cct.lsu.edu](mailto:zyun@cct.lsu.edu))

#### Upcoming events:

- May 29- July 28: [REU Computational Sciences](#)
- May 29- July 28: [REU Materials Science](#)
- July 9-13: [Beowulf Boot Camp for High School Teachers & Students](#)
- July 10-13: [Programming Heterogeneous Parallel Computing Systems](#)
- July 30-August 3: [Science Cloud Summer School](#)
- July 30- August 10: [LSU iOS App Boot Camp for Undergraduate Students](#)

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