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May 12, 2010

## OSC Serves New Research Groups with Launch of 'Csuri' Advanced GPU Environment

*GPGPU Development Workshop offered May 25th at OSC*

COLUMBUS, Ohio, May 12 -- A new, advanced service offered by the Ohio Supercomputer Center leverages the unique computing properties of the graphics processing unit (GPU) to provide a robust visualization environment to researchers in fields as diverse as biomedicine, electrosiences and the animation arts.

OSC recently completed deployment of the "Csuri" Advanced GPU environment, increasing the Center's capabilities for advanced large-scale remote visualization and batch-rendering applications, as well as GPGPU applications. This powerful computing environment is now available to all Ohio college and university faculty, students and staff, as is an upcoming workshop planned to provide insights on the effective use of the service.

The high performance computing (HPC) community is aggressively exploring general-purpose GPU (GPGPU) computing by using them as "many-core processors" to solve scientific problems. Modern, commercially-available central processing units (CPUs) are multicore processors with 2, 4 or 8 independent processors on a single chip. Many-core processors, on the other hand, have hundreds or thousands of processors that are more tightly connected.

"For the right kind of problems, GPGPU computing can provide revolutionary performance advantages," said David Hudak, Ph.D., program director of cyberinfrastructure and software development at OSC. "The Csuri platform is designed to support the development of both GPGPU and advanced visualization solutions. We look forward to working with our user communities to develop codes and evaluate GPU-enabled third party applications."

One example of the work that can benefit from the Csuri Advanced GPU environment is the work of its namesake, Charles "Chuck" Csuri, whose sophisticated digital art involves giant rendering of thousands of frames.

Csuri is best known as the father of computer graphics, computer animation and digital fine

art, creating the first computer art in the 1960s. In addition to being recognized by the Smithsonian Magazine, Csuri is seen as a pioneer of computer animation by the Museum of Modern Art (MOMA) and the Association for Computing Machinery Special Interest Group Graphics (ACM-SIGGRAPH).

Csuri became interested in the digital computer as a means of imaging in 1964, when he saw a computer-generated face in a publication from the university's department of electrical engineering. While a senior professor at The Ohio State University (OSU), Csuri founded the Computer Graphics Research Group, the OSC Graphics Project and accad, an academic unit dedicated to the development of digital art and computer animation.

During the beta testing of the GPU system, Umit Catalyurek, Ph.D., associate professor in the Department of Biomedical Informatics and Department of Electrical and Computer Engineering at OSU, used the nodes to develop a component-based runtime system for various biomedical image analyses and synthetic aperture radar image formations.

"One of student researchers is using the new GPU system to finish his experiments for a project on automatic tuning of radar signal processing on emergent architectures," said Catalyurek. "We are now developing software systems that will enable applications to easily scale from a single CPU or GPU to a cluster of GPUs and multicore CPUs."

With matching funding from DaytaOhio, a Wright Center of Innovation, OSC was able to develop the Csuri Advanced GPU Environment with the latest NVIDIA visualization technology, providing researchers with 18 NVIDIA Quadro Plex 2200 S4 units installed in the Center's flagship production cluster, the Glenn IBM 1350, and 16 nVidia C1060 cards installed in the BALE research cluster. The GPU environment also features the CUDA toolkit, including the CUDA SDK, a collection of example programs illustrating various aspects of CUDA and GPGPU usage.

### **OSC's Csuri Advanced GPU Environment Configuration**

36 GPU-accelerated nodes on the Glenn IBM 1350 cluster, connected to 18 NIVIDA Quadro Plex S4's for a total of 72 CUDA-enabled graphics devices. Each node has access to two Quadro FX 5800-level graphics cards.

Each Quadro Plex S4 includes:

- 4 Quadro FX 5800 GPU's
- 240 cores per GPU
- 4GB Memory per card

In addition, each of the 36 compute nodes contain:

- Dual socket, quad core 2.5 GHz AMD Opterons
- 24 GB RAM
- 393 local disk space in '/tmp'
- 20Gb/s Infiniband ConnectX host channel adapter (HCA)

Supported software includes:

CUDA v2.3

CUDA SDK for C and FORTRAN, including gdb integration

Parallel application examples- CUDA+MPI, CUDA+OpenMP, CUDA+OMP+MPI

### **GPU Orientation Workshop Offered**

In order to orient researchers to the new computing environment, OSC will host a GPGPU Development Workshop from 9:30 a.m. -5 p.m., on May 25, 2010, in OSC's BALE Theatre. The workshop will provide an overview of the GPGPU resources available at OSC, summarize some of the key potential benefits and provide an overview of the most popular programming toolkits and techniques currently in use.

More information is available by visiting the workshop registration page on the OSC Web site at [www.osc.edu/supercomputing/training/register/gpgpuregister.shtml](http://www.osc.edu/supercomputing/training/register/gpgpuregister.shtml) or by emailing [trn-contact@osc.edu](mailto:trn-contact@osc.edu).

As in prior summers, OSC also is a training site for the Virtual School for Computational Science, with a session that covers many-core processors and GPGPU programming. More information is available at [www.vscse.org/summerschool/2010/](http://www.vscse.org/summerschool/2010/)

### **About the Ohio Supercomputer Center**

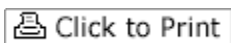
The Ohio Supercomputer Center is a catalytic partner of Ohio universities and industries that provides a reliable high performance computing infrastructure for a diverse statewide/regional community. Funded by the Ohio Board of Regents, OSC promotes and stimulates computational research and education in order to act as a key enabler for the state's aspirations in advanced technology, information systems, and advanced industries. For additional information, visit <http://www.osc.edu>.

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*Source: Ohio Supercomputer Center*

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