



CINECA named a CUDA Research Center

Cineca has been selected to be a 2011 CUDA Research Center, based on the vision, quality, and impact of its research leveraging GPU technology. **This achievement will give the HPC group of Cineca participate in NVIDIA GPUs, events, meetings, and training courses on NVIDIA technology and GPU computing.**

CUDA is NVIDIA's parallel computing architecture that enables dramatic increases in computing performance by harnessing the power of the graphics processing unit (GPU). CUDA Research Centers, which are at the forefront of some of the world's most innovative and important scientific research, are recognized institutions that embrace and utilize GPU computing across a range research fields.

In the frame of this achievement, Cineca has many activities planned to include:

1. Application porting and benchmarking.

The current GPU supercomputing facility at CINECA is ranked 54 in the Top 500 and is the largest public GPU cluster in Europe. It is an IBM Cluster made of 548 NVIDIA® Tesla® M2070 (see <http://hpc.cineca.it/content/ibm-plx-user-guide>) called PLX. It is available both for European researchers as Tier-1 machine in [PRACE](#), and for Italian researchers via [IS CRA](#) national calls. For this reason a significant part of Cineca's activity will be devoted to the porting on this cluster and benchmark of the CUDA version of several scientific applications.

2. Evaluation of the feasibility and porting of scientific applications kernel/solver on GPGPU.

These applications are mainly focused in material science and fluid dynamics such as Quantum Espresso (<http://www.quantum-espresso.org/>) and OpenFOAM (<http://www.openfoam.com/>). This work will be done in collaboration with NVIDIA and other CUDA Research Centers.

Visualization services. Cineca is supporting High end Visualization services in scientific as well as cultural heritage fields. In scientific visualization, tools such as ParaView and Visit can leverage both cpu as well as GPU assisted rendering: one field of research would be to test and deploy GPU assisted visualization services with minimum impact on the whole cluster scheduling. Another line of development will be the provisioning of very high quality rendering visualization services, either near-real time with Reality server NVIDIA GPU accelerated iray technology⁶ or as a classical rendering farm approach using GPU accelerated unbiased rendering code such as LuxRender⁷.

Collaboration with Italian research groups. University of Bologna – INFN: Jasmine is an implementation of an electromagnetic particle in cell code using hybrid (CUDA or OpenMP and MPI) parallelization.

3. Training activities.

The 2011 edition of the annual Advanced School of Parallel Computing will be international and will be entirely focused on GPGPU programming. (see <http://www.cineca.it/page/advanced-school-parallel-computing>) CINECA also organizes a 2-day CUDA course for users and researchers interested in developing codes based on this language (presenter in 2 editions).