

EU-Russia Call

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EU-Russia Call

- First ICT Joint Call with Russia (dedicated INCO Call in WP 11-12); joint calls have already been implemented in other areas of FP7
- Russia is investing in High Performance Computing: No 12 supercomputer in the top500 list is Russian; aiming to enter Top3 already in 2010 (Petaflop range)
- Russia has leading academic expertise in a variety of scientific fields that are users of HPC
- EU has leading academic expertise in parallel programming and is home to a dynamic ecosystem of innovative HPC tool companies



Target outcomes:

- a) **Programming Models and Runtime Support**
 - generic and portable programming models
 - heterogeneous multicore and accelerator based systems
- b) **Performance Analysis Tools for High-Performance Computing**
 - measurement, analysis, and modeling tools to support hybrid programming
 - tools targeted towards abstract characterisations of the performance of applications
- c) **Optimisation, Scalability and Porting of Codes**
 - Optimisation and scaling of application codes to thousands of cores
 - Examples of application domains: Computational Fluid Dynamics, molecular dynamics, electromagnetic, biology, seismic signal processing and remote sensing.

**Call: INCO Russia, 4M€ EU + 2M€ Russia,
3 STREPs of 2-years, 1 project per topic**



a) Programming Models and Runtime Support

- Programming models to address programmability and portability issues for multicore and accelerator based systems.
 - Work should focus on developing or selecting specifications of generic and portable programming models (e.g. via languages, directives or library APIs) and provide implementations (compilers and runtime support libraries) on heterogeneous multicore and accelerator based nodes.
 - The models should address the integration issues between system level and node level models in hybrid programming styles as well as compatibility between different low level devices (GPUs, FPGAs,...).
 - Includes flexible and efficient mechanisms for synchronization and locality handling.
 - Efforts to evaluate the developed environments in comparison to other alternatives would be desirable.

Expected Impacts

- Improved understanding of the advantages/disadvantages/applicability of programming models.
- Improved programmability of parallel computing systems.
- Increased cooperation between EU and Russian organisations



b) Performance Analysis Tools for High-Performance Computing

- Portable and efficient performance measurement, analysis, and modeling tools to support hybrid programming
 - e.g., mixed MPI/OpenMP/Accelerator both on homogeneous and heterogeneous multicore hardware architectures and accelerators including GPUs and FPGAs.
- Tools should be targeted towards abstract characterisations of the performance of applications hiding the user from the specifics of a given hardware platform from the whole system down to the level of separate low-level units.

Expected Impacts

- The state-of-the-art in hybrid parallel programming methodologies should be significantly advanced.
- Development of tools to support mixed-mode programming and programming of heterogeneous architectures.
- Increased cooperation between EU and Russian organisations



c) Optimisation, Scalability and Porting of Codes

- Optimisation and scaling of application codes to thousands of cores including porting of codes to new (heterogeneous or homogeneous) multicore hardware architectures, using advanced methods, technologies, and tools.
 - Examples include: use of new methods for mesh generation, new solver parallelisation, various forms of task and data parallelisation, utilization of specific accelerators, including GPU and FPGA.
 - Scientific computing domains and application domains are focused on, but not limited to: CFD, molecular dynamics, electromagnetic, biology, seismic signal processing and remote sensing.

Expected Impacts

- The state-of-the-art in optimisation and scalability methodologies should be significantly advanced.
 - Effective measurements of improved performance and comparison between various types of parallelisation will be valuable.
- Porting of codes to bigger number of cores
- Increased cooperation between EU and Russian organisations



Thank You

