The CCU 'High Performance Computing'

Information
Full name:
Federal State Autonomous Educational Institution of Higher Professional Education "Southern Federal University'
Center for Collective Usage of the scientific equipment 'High Performance Computing'.
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All necessary information can be found on the website:
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History
The CCU 'High Performance Computing' was founded in 2010 in order to unite the computing recourses of different SFedU departments (South-Russian Reginal IT Center; Mechanics and Applied Mathematics Research Institute; Faculty of Mechanics, Mathematics and Computer Science).
The structure reorganization resulted in uniting all the above faculties into the Institute of Mathematics, Mechanics and Computer Science named after I.I. Vorovich. The CCU structure was reorganized accordingly. The Institute of Mathematics, Mechanics and Computer Science became the CCU basic unit and the following departments became the Center's parts:
1. Laboratory of High performance computing and its applications.
2. Laboratory of Mechanics of deformable solids and constructions.
3. Open systems laboratory.
4. Department of High-performance computing, information and communication technology.

The CCU activity
The general scope of CCU`s work is to provide the scientific research, education and innovation activity with the computing recourses. The Center possesses the unique expensive computing systems and provides methodical support to the scientific and educational projects, as well as the projects of various enterprises demanding the extensional calculations. Currently, the Institute of Mathematics, Mechanics and Computer Science named after I.I. Vorovich, the Faculties of Physics and Chemistry, the Research Institute of Physics and the Federal Research Centre the Southern Scientific Centre of the Russian Academy of Sciences use their services. The Tver State University, the Ural State University, the Niels Bohr Institute (Denmark) used the Center's capacities in the various years.
In addition to the computing recourses, the CCU provides access to the various application program packages:
- to solve the quantum chemistry tasks (Gaussin03, ORCA, Gamess, OpenMX)

- to do research in the field of the condensed state physics (FDMNES, FEFF84, VASP, WIEN2k, ABINIT, Quantum Espresso, Yambo)
- to solve mathematical modeling and continuum mechanics tasks (ANSYS, OpenFOAM, MAXIMA, SciLAB).

The computing recourses are based on the 4 computing Linux-clusters serviced by the unified dispatching system of task management OpenPBS. This system allows to process both conventional uniprocessor programs providing a separate computational node for each of them and to unite the powers of several computational nodes of any cluster in order to solve a task.

Besides, the CCU trains the students in the field of super computer technologies. There is a special study cluster provided for this task. This cluster allows to organize the educational process for a number of computer sciences (programming languages, programming, parallel programming, numerical methods, application program packages, Unix-like operating systems).

The CCU main activity:
- exploitation and development of the SFedU super computer center recourses;
- development of system software and application programs of the high performance computing systems;
- informational and advisory support of the super computer center users;
- organizing and ensuring the studying process in the field of high performance computing technology;
- development of guidance materials on the multiprocessor programming and the specialist software usage;
- environmental management research support;
- environmental processes modeling;
- development of numerical methods for solving the simultaneous linear algebraic equations.