

PRACE Autumn School 2013 - Industry Oriented HPC Simulations

Monday 23 September 2013 - Friday 27 September 2013

University of Ljubljana

Programme

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Resolving Industrial Engineering Applications with HPC by ANSYS, optiSLang, AVBP, elsA, RBF morph, etc.

The programme targets at HPC applications of structural mechanics (SM), low and high frequency electromechanical design (EM) and computational fluid dynamics (CFD) with some specialized plugins and CFD codes. The programme timetable is tailored to the expected interest of applicants. Depending on the tutorial applications, it is possible to arrange seats in computing rooms and change the timetable to better match the trainers/trainees/class rooms and computing resources available.</div>

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Programme committee:

Alexander Dopf, CADFEM, Austria : General engineering competence support.

Antonio C.M. Sousa, University of Aveiro, Portugal : CFD and "multi-physics".

Claudio Arlandini, CICECA Milano, Italy: 3IP-WP3 industry contact and CFD topics w/ Fluent.

Georgi Prangov, NCSA, Bulgaria: PRACE Outreach and training support.

Paola Alberigo, CINECA, Bologna, Italy: PACT contact and attendees selection process.

Antun Balaz, IPB Serbia: dissemination support.

Leon Kos, University of Ljubljana, Slovenia: Local organizing contact.

Training resource: 768 (1536 hyper) core x86_64 Linux cluster, 64 nodes w/48GB RAM running CentOS 6.4 and LSF scheduler

Computing classrooms:

II/5 - 44 workstations with 24" displays

III/1 - 18 workstations with 24" displays

N17 - 18 workstations with 24" displays

Structural Mechanics

Robust Design Optimization - from the idea to the optimized product.

A classic FEA simulation provides a result for a specific geometry, material and load configuration. In practice, however, most parameters are variable - there are different geometry and material variations, different load conditions or variances that must be reflected in the simulation to understand products and production processes to be improved.

OptiSLang will be presented on how to investigate a design space

systematically to perform optimization with competing objectives and ensure the integrity of scattering influences. In addition to typical questions for robust parameter variation simultaneous solution through powerful high performance computing will be presented to save time. At the end procedures for the operation and organization of the results are presented.

Computational Fluid Dynamics

Computational Fluid Dynamics (CFD), as we see it, is one of the most advanced areas of HPC-based Computational Mechanics, particularly in technological applications dealing with industry, energy and environment. School presents diverse CFD areas with case studies and hands-on trainings on the topics like: General Fluent training with hands on topics focused to participant interests. RBF morph plugin for Fluent for quick mesh morphing. ONERA/CERFACS CDF solvers elsA and AVBP, BIO-CFD flow modelling, and Sails optimization case history.

Multiphysics: Electromechanical and Mechatronic Systems

Simulations are critical for the successful development of complex mechatronic systems. The function of these components is based on the selective use of field effects like drives, actuators, sensors, signal and power transformers and their interaction in the overall system such as motion, heat and vibration. Comprehensive simulation software offers capabilities for analyzing all of these systems and effects. It allows users to detect imponderables early in the design process, enabling them to develop more innovative products and significantly shorten development time.