High-Performance Computing on Multicore Processors

Module-No./Abbreviation	Credits	Workload	Term	Frequency	Duration
CE-WP25/HPCM	6 CP	180 h	2nd Sem.	Summer term	1 Semester

Courses	Contact hours	Self-Study	Group Size:
High-Performance Computing on Multicore Processors	4 SWS (60 h)	120 h	No Restrictions

Prerequisites

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Learning goals / Competences

After successfully completing the module, the students

- are enabled to design and create programs for multicore processors,
- can critically evaluate multi-threaded programs and shared-memory access patterns,
- can assess the benefits and challenges of multicore programming techniques.

Content

The lecture addresses parallelization on multicore processors. Thread-based programming concepts and techniques, including pthreads, C++11 threads, OpenMP and SYCL, are introduced and best practices are highlighted using applications from scientific computing.

An overview of the relevant hardware aspects including multicore architectures and memory hierarchies is provided. An in-depth introduction to multi-threaded programming on multicore systems with special emphasis on shared-memory parallelization is given and parallelization patterns, thread management and memory access strategies are discussed.

In hands-on sessions, programming exercises are used to discuss and illustrate the presented content.

Teaching methods / Language

Lecture (2h / week), Exercises (2h / week) / English

Mode of assessment

Written examination (120 min., 100%)

Requirement for the award of credit points

Passed final module examination

Module applicability

MSc. Bauingenieurwesen, MSc. Subsurface Engineering, MSc. Angewandte Informatik

Weight of the mark for the final score

6 %

Module coordinator and lecturer(s)

Prof. Dr. A. Vogel, Assistants

Further information