High-Performance Computing on Multicore Processors

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Module number BI-WP56/CE-WP25/SE-O-8	Credits 6 CP	Workload 180 h	Semester[s] 2. Sem.	Duration 1 Semester[s]	Group size no limitation
Courses a) High-Performance Computing on Multicore Processors			**Contact hours** a) 4 WLH (60 h)	**Self-study** a) 120 h	**Frequency** a) each summer

Module coordinator and lecturer(s)

Prof. Dr. Andreas Vogel

a) Prof. Dr. Andreas Vogel

Admission requirements

Learning outcome, core skills

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.

Contents

a)

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.

Educational form / Language

a) Tutorial (2 WLH) / Lecture (2 WLH) / English

Examination methods

• Written exam 'High-Performance Computing on Multicore Processors' (120 min., Part of modul grade 100 %)

Requirements for the award of credit points

- Passed final module examination

Module applicability

- M.Sc. Computational Engineering
- M.Sc. Civil Engineering
- M.Sc. Applied Computer Science
- M.Sc. Subsurface Engineering

Weight of the mark for the final score

Percentage of total grade [%] = 6 * 100 * FAK / DIV

FAK: The weighting factors can be taken from the table of contents.

DIV: The values can be taken from the table of contents.

Further Information