Parallele Programmierung

Winter

(engl. Parallel Programming)

Modulnummer: FIN-INF-110463

Kürzel	CP	Semester	Fachsem.	Dauer	Sprache	Niveau
PP	5	Winter	starting at 3.	1 Semester	deutsch	Bachelor

Link zum LSF:	LSF
Zugang beschränkt:	
Verantwortung:	Prof. Dr. Michael Kuhn
Dozent:in:	Prof. Dr. Michael Kuhn
Lehrveranstaltungen:	• Lecture *Parallele Programmierung* • Exercise *Parallele Programmierung*
Verwendbarkeit:	- B.Sc. INF: Informatik - Wahlpflicht - B.Sc. INF: Studienprofil: Computer Games - B.Sc. INF: Informatik Wahlpflicht (SPO 2027) - B.Sc. CV: Informatik - Wahlpflicht - B.Sc. CV: Anwendungsfach - Computer Games - B.Sc. CV: Computervisualistik Wahlpflicht (SPO 2027) - B.Sc. INGINF: Informatik - Wahlpflicht - B.Sc. INGINF: Informatik Wahlpflicht (SPO 2027) - B.Sc. WIF: Gestalten und Anwenden - Wahlpflicht - B.Sc. WIF: Informatik Wahlpflicht (SPO 2027) - B.Sc. INF (bilingual): Informatik - Wahlpflicht - B.Sc. INF (bilingual): Informatik Wahlpflicht (SPO 2027)

Angestrebte Lernergebnisse:
The participants...

- understand the hardware architectures of parallel computers
- optimize applications with regard to their performance
- understand important concepts for the parallelization of applications
- create parallel programs with different programming approaches in smaller teams

- present solutions and results to other participants

Inhalt:
Parallel programming is becoming increasingly important, as even cell phones and laptops today have several processor cores. Some supercomputers even have several million cores and have established themselves as a useful and now indispensable tool for many areas of science. The resulting analyses and simulations have made it possible to significantly increase scientific knowledge in many areas. However, the optimal use of these components is no easy task, which is why scientists are constantly faced with new challenges in the development of efficient applications. A deeper understanding of the hardware and software environment and possible causes of errors is therefore essential for parallel programming. The fundamentals of parallel programming are taught in the lecture; the exercises are used for the practical application and implementation of the acquired knowledge in the C programming language. The lecture covers some of the most important topics: Hardware and software concepts (multi-core processors, processes/threads, NUMA etc.), different approaches to parallel programming (OpenMP, POSIX threads, MPI) as well as tools for performance analysis and debugging (scalability, deadlocks, race conditions etc.). In addition, reasons and solutions for performance problems are discussed and alternative approaches for the

Arbeitsaufwand:

- 56h attendance
- 94h independent work

Prüfungsvorleistungen:	**Studien-/Prüfungsleistungen:**	**Lehrform / SWS:**
• Active and successful participation in the exercises	Written exam (120 minutes)	• Lecture (2 SWS) • Exercise (2 SWS)

Voraussetzungen nach Prüfungsordnung:	**Empfohlene Voraussetzungen:**
none	• Practical knowledge of a programming language and the ability to create simple programs • Basic knowledge of operating systems and computer architectures (e.g. *Technische Informatik*)

Medienformen:	Literatur:
	• High Performance Computing: Modern Systems and Practices (Thomas Sterling, Matthew Anderson und Maciej Brodowicz)

Hinweise:

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