inf453 - Combination of Specification Techniques

Module label
Combination of Specification Techniques

Module code
inf453

Credit points
6.0 KP

Workload
180 h

Used in course of study
- Master's Programme Computing Science > Theoretische Informatik
- Master's Programme Embedded Systems and Microrobotics > Akzentsetzungsmodule

Contact person
Module responsibility
- Andreas Hein
- Ernst-Rüdiger Olderog
- Die im Modul Lehrenden

Authorized examiners
- Andreas Hein
- Ernst-Rüdiger Olderog
- Die im Modul Lehrenden

Entry requirements
inf400/inf401 Theoretische Informatik I and II

Skills to be acquired in this module
Introduction to the specification languages Z for data, CSP for processes, and their combination CSP-OZ for reactive systems with data and process parts.

Professional competence
The students:
- specify data and processes with Z, CSP and CSP-OZ formally
- check data refinement relations formally
- verify CSP-OZ specifications with FDR model checker

Methodological competence
The students:
- are able to integrate complementary specification methods

Social competence
The students:
- work together in small groups to solve problems
- present solutions to problems to groups of other students

Self-competence
The students:
- learn persistence in pursuing difficult tasks
- learn precision in specifying problems

Module contents
The course addresses a research trend in formal methods, the combination and integration of different specification methods. It focuses on a concrete combination CSP-OZ of the specification techniques CSP (Communicating Sequential Processes) for processes and Z and Object-Z for data, respectively. Reactive systems are described by CSP-OZ.

As a preparation, the specification languages Z and CSP are described, followed by the combination CSP-OZ with its process-oriented semantics. The concepts of refinement and inheritance and the possibility of automatic verification of a sublanguage of CSP-OZ with the FDR model checker for CSP will be discussed. Finally, the course explains possibilities of extending CSP-OZ for the specification of time-critical systems.

Topics:
- specification of complex data and operations in Z, type definition and pattern calculations of Z, data refinement
- specifications of communicating processes in CSP, operational semantics of CSP, three abstract semantic models
for CSP: Trace semantics, failures semantics, failures-divergences semantics, process refinement in the above semantics, FDR model checker for CSP

- combined specification method CSP-OZ, transformational semantics as CSP-process, theorems of refinements,

object-oriented concepts of class and inheritance in CSP-OZ

Reader’s advisory

**Essential:**


**Recommended:**


**Links**

- Language of instruction: German
- Duration (semesters): 1 Semester
- Module frequency: unregelmäßig
- Module capacity: unlimited
- Module level: ---
- Modulart: je nach Studiengang Pflicht oder Wahlpflicht

**Lern-/Lehrform / Type of program**

- Vorkenntnisse / Previous knowledge:
  - inf400 Theoretische Informatik I
  - inf401 Theoretische Informatik II

**Examination**

- **Final exam of module**
  - Time of examination: At the end of the lecture period
  - Type of examination: exercises and oral exam

**Course type**

- **Lecture**
  - Comment: SWS
  - Frequency: 3.00
  - Workload attendance: 42 h
- **Exercises**
  - Comment: SWS
  - Frequency: 1.00
  - Workload attendance: 14 h

**Total time of attendance for the module**

- 56 h