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 > Akzentsetzungsmodul
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
Modulelevel  ---
Lern-/Lehrform / Type of program  je nach Studiengang Pflicht oder Wahlpflicht
Vorkenntnisse / Previous knowledge  - inf400 Theoretische Informatik I
- inf401 Theoretische Informatik II

Final exam of module  At the end of the lecture period  exercises and oral exam

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Total time of attendance for the module  56 h