Tárgyleírás

Tárgy neve: Analysis of distributed systems

Tárgyfelelős neve: Tejfel Máté

Tárgyfelelős tudományos fokozata: PhD, (habilitáció)

Tárgyfelelős MAB szerinti akkreditációs státusza: AT

Az oktatás célja angolul / Aim of the subject:

Knowledge:

- In order to be able to perform their work in an innovative way and do research (when necessary) in their own IT specialisation, they have comprehensive and up-to-date knowledge of general mathematical and computing principles, rules and relationships, particularly – depending on their chosen specialization – in the area of formal models and tools in computing science. They have comprehensive and up-to-date knowledge and understanding of the general theories, contexts, facts, and the related concepts of IT, particularly – depending on their chosen specialization – in the areas of program design, synthesis and verification and distributed systems. They have comprehensive and up-to-date knowledge of the principles, methods, and procedures for designing, developing, operating, and controlling IT processes, particularly – depending on their chosen specialization – in the areas of design, construction and management of distributed systems.

Abilities:

- They are able to formalize complex IT tasks, to identify and study their theoretical and practical background and then to solve them. They are able to comprehensively understand, plan, organize, manage and control processes related to their IT specialisation at management level. They are able to validate completed software products. They are able to analyse and apply new problem-solving methods and procedures related to their IT specialisation.

Attitude:

- They are committed to having quality requirements met and to analysing them with IT tools. They follow professional and technological developments in their IT field.

Autonomy, responsibility:

- They take responsibility for their professional decisions made in their IT-related activities. They bear responsibility for their own work as well as for the work of their colleagues they work together with in a project.

Az oktatás tartalma angolul / Major topics:

The goal of the subject is to give an overview for the student about how can we explain the parallel behaviour by algebraic methods and Petri-nets, and how work applications based on

that models in practice. The basic concepts are processes, computational processes, parallelism, operations of processes, compositions of processes and properties of processes (liveness, deadlock-free, etc.). The theory of Petri-nets is explored more partially with many modelling example. The behavioural and structural properties, methods of analysis, famed subclasses and relationships between these subclasses are investigated. We define theorems about liveness, safetyness and reachability and present transformation, which preserve these properties. The course introduces the Petri-boxes, a special class of Petri-nets, which help to model the program structures (sequences, branches and loops). Some tools for simulation and analysis of Petri-nets are also investigated. The course also introduces the theory of algebraic models through some given example. The properties of the models, the methods of descriptions of processes and the possible compositions are examined. The denotational, operational and axiomatic semantics of the model is given and the relationships of these different descriptions are investigated.

A számonkérés és értékelés rendszere angolul / Requirements and evaluation:

mixed assessment

Irodalom / Literature:

Murata, T.: Petri Nets, Properties, Analysis and Applications (Proc. of the IEEE. Vol. 77., no. 4, ASpr 1989, 541-580)

Best, E., Devillers, R., Koutny, M.: Petri Net Algebra (Springer 2001)

Hennessy M.: Algebraic Theory of Processes (MIT, 1989)

Hoare, C.A.R.: Communicating Sequential Processes (Prentice-Hall, 1985)