T–79.4301 Parallel and Distributed Systems (4 ECTS)

Lecture 12

11th of December 2008

Keijo Heljanko

Keijo.Heljanko@tkk.fi

Course Feedback

- Remember to give course feedback by 7th of January 2009 at the latest. There are some exam related questions so it might make sense to give feedback soon after the exam.
- Please also give free form feedback in the textual fields as this feedback is very useful in improving the course in the future.
- The direct links to the course feedback forms in different languages are on the course Noppa page on the left hand side menu under "Course feedback".
- Lecture 12 (this lecture) is not part of the exam requirements.

Distributed Computation Group

- Leader: Prof. Keijo Heljanko
- Members:
  - D.Sc. (Tech.) Tommi Junttila, M.Sc. Siert Wieringa, M.Sc. (Tech.) Kari Kähkönen,
  - A number of students working either towards their Master's Thesis or as research assistants.
- Was one of three "Outstanding junior research groups of Helsinki University of Technology (TKK)" Aug 2006–Jul 2008

Projects

- Testing, Verification and Synthesis of Distributed Systems
- Model-Based Safety Evaluation of Automation Systems (MODSAFE)
- LightweIght formal Methods for distributed component-based Embedded systems (LIME)
- Computer Aided Verification Theory and Tools (CAV)

Instructed Theses in 2008

- Kari Kähkönen: Automated dynamic test generation for sequential Java programs
- Jussi Lahtinen: Model checking timed safety instrumented systems
- Jani Lampinen: Interface specification methods for software components
- Matti Koskimies: Applying model checking to analyzing safety instrumented systems

Research Goal

The main goal of the research is to create methods and tools to enable the cost efficient development of correctly functioning software systems. The main methods are:

- Model based software design: The development of methods and tools that enabled software to be model checked early in the design cycle.
- Bounded model checking: An efficient symbolic model checking method employing techniques from computational logic
- Symbolic partial order methods: Creating methods combining the theory of concurrency with symbolic model checking methods

Main Achievements

- Doctoral Theses on Model Checking: Latvala (2005), Jussila (2005), Keinänen (2006), Tauriainen (2006). Journal and conference articles.
- A new state-of-the-art approach to bounded model checking, implemented into the NuSMV2 system:
  - Heljanko, K., Junttila, T., and Latvala, T.: Incremental and Complete Bounded Model Checking for Full PLTL. In Proceedings of CAV'2005 (Computer Aided Verification).
  - Heljanko, K., Junttila, T., Keinänen. M., Lange, M., and Latvala, T.: Bounded Model Checking for Weak Alternating Automata. In CAV'2006.

New Book on Unfoldings

- Unfoldings are an approach based on partial-orders to alleviate the state explosion problem:
  - Esparza, J. and Heljanko, K.: Unfoldings – A Partial-Order Approach to Model Checking. EATCS Monographs in Theoretical Computer Science, Springer-Verlag, ISBN 978-3-540-77425-9, 172 p., 2008.

Teaching

- T–79.4301 Parallel and Distributed Systems, Autumn
- T–79.5301 Reactive Systems, Spring
- T–79.5302 Symbolic Model Checking, every second year, next time Autumn 2009
- T–79.5304 Formal Conformance Testing, every second year, next time Autumn 2010
- T–79.5305 Formal Methods, every second year, next time Autumn 2010
- T–79.7001 Postgraduate course in theoretical computer science P (2-10 cr), in Spring 2009