

Editorial for the Special Issue on Open Problems in Concurrency Theory

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The research seminar “Open Problems in Concurrency Theory” (OPCT 2014) was a prolific and successful gathering of the leading researchers in concurrency theory aiming to identify the most important open problems in the area. This special issue contains a selected set of papers of the 44 presentations¹ given during the seminar. The meeting was held on 18–21 June 2014 in the *Fresco Room* of the *University Residential Center of Bertinoro*, Italy, and supported by the IFIP Working Group 1.8.

The special issue features 8 articles ranging from classical process theory and behavioural abstraction up to coalgebraic semantics, types, and security.

In the first paper, “*The role of concurrency in an evolutionary view of programming abstractions*”, the author examines how concurrency has been embodied in mainstream programming languages and discuss different abstraction levels of present-day concurrent programming languages.

The paper “*Revisiting sequential composition in process calculi*” reviews the various ways sequential composition is defined in traditional process calculi. The author argues that such definitions somehow limit the dissemination of concurrency theory ideas among computer scientists. An alternative approach to sequential composition based on a symmetric binary operator and write-many variables is proposed.

A survey of existing approaches based on behavioural types that are aimed at ensuring security and trustworthiness properties in realistic distributed applications is presented in the paper “*Combining behavioural types with security analysis*”.

¹Available online at <http://opct2014.cs.vu.nl/>.

In the paper “*Reversibility and asymmetric conflict in event structures*”, the authors introduce reversible forms of prime event structures and asymmetric event structures. The proposed framework can be used to control the manner in which events occurring in a computation can be reversed.

The authors of “*A behavioural theory for a π -calculus with preorders*” study the behavioural theory of $\pi\mathsf{P}$, a π -calculus in the tradition of Fusions and Chi calculi. The paper shows that $\pi\mathsf{P}$ is a calculus in which both types and behavioural equivalences can be exploited in order to reason rigorously about concurrent and mobile systems.

A general categorical framework for the definition of weak behavioural equivalences is presented in “*Behavioural equivalences for coalgebras with unobservable moves*”. The proposed framework, based on parameterised saturation categories, can be used to instantiate the abstract definitions to a wide range of existing systems while recovering the corresponding notions of weak behavioural equivalences.

In the paper “*A coalgebraic semantics for causality in Petri nets*”, the authors propose coalgebras on a presheaf category on an index category of partial orders as a model for causality in Petri nets.

Finally, a multimodal logic for concurrent labeled weighted transition systems is presented in “*Concurrent weighted logic*”, where the authors also develop a Hilbert-style axiomatic system that is both weak and strong complete.

We want to thank all authors who contributed to this volume. Furthermore, we are grateful for the thorough reviews provided by all referees. We would also like to thank the editors of JLAMP, for their support during the whole editorial process.

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