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Transactions on Petri Nets and Other Models of Concurrency IV

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Preface by Editor-in-Chief

The fourth issue of LNCS Transactions on Petri Nets and Other Models of Concurrency (ToPNoC) contains revised and extended versions of a selection of the best papers from the workshops held at the 30th International Conference on Application and Theory of Petri Nets and Other Models of Concurrency, Paris, France, June 22–26, 2009, and from the 10th Workshop and Tutorial on Practical Use of Coloured Petri Nets and the CPN Tools, Aarhus, Denmark, October 19–22, 2009.

I would like to thank the two guest editors of this special issue: Susanna Donatelli and Maciej Koutny. Moreover, I would like to thank all authors, reviewers, and the organizers of the Petri net conference satellite workshops, without whom this issue of ToPNoC would not have been possible.

November 2010

Kurt Jensen
Editor-in-Chief

LNCS Transactions on Petri Nets and Other Models of Concurrency (ToPNoC)

LNCS Transactions on Petri Nets and Other Models of Concurrency: Aims and Scope

ToPNoC aims to publish papers from all areas of Petri nets and other models of concurrency ranging from theoretical work to tool support and industrial applications. The foundation of Petri nets was laid by the pioneering work of Carl Adam Petri and his colleagues in the early 1960s. Since then, an enormous amount of material has been developed and published in journals and books and presented at workshops and conferences.

The annual International Conference on Application and Theory of Petri Nets and Other Models of Concurrency started in 1980. The International Petri Net Bibliography maintained by the Petri Net Newsletter contains close to 10,000 different entries, and the International Petri Net Mailing List has 1,500 subscribers. For more information on the International Petri Net community, see: <http://www.informatik.uni-hamburg.de/TGI/PetriNets/>

All issues of ToPNoC are LNCS volumes. Hence they appear in all large libraries and are also accessible in LNCS Online (electronically). It is possible to subscribe to ToPNoC without subscribing to the rest of LNCS.

ToPNoC contains:

- revised versions of a selection of the best papers from workshops and tutorials concerned with Petri nets and concurrency;
- special issues related to particular subareas (similar to those published in the *Advances in Petri Nets* series);
- other papers invited for publication in ToPNoC; and
- papers submitted directly to ToPNoC by their authors.

Like all other journals, ToPNoC has an Editorial Board, which is responsible for the quality of the journal. The members of the board assist in the reviewing of papers submitted or invited for publication in ToPNoC. Moreover, they may make recommendations concerning collections of papers for special issues. The Editorial Board consists of prominent researchers within the Petri net community and in related fields.

Topics

System design and verification using nets; analysis and synthesis, structure and behavior of nets; relationships between net theory and other approaches; causality/partial order theory of concurrency; net-based semantical, logical and algebraic calculi; symbolic net representation (graphical or textual); computer tools for nets; experience with using nets, case studies; educational issues related to nets; higher level net models; timed and stochastic nets; and standardization of nets.

Applications of nets to: biological systems, defence systems, e-commerce and trading, embedded systems, environmental systems, flexible manufacturing systems, hardware structures, health and medical systems, office automation, operations research, performance evaluation, programming languages, protocols and networks, railway networks, real-time systems, supervisory control, telecommunications, and workflow.

For more information about ToPNoC, please see:

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Submission of Manuscripts

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Preface by Guest Editors

This issue of ToPNoC contains revised and extended versions of a selection of the best papers from the workshops held at the 30th International Conference on Application and Theory of Petri Nets and Other Models of Concurrency, Paris, France, June 22–26, 2009, and from the 10th Workshop and Tutorial on Practical Use of Coloured Petri Nets and the CPN Tools, Aarhus, Denmark, October 19–22, 2009.

We are indebted to the Program Committees (PCs) of the workshops and in particular their chairs. Without their enthusiastic work this volume would not have been possible. Many members of the PCs participated in reviewing the revised and extended papers considered for this issue. Papers from the following workshops were considered when selecting the best papers:

- APNOC 2009: International Workshop on Abstractions for Petri Nets and Other Models of Concurrency, organized by Natalia Sidorova and Alexander Serebrenik (The Netherlands);
- PNSE 2009: International Workshop on Petri Nets and Software Engineering, organized by Daniel Moldt (Germany);
- ORGMOD 2009: International Workshop on Organizational Modeling, organized by Michael Köhler-Bußmeier and Daniel Moldt (Germany);
- TiSto 2009: International Workshop on Timing and Stochasticity in Petri Nets and Other Models of Concurrency, organized by Andras Horvath (Italy) and Olivier H. Roux (France); and
- CPN 2009: The 10th Workshop and Tutorial on Practical Use of Coloured Petri Nets and the CPN Tools, organized by Kurt Jensen, Søren Christensen (Denmark), and Lars M. Kristensen (Norway).

The best papers of these workshops were selected in close cooperation with their chairs. The authors of these papers were invited to submit improved and extended versions. The papers needed to incorporate new results and to address comments made by the workshop’s referees and those made during discussions at the workshop.

All invited papers were reviewed by three referees. We followed the principle of also asking for “fresh” reviews of the revised papers, i.e., from referees who had not been involved initially in reviewing the papers. After the first round of reviews, some papers were rejected while the authors of the others were asked to revise their papers in line with the reviewers’ comments and to include a response to each comment to indicate how changes had been incorporated as a result of the comment. The revised paper and the responses were then forwarded to the reviewers for a final recommendation and comment. We would like to thank all authors and the reviewers for their excellent cooperation and for their outstanding work, which has led to a set of excellent papers in this issue.

After this rigorous review process, 9 papers were accepted out of the 15 initially considered as best papers. (Note that the workshops accepted about 60 papers in total and that the number of submissions to these workshops was considerably higher.)

This issue begins with a theoretical paper by Jörg Desel and Agathe Merceron, “Vicinity Respecting Homomorphisms for Abstracting System Requirements”, which is concerned with structuring system requirements on an abstract conceptual level using the Channel/Agency Petri nets allowing one to represent functional and data aspects of the requirements in a graphical way. It is then shown that vicinity respecting homomorphisms can be applied to refine and abstract these nets as they preserve both dependencies between computational elements and important structural properties of nets.

The group of four papers that follows is concerned with formal verification of concurrent systems using model checking. The paper “Search-Order Independent State Caching” by Sami Evangelista and Lars Michael Kristensen revisits state caching which has been used to alleviate the state explosion problem in the context of depth-first search algorithms. The paper proposes and evaluates an extension of the state caching method for general state exploring algorithms that are independent of the search order. The second paper, “Bounded Parametric Model Checking for Elementary Net Systems” by Michał Knapik, Maciej Sreter, and Wojciech Penczek investigates formal verification of properties expressed in (timed) modal logics using bounded model checking (BMC). It shows that such a technique can be extended to the parametric extension of an existential fragment of CTL (PRTECTL).

The theme of BMC is continued in the third paper, “SAT-Based (Parametric) Reachability for Distributed Time Petri Nets”, by Wojciech Penczek, Agata Pólrola, and Andrzej Zbrzezny. The paper describes how to adapt the bounded model checking methods originally developed for timed automata to make them applicable to distributed time Petri nets and parametric reachability checking. The last two papers are complemented by the final (tool) paper of this group, “Parametric Model Checking with VerICS”, by Michał Knapik et al. The paper presents the verification system VerICS extended features exploiting BMC for the verification of parametric reachability and properties expressed in PRTECTL.

The next two papers address various aspects of computer based support for business processes. Ronny Mans et al. present an approach that supports the seamless integration of unscheduled and scheduled tasks in workflow management systems in their paper “Schedule-Aware Workflow Management Systems”. The proposed approach is illustrated using a real-life (hospital) case study. The second paper, “On-the-fly Auditing of Business Processes” by Kees van Hee et al., deals with the problem of ensuring that certain business rules are enforced in a business process. The proposed approach is based on a dedicated system, called a monitor, that collects the actual events of the business processes and then verifies business rules over finite system histories.

The last couple of papers discuss different aspects of the agent-based approach to software engineering. The paper “Modeling Organizational Units as

Modular Components of Systems of Systems” by Matthias Wester-Ebbinghaus, Daniel Moldt, and Michael Köhler-Bußmeier, is concerned with hierarchical and recursive system decomposition where classical agent orientation reaches its limits. The paper proposes the concept of an organizational unit that both embeds actors and is itself embedded as a collective actor in surrounding organizational units, and gives a precise notion of operational semantics. The following paper, “A Multi-Agent Organizational Framework for Coevolutionary Optimization” by Grégoire Danoy, Pascal Bouvry, and Olivier Boissier, introduces a distributed agent framework for optimization (DAFO) that helps in designing and applying coevolutionary genetic algorithms (CGAs). In particular, DAFO includes a complete organization and reorganization model, multi-agent system for evolutionary optimization, that permits the user to formalize CGAs structure, interactions, and adaptation.

The 9 papers of this issue provide a good mixture of theory, tools, and practical applications related to concurrency and provides a useful snapshot of current research. As guest editors we would like to thank Lars Madsen and Annemette Hammer of Aarhus University for providing administrative and technical support and the Springer/ToPNoC team for the final production of this issue.

November 2010

Susanna Donatelli
Maciej Koutny
Guest Editors, Fourth Issue of ToPNoC

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