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Transactions on Petri Nets and Other Models of Concurrency III

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Preface by Editor-in-Chief

The third 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 associated with the 29th International Conference on Application and Theory of Petri Nets and Other Models of Concurrency, which took place in Xi'an, China, 23–27 June 2008, and from the 8th and 9th Workshop and Tutorial on Practical Use of Coloured Petri Nets and the CPN Tools, held in Aarhus, Denmark, in October 2007 and 2008. It also contains a paper that was submitted to ToPNoC directly.

I would like to thank the two guest editors of this special issue: Jonathan Billington 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.

July 2009

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: www.springer.com/lncs/topnoc

Submission of Manuscripts

Manuscripts should follow LNCS formatting guidelines, and should be submitted as PDF or zipped PostScript files to ToPNoC@cs.au.dk. All queries should be addressed to the same e-mail address.

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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 29th International Conference on Application and Theory of Petri Nets and Other Models of Concurrency, Xi'an, China, 23–27 June 2008 and from the 8th and 9th Workshops and Tutorials on Practical Use of Coloured Petri Nets and the CPN Tools, Aarhus, Denmark, October 2007 and 2008. It also contains a paper that was submitted to ToPNoC directly.

We are indebted to the programme 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:

- PND8 2008: International Workshop on Petri Nets and Distributed Systems, organized by Heiko Rölke (Germany), Natalia Sidorova (The Netherlands) and Daniel Moldt (Germany);
- CHINA 2008: Workshop on Concurrency Methods, Issues and Applications, organized by Jetty Kleijn (The Netherlands) and Maciej Koutny (UK);
- PNAM 2008: The 2008 Workshop on Petri Nets and Agile Manufacturing organized by MengChu Zhou (USA) and ZhiWu Li (China);
- CPN 2007: The 8th Workshop and Tutorial on Practical Use of Coloured Petri Nets and the CPN Tools, organized by Kurt Jensen and his group (Denmark); and
- CPN 2008: The 9th Workshop and Tutorial on Practical Use of Coloured Petri Nets and the CPN Tools, organized by Kurt Jensen and his group (Denmark).

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 or four 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 reviewer 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 18 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.)

The first three papers of this issue are concerned with workflow. The paper “Designing a Workflow System Using Coloured Petri Nets” by Nick Russell, Wil van der Aalst and Arthur ter Hofstede, addresses the design of a workflow system, called newYawl, the objective of which is to provide support for both data management and resources as well as the traditional control flow perspective. The language semantics are based on Coloured Petri Nets. The second paper, “From Requirements via Coloured Workflow Nets to an Implementation in Several Workflow Systems” by Ronny Mans et al, presents a large workflow case study concerning the process used for the diagnosis of cancer in a teaching hospital in The Netherlands. These first two papers are complemented by the final paper of this group, “Soundness of Workflow Nets with Reset Arcs” by Wil van der Aalst et al. There is a shift from Coloured Petri Nets to Place/Transition Nets, and a proof is provided that the important workflow property of soundness is undecidable for workflow nets with reset arcs. An excellent introduction to the problem is provided in this paper, set in the context of practical workflow systems.

The next 3 papers address various aspects of modelling and analysing computer network protocols. Jonathan Billington, Somsak Vanit-Anunchai and Guy Gallasch explore, in tutorial fashion, the problem of modelling bounded and unbounded communication channels that may or may not lose and reorder packets in their paper “Parameterised Coloured Petri Net Channel Models”. Adhoc routing protocols are being developed and standardised for networks where there is no central administration, useful when there is a need to quickly establish a computer communications network in difficult terrain. The paper, “On Modelling and Analysing the Dynamic MANET On-Demand (DYMO) Routing Protocol” by Jonathan Billington and Cong Yuan, presents a modelling method that reduces state space explosion, and hence increases the range of analysis results possible for a mobile adhoc network (MANET) on-demand routing protocol being developed by the Internet Engineering Task Force. The mobility theme is continued in the last paper of this group, “Modelling Mobile IP with Mobile Petri Nets” by Charles Lakos. The paper presents a case study, the Mobile Internet Protocol (Mobile IP), to assess the utility of a hierarchical Petri net formalism, known as Mobile Petri Nets.

The last four papers have an increasingly theoretical flavour. In “A Discretization Method from Coloured to Symmetric Nets: Application to an Industrial Example”, Fabien Bonnefoi, Christine Choppy and Fabrice Kordon propose a methodology for modelling and analysis of complex systems that involves translating an initial Coloured Petri Net model of the system to a Symmetric Net model for analysis. An important consideration in the translation is dealing

with hybrid systems by discretization of continuous variables. The paper discusses the errors introduced by quantization and illustrates the method with a case study involving the emergency braking module of an intelligent transport system. “The ComBack Method Revisited: Caching Strategies and Extension with Delayed Duplicate Detection” by Sami Evangelista, Michael Westergaard and Lars Kristensen, tackles the state explosion problem which limits the extent to which model checking can be used for industrial systems. They improve the previously published ComBack technique for memory reduction, by proposing several strategies that reduce its time penalty. The algorithms are implemented and extensive experiments on various examples illustrate their utility. The third paper of this group also investigates the effectiveness of algorithms, this time in the setting of Petri net synthesis. In their paper, “Comparison of Different Algorithms to Synthesize a Petri Net from a Partial Language”, Robin Bergenthum, Joerg Desel and Sebastian Mauser report on two new algorithms they have developed for synthesising a Place/Transition net from a finite partial language. They are implemented in the VipTool and compared with their predecessors. The new algorithms are also compared with respect to their theoretical complexity and by an extensive set of examples using the VipTool. The last paper of this issue is devoted to theoretical considerations of the π -calculus. In the paper, “On Bisimulation Theory in Linear Higher-Order π -Calculus”, Xian Xu discusses several aspects of bisimulation in the higher-order π -calculus, and establishes two simpler bisimulation variants.

The 10 papers of this issue provide good coverage of a diverse range of topics including workflow systems, network protocols, mobility, intelligent transport systems, the state explosion problem, Petri net synthesis and the π -calculus. The volume offers 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 Dorthe Haagen Nielsen of Aarhus University for providing administrative support and the Springer/ToPNoC team for the final production of this issue.

July 2009

Jonathan Billington
Maciej Koutny
Guest Editors, Third Issue of ToPNoC

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Daniel Moldt (Germany)

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