

Application and Theory of Petri Nets and Concurrency: Special Issue of Selected Papers from Petri Nets 2022

Preface

The 43rd International Conference on Application and Theory of Petri Nets and Other Models of Concurrency (Petri Nets 2022) took place in Bergen, Norway, from June 19th to June 24th, 2022.

This special issue hosts a selection of three papers, which extend papers presented at the conference.

Since its first edition, in 1980, the Petri Net conference has been serving as a meeting place for researchers in the field of Petri Nets and other models of concurrency. Both theoretical results and applications are presented in the scientific programme of the conference. Tools for modelling, running, analysing, and verifying Petri Nets are presented in a dedicated session. The conference always has a number of invited talks in which also surveys on related fields are presented. In addition, it is a meeting place for associated workshops and tutorials. For more information about the Petri Net conferences and related activities see: <http://www.informatik.uni-hamburg.de/TGI/Petrinets/>.

After two editions held entirely online, the 2022 Conference allowed participants to gather physically again, and led to fruitful interactions, which have always been a main success factor for the conference. Petri Nets 2022 was organised by the Software Engineering Research Group at the Western Norway University of Applied Sciences. There were three invited speakers, an introductory course on Petri Nets, two tutorials, three workshops, a model checking contest, and a tool demonstration session. The main conference received 35 submissions by authors from 18 different countries. The Program Committee accepted 16 regular papers and three tool papers. As in previous years, the authors of the best contributions to the conference were invited to submit an extended version of their papers to a special issue of *Fundamenta Informaticae*. They were asked to substantially enhance their papers, which means that these submissions differ significantly from the original conference papers. Each paper was reviewed according to the standards of the journal. The three selected papers in this special issue cover a variety of new results in theory as well as in applications.

The paper *Waiting nets: state classes and taxonomy* deals with timed models. The authors define a new class of Time Petri nets, named *waiting nets*, with the explicit aim of decoupling “time

measurement and control”. This is obtained by starting the clock associated with a transition when one input place gets marked, while in previous models the clock starts when the transition becomes enabled. The paper develops analysis techniques for this class, in particular by defining state class graphs, based on a symbolic representation of clock values. Several results regarding reachability and coverability are stated and proved. A comparison of waiting nets, time Petri nets, and timed automata allows the reader to put this contribution in the general context of timed models.

Process discovery is the main topic of *Discovering process models with long-term dependencies while providing guarantees and filtering infrequent behavior patterns*. The authors present a process discovery algorithm which extends one of the most popular existing algorithms: eST-Miner. The variant proposed here aims at giving more freedom to the user; more specifically, it is possible to explore different strategies in selecting places of the net to be built starting from an event log, with the aim of guaranteeing a given fitness without sacrificing precision and simplicity of the synthesized model.

In *Correctness notions for Petri nets with identifiers*, the authors propose an extension of the usual Petri net formalism by adding information to tokens, thus giving rise to a specific type of high-level nets, intended to model typical information systems. Here, each token bears a vector of identifiers; each identifier refers uniquely to a *data object* which is manipulated within the system. For this class of net systems, the paper gives a correctness criterion which takes into account the manipulation and management of objects, and discusses the decidability of this criterion.

Overall, we believe that the three contributions cover a wide spectrum of areas of interest for Petri nets theoreticians and practitioners, and that they will foster further developments.

We thank all authors for contributing to this special issue and the reviewers for their hard work and constructive comments. We are grateful to the Organising Committee, chaired by Lars Michael Kristensen and Violet Ka I Pun, who did a very good job. Finally, we would like to thank the managing editors of *Fundamenta Informaticae* for their support in preparing this special issue.

Editors of this special issue

Luca Bernardinello
luca.bernardinello@unimib.it

Jetty Kleijn
h.c.m.kleijn@liacs.leidenuniv.nl

Laure Petrucci
laure.petrucci@lipn.univ-paris13.fr