

Lecture Notes in Computer Science

1248

Edited by G. Goos, J. Hartmanis and J. van Leeuwen

Advisory Board: W. Brauer D. Gries J. Stoer

Pierre Azéma Gianfranco Balbo (Eds.)

Application and Theory of Petri Nets 1997

18th International Conference, ICATPN'97
Toulouse, France, June 23-27, 1997
Proceedings



Springer

Series Editors

Gerhard Goos, Karlsruhe University, Germany

Juris Hartmanis, Cornell University, NY, USA

Jan van Leeuwen, Utrecht University, The Netherlands

Volume Editors

Pierre Azéma

LAAS, CNRS Toulouse

7 avenue Colonel Roche, F-31077 Toulouse Cedex, France

E-mail: azema@laas.fr

Gianfranco Balbo

Dipartimento di Informatica, Università degli Studi di Torino

Corso Svizzera, 185, I-10149 Torino, Italy

E-mail: balbo@di.unito.it

Cataloging-in-Publication data applied for

Die Deutsche Bibliothek - CIP-Einheitsaufnahme

Application and theory of Petri Nets 1997 : 18th international conference ; proceedings / ICATPN '97, Toulouse, France, June 23 - 27, 1997. Pierre Azéma ; Gianfranco Balbo (ed.). - Berlin ; Heidelberg ; New York ; Barcelona ; Budapest ; Hong Kong ; London ; Milan ; Paris ; Santa Clara ; Singapore ; Tokyo : Springer, 1997

(Lecture notes in computer science ; Vol. 1248)

ISBN 3-540-63139-9

CR Subject Classification (1991): F.1-3, C.1-2, G.2.2, D.4, J.4

ISSN 0302-9743

ISBN 3-540-63139-9 Springer-Verlag Berlin Heidelberg New York

This work is subject to copyright. All rights are reserved, whether the whole or part of the material is concerned, specifically the rights of translation, reprinting, re-use of illustrations, recitation, broadcasting, reproduction on microfilms or in any other way, and storage in data banks. Duplication of this publication or parts thereof is permitted only under the provisions of the German Copyright Law of September 9, 1965, in its current version, and permission for use must always be obtained from Springer-Verlag. Violations are liable for prosecution under the German Copyright Law.

© Springer-Verlag Berlin Heidelberg 1997

Printed in Germany

Typesetting: Camera-ready by author

SPIN 10550308 06/3142 - 5 4 3 2 1 0 Printed on acid-free paper

Preface

This volume contains the proceedings of the 18th International Conference on Application and Theory of Petri Nets. The aim of the Petri net conference is to create a forum for the dissemination of the latest results in the application and theory of Petri nets. Typically the conferences have 150-200 participants and usually one third of these come from industry, while the rest are from universities and research institutions. The conferences always take place in the last week of June.

The previous conferences (1980-1996) were held in Strasbourg (France), Bad Honnef (Germany), Varenna (Italy), Toulouse (France), Aarhus (Denmark), Espoo (Finland), Oxford (United Kingdom), Saragossa (Spain), Venice (Italy), Bonn (Germany), Paris (France), Aarhus (Denmark), Sheffield (United Kingdom), Chicago (United States), Saragossa (Spain), Turin (Italy), and Osaka (Japan).

The conferences and a number of other activities are coordinated by a steering committee with the following members: G. Balbo (Italy), J. Billington (Australia), G. De Michelis (Italy), C. Girault (France), K. Jensen (Denmark), T. Murata (United States), C.A. Petri (Germany; honorary member), W. Reisig (Germany), G. Roucairol (France), G. Rozenberg (The Netherlands; chairman), and M. Silva (Spain).

The 1997 conference was organized by the Laboratoire d'Analyse et d'Architecture des Systèmes du Centre National de la Recherche Scientifique de Toulouse, jointly with the University of Toulouse I. In addition to the conference there were tool presentations and demonstrations, extensive introductory and advanced tutorials, and two workshops on manufacturing and Petri nets and on multi-media and concurrency.

We received 61 papers from 15 countries and 22 were accepted for presentation. Invited lectures were given by J. Esparza (Germany), J. Sifakis (France), and R. Valette (France).

The submitted papers were evaluated by a programme committee with the following members: W.M.P. van der Aalst (The Netherlands), P. Azéma (France; co-chair), G. Balbo (Italy; co-chair), J.M. Colom (Spain), J. Desel (Germany), C. Girault (France), R. Gorrieri (Italy), K. Jensen (Denmark), E. Kindler (Germany), J. Kleijn (The Netherlands), M. Koutny (United Kingdom), S. Kumagai (Japan), C. Lakos (Australia), G.J. Nutt (United States), L. Ojala (Finland), S. Shatz (United States), D. Simpson (United Kingdom), and W.M. Zuberek (Canada). The programme committee meeting took place at LAAS-CNRS, Toulouse, France.

We should like to express our gratitude to all authors of submitted papers, to the members of the programme committee, and to the referees who assisted them, providing more than 350 reports. The names of the referees are listed on the following page. For the local organization of the conference we gratefully acknowledge the help of Chibab Hanachi, Marie Thérèse Ippolito, Joelle Penavayre, Christophe Sibertin Blanc, Danielle Trabet, and François Vernadat. Finally we should like to acknowledge the excellent cooperation with Alfred Hofmann of Springer-Verlag in the preparation of this volume.

Toulouse
Turin
April 1997

Pierre Azéma
Gianfranco Balbo

List of Referees

W.M.P. van der Aalst	G. Franceschinis	C. Lakos	H. Shiizuka
M. Ajmone-Marsan	T. Freytag	C. Laneve	C. Sibertin-Blanc
C. Anglano	O. Fricke	K. Lautenbach	M. Silva
N. Anisimov	Y. Fujiwara	J. Lilius	C. Simone
M. Aoyama	F. Garcia-Valles	H. Müller	D. Simpson
U. Arronategui	M. Gaspari	R. Mackenthun	V. Sliva
T. Aura	T.J. Gelsema	A. Maggiolo-Schettini	E. Smith
P. Azéma	H.J. Genrich	S. Melzer	L.J. Somers
G. Balbo	J.-C. Gentina	F. Michel	M.-O. Stehr
K. Barkaoui	R. German	B. Mikolajczak	Y. Sugasawa
T. Basten	R. Gerth	T. Miyamoto	S. Takai
M. Bernardo	C. Girault	M. Mukund	E. Teruel
E. Best	H.J.M. Goeman	T. Murata	T. Thielke
J. Billington	L.P.J. Groenewegen	K.-P. Neuendorf	F. Tricas
A. Bobbio	V. Gruhn	M. Nielsen	K. Tsuji
R. Bosworth	S. Haddad	G. Nutt	S. Tu
O. Botti	J. Hall	A. Oberweis	N. Uchihira
N. Busi	M. Heiner	L. Ojala	R. Valette
U. Buy	K. Heljanko	K. Onaga	R. Valk
L. Capra	H. Hermanns	J. Padberg	K. Varpaanniemi
P. Chretienne	K. Hiraishi	P. Passmore	J.J. Vereijken
S. Christensen	S. Honiden	L. Petrucci-Dauchy	F. Vernadat
J.M. Colom	H.J. Hoogeboom	S. Peuker	I. Vernier
J.P. Courtiat	J. Huang	J.-F. Peyre	T. Vesper
Y. Dallery	P. Huber	G.M. Pinna	R. Vidale
P. Darondeau	N. Husberg	L. Pogrell	J.L. Villarroel
R. Davoli	J.-M. Ilié	D. Poitrenaud	W. Vogler
F. De Cindio	R. Janicki	L. Pomello	M. Voorhoeve
G. De Michelis	J. Jeffrey	B. Pradin	K. Voss
P. Degano	I. Jelly	L. Recalde	H. Völzer
J. Desel	G. Juanole	W. Reisig	R. Walter
A. Diagne	J.B. Jørgensen	M. Ribaud	T. Watanabe
S. Donatelli	P. Kemper	H. Ridder	W. Weitz
S. Duri	A. Khetarpal	M. Roccetti	D. Wikarski
E. Encrenaz	H. Klaudel	F. Rossi	X. Xie
J. Engelfriet	H.C.M. Kleijn	B. Rozoy	A. Yakovlev
J. Esparza	M. Kohn	H. Schmidt	M. Young
P. Estrailier	F. Kordon	R. Segala	G. Zavattaro
J. Ezpeleta	L.M. Kristensen	M. Sereno	G. Zimmermann
R. Focardi	S. Kumagai	S. Shatz	W. Zuberek
W. Fraçzak			

Table of Contents

Invited Papers

<i>J. Esparza, S. Melzer</i> Model Checking LTL Using Constraint Programming	1
<i>J. Sifakis</i> On the Composition of Timed Systems	21
<i>R. Valette</i> Some Issues about Petri Net Application to Manufacturing and Process Supervisory Control	23

Regular Papers

<i>C. Lakos</i> On the Abstraction of Coloured Petri Nets	42
<i>W.M.P. van der Aalst, T. Basten</i> Life-cycle Inheritance: A Petri-Net-Based Approach	62
<i>D. Moldt, F. Wienberg</i> Multi-Agent-Systems Based on Coloured Petri Nets	82
<i>P. Habermehl</i> On the Complexity of the Linear-Time mu-calculus for Petri Nets	102
<i>W. Fraçzak, E. Pelz</i> Improved Implementations via a New Structural Equivalence on Labelled Nets ...	117
<i>T. Aura, J. Lilius</i> Time Processes for Time Petri Nets	136
<i>M. Tanabe</i> Timed Petri Nets and Temporal Linear Logic	156
<i>S. Haddad, P. Moreaux, G. Chiola</i> Efficient Handling of Phase-Type Distributions in Generalized Stochastic Petri Nets	175
<i>O. Kummer, M.-O. Stehr</i> Petri's Axioms of Concurrency - A Selection of Recent Results	195
<i>F. Bause</i> Analysis of Petri Nets with a Dynamic Priority Method	215
<i>E. Kindler</i> A Compositional Partial Order Semantics for Petri Net Components	235
<i>F. Vernadat, F. Michel</i> Covering Step Graph Preserving Failure Semantics	253

<i>K. Schmidt</i> Siphons, Traps and High-Level Nets with Infinite Color Domains	271
<i>S. Christensen, K.H. Mortensen</i> Teaching Coloured Petri Nets - A Gentle Introduction to Formal Methods in a Distributed Systems Course	290
<i>M. Pietkiewicz-Koutny</i> Transition Systems of Elementary Net Systems with Inhibitor Arcs	310
<i>M. Kishinevsky, J. Cortadella, A. Kondratyev, L. Lavagno, A. Taubin, A. Yakovlev</i> Coupling Asynchrony and Interrupts: Place Chart Nets	328
<i>L. Portinale</i> Modelling and Solving Constraint Satisfaction Problems through Petri Nets	348
<i>R. Boubour, C. Jard</i> Fault Detection in Telecommunication Networks Based on Petri Net Representation of Alarm Propagation	367
<i>S. Christensen, J.B. Jørgensen</i> Analysing Bang & Olufsen's BeoLink® Audio/Video System Using Coloured Petri Nets	387
<i>W.M.P. van der Aalst</i> Verification of Workflow Nets	407
<i>K. Schmidt</i> Verification of Siphons and Traps for Algebraic Petri Nets	427
<i>E. Best, T. Thielke</i> Orthogonal Transformations for Coloured Petri Nets	447
Author Index	467