

Dines Bjørner Manfred Broy  
Alexandre V. Zamulin (Eds.)

# Perspectives of System Informatics

4th International  
Andrei Ershov Memorial Conference, PSI 2001  
Akademgorodok, Novosibirsk, Russia, July 2-6, 2001  
Revised Papers



Springer

# Table of Contents

## Memorial Session

- A.P. Ershov — A Pioneer and a Leader of National Programming . . . . . 1  
*Igor V. Pottosin*
- A.A. Lyapunov and A.P. Ershov in the Theory of Program Schemes and  
the Development of Its Logic Concepts . . . . . 8  
*Rimma I. Podlouchenko*

## Computing and Algorithms

- The Abstract State Machine Paradigm: What Is in and What Is out . . . . . 24  
*Yuri Gurevich*
- On Algorithmic Unsolvability . . . . . 25  
*Svyatoslav S. Lavrov*

## Logical Methods

- Resolution and Binary Decision Diagrams Cannot Simulate Each  
Other Polynomially . . . . . 33  
*Jan Friso Groote, Hans Zantema*
- On Expressive and Model Checking Power of  
Propositional Program Logics . . . . . 39  
*Nikolai V. Shilov, Kwang Yi*
- An Extension of Dynamic Logic for Modelling OCL's @pre Operator . . . . . 47  
*Thomas Baar, Bernhard Beckert, Peter H. Schmitt*
- Optimal Algorithms of Event-Driven Re-evaluation of Boolean Functions . . 55  
*Valeriy Vyatkin*

## Verification

- A Transformation of SDL Specifications — A Step towards  
the Verification . . . . . 64  
*Natalia Ioustinova, Natalia Sidorova*
- Accurate Widenings and Boundedness Properties of Timed Systems . . . . . 79  
*Supratik Mukhopadhyay, Andreas Podelski*
- Adaptive Saturation-Based Reasoning . . . . . 95  
*Alexandre Riazanov, Andrei Voronkov*

A Verification Approach for Distributed Abstract State Machines ..... 109  
*Robert Eschbach*

**Program Transformation and Synthesis**

Transformational Construction of Correct Pointer Algorithms..... 116  
*Thorsten Ehm*

A Theoretical Foundation of Program Synthesis by  
 Equivalent Transformation ..... 131  
*Kiyoshi Akama, Hidekatsu Koike, Hiroshi Mabuchi*

Equivalent Transformation by Safe Extension of Data Structures ..... 140  
*Kiyoshi Akama, Hidekatsu Koike, Hiroshi Mabuchi*

Semantics and Transformations in Formal Synthesis at System Level ..... 149  
*Viktor Sabelfeld, Christian Blumenröhr, Kai Kapp*

Automated Program Synthesis for Java Programming Language ..... 157  
*Mait Harf, Kristiina Kindel, Vahur Kotkas, Peep Kungas, Enn Tyugu*

**Semantics & Types**

The Varieties of Programming Language Semantics (And Their Uses) .... 165  
*Peter D. Mosses*

Binding-Time Analysis for Polymorphic Types..... 191  
*Rogardt Heldal, John Hughes*

An Investigation of Compact and Efficient Number Representations in the  
 Pure Lambda Calculus ..... 205  
*Torben Æ. Mogensen*

**Processes and Concurrency**

Observational Semantics for Timed Event Structures ..... 214  
*Irina B. Virbitskaite*

The Impact of Synchronisation on Secure Information Flow in  
 Concurrent Programs..... 225  
*Andrei Sabelfeld*

Dynamical Priorities without Time Measurement and Modification of  
 the TCP ..... 240  
*Valery A. Sokolov, Eugeny A. Timofeev*

**UML Specification**

From ADT to UML-Like Modelling ..... 246  
*Egidio Astesiano, Maura Cerioli, Gianna Reggio*

Transformation of UML Specification to XTG .....	247
<i>Ella E. Roubtsova, Jan van Katwijk, Ruud C.M. de Rooij, Hans Toetenel</i>	

## Petri Nets

A Systematic Approach towards Object-Based Petri Net Formalisms .....	255
<i>Berndt Farwer, Irina Lomazova</i>	
Unfoldings of Coloured Petri Nets .....	268
<i>Vitaly E. Kozura</i>	
A Net-Based Multi-tier Behavior Inheritance Modelling Method .....	279
<i>Shengyuan Wang, Jian Yu, Chongyi Yuan</i>	

## Testing

Specification Based Testing: Towards Practice .....	287
<i>Alexander K. Petrenko</i>	
Java Specification Extension for Automated Test Development.....	301
<i>Igor B. Bourdonov, Alexey V. Demakov, Andrew A. Jarov, Alexander S. Kossatchev, Victor V. Kuliamin, Alexander K. Petrenko, Sergey V. Zelenov</i>	
Specification-Based Testing of Firewalls .....	308
<i>Jan Jürjens, Guido Wimmel</i>	

## Software Construction

Academic vs. Industrial Software Engineering: Closing the Gap .....	317
<i>Andrey N. Terekhov, Len Erlikh</i>	
A Method for Recovery and Maintenance of Software Architecture .....	324
<i>Dmitry Koznov, Konstantin Romanovsky, Alexei Nikitin</i>	
An Empirical Study of Retargetable Compilers .....	328
<i>Dmitry Boulytchev, Dmitry Lomov</i>	

## Data & Knowledge Bases

Conceptual Data Modeling: An Algebraic Viewpoint .....	336
<i>Kazem Lellahi</i>	
Integrating and Managing Conflicting Data .....	349
<i>Sergio Greco, Luigi Pontieri, Ester Zumpano</i>	
A Knowledge Engineering Approach to Deal with 'Narrative' Multimedia Documents .....	363
<i>Gian Piero Zarri</i>	

Using Agents for Concurrent Querying of Web-Like Databases via  
 a Hyper-Set-Theoretic Approach ..... 378  
*Vladimir Sazonov*

**Logic Programming**

Reexecution-Based Analysis of Logic Programs with Delay Declarations... 395  
*Agostino Cortesi, Baudouin Le Charlier, Sabina Rossi*

$Pos(T)$ : Analyzing Dependencies in Typed Logic Programs ..... 406  
*Maurice Bruynooghe, Wim Vanhoof, Michael Codish*

A Prolog Tailoring Technique on an Epilog Tailored Procedure ..... 421  
*Yoon-Chan Jhi, Ki-Chang Kim, Kemal Ebcioglu, Yong Surk Lee*

**Constraint Programming**

Hierarchical Constraint Satisfaction Based on Subdefinite Models ..... 434  
*Dmitry Ushakov*

Using Constraint Solvers in CAD/CAM Systems ..... 446  
*Vitaly Telerman*

A Graphical Interface for Solver Cooperations ..... 457  
*Laurent Granvilliers, Eric Monfroy*

**Program Analysis**

Abstract Computability of Non-deterministic Programs over  
 Various Data Structures ..... 468  
*Nikolaj S. Nikitchenko*

On Lexicographic Termination Ordering with  
 Space Bound Certifications ..... 482  
*Guillaume Bonfante, Jean-Yves Marion, Jean-Yves Moyen*

Generalised Computability and Applications to Hybrid Systems..... 494  
*Margarita V. Korovina, Oleg V. Kudinov*

**Language Implementation**

Exploring Template Template Parameters ..... 500  
*Roland Weiss, Volker Simonis*

Compiler-Cooperative Memory Management in Java..... 511  
*Vitaly V. Mikheev, Stanislav A. Fedoseev*

A Software Composition Language and Its Implementation ..... 519  
*Dietrich Birngruber*

Editor Definition Language and Its Implementation .....	530
<i>Audris Kalnins, Karlis Podnieks, Andris Zarins, Edgars Celms, Janis Barzdins</i>	
Oberon-2 as Successor of Modula-2 in Simulation .....	538
<i>Alexey S. Rodionov, Dmitry V. Leskov</i>	
<b>Author Index</b> .....	<b>547</b>