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Theoretical Computer Science

Foreword

This special volume is based on a selection of 11 papers presented at, or inspired by the final "Gentzen" conference held in Rome, 3–5 October 1996.

"Gentzen" is a keyword for the Esprit-BRA Working Group 7232, successor of the Esprit-BRA Working Group 3230, entitled "Common Foundations of Functional and Logic Programming". "Gentzen" developed methodologies and programming techniques along the following research lines:

1. programs as proofs,
2. programs as recursive specifications,
3. programs as untyped terms,
4. principal problems in realizing an integration of functional and logic programming.

Some of the involved tools are: Proof Theory, λ-Calculus and Combinatory Logic, Type Theory, Sequent Calculus, Universal Algebra, Horn Logic.

The Working Group consisted of Mathematics or Computer Science Departments of European Universities distributed as follows: 1 in the Czech Republic, 3 in France, 4 in Germany, 1 in Greece, 4 in Italy, 1 in Poland, 1 in Sweden, 2 in the United Kingdom.

Out of the 18 submitted papers, 4 have been rejected only on the grounds that they were published in some conference proceedings. Each submitted paper has been sent to at least three referees who were selected worldwide.

A short review of the accepted papers will follow.

Some Complexity Bounds for Sybtype Inequalities by M. Benke studies the satisfiability of systems of inequalities in posets and shows that it is in PTIME for TC-feasible posets. *Infinite λ-calculus and Types* by A. Berarducci and M. Dezani-Ciancaglini devises, in a fundamental study, an intersection type system in the infinite λ-calculus in which completeness and approximation theorems can be proven. *Functional-Logic Integration via Minimal Reciprocal Extensions* by H. Boley considers a language RELFUN integrating functional and logic programming, and develops a procedural and model-theoretical semantics implementing it by a WAM emulator. *Matching for the Lambda Calculus of Objects* by V. Bono and M. Bugliesi investigates the role of matching in the design of a type system for the calculus of objects: a new operational semantics is defined and its type soundness is proved. *Permutability of Proofs in Intuitionistic Sequent Calculi* by R. Dyckhoff and L. Pinto provides a confluent and weakly normalizing rewriting system for terms representing cut-free sequent calculus derivations. *Extending the Type Checker of Standard ML by Polymorphic Recursion* by M. Emms and H. Leiß describes an algorithm for type inference which integrates

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semiunification into Milner's algorithm and can handle recursion. *Semantical Analysis of Perpetual Strategies in λ-calculus* by F. Honsell and M. Lenisa studies the observational (operational) equivalence induced by perpetual strategies yielding a denotationally correct extension of the λ-calculus. *Orders, Reduction Graphs and Spectra* by B. Intrigila and M. Venturini Zilli characterizes some not well-ordered condensed reduction graphs in terms of forbidden subgraphs. The well-ordered ones give rise to constructive successor ordinals that are shown to be $\lambda\beta$ representable up to ε_0. *An Algebraic View of the Böhm-out Technique* by A. Piperno presents an algebraic representation of closed β-normal forms in λ-calculus allowing to prove, among many other results, the Böhm theorem by a representation of the equality predicate for some infinite sets containing arbitrary finite sets of β-normal forms. *Termination of Permutative Conversions in Intuitionistic Gentzen Calculi* by H. Schwichtenberg proves the result stated in the title by referring to a λ-calculus with explicit substitution. *On Functions Preserving Levels of Approximations: a Refined Model Construction for Various Lambda Calculi* by D. Spreen is a fundamental study on enrichments and refinements of dI-domains and related classes of models.

We would like to thank the referees for their insightful and constructive comments. Maurice Nivat has our gratitude for entrusting this special volume to us.

Corrado Böhm and Irène Guessarian
Guest Editors