RWTH Aachen

Department of Computer Science
Technical Report

Parameterized Power Domination Complexity

Joachim Kneis, Daniel Mölle, Stefan Richter, Peter Rossmanith

ISSN 0935–3232 · Aachener Informatik Berichte · AIB-2004-09

RWTH Aachen · Department of Computer Science · December 2004

The publications of the Department of Computer Science of *RWTH Aachen University* are in general accessible through the World Wide Web.

http://aib.informatik.rwth-aachen.de/

Parameterized Power Domination Complexity*

Joachim Kneis, Daniel Mölle, Stefan Richter, Peter Rossmanith

Lehr- und Forschungsgebiet Theoretische Informatik
RWTH Aachen, Germany
Email: {kneis,moelle,richter,rossmani}@cs.rwth-aachen.de

Abstract. The optimization problem of measuring all nodes in an electrical network by placing as few measurement units (PMUs) as possible is known as POWER DOMINATING SET. Nodes can be measured indirectly according to Kirchhoff's law. We show that this problem can be solved in linear time for graphs of bounded treewidth and establish bounds on its parameterized complexity if the number of PMUs is the parameter.

1 Introduction

Electrical networks can be interpreted as undirected graphs in a very natural fashion. Each node represents a measuring point and edges denote electrical connections between them. In this paper, we discuss a graph problem known as POWER DOMINATING SET which has been introduced by Haynes, Hedetniemi, Hedetniemi and Henning [12]. In order to observe the voltage and phase angle at some measuring point, we may place a Phase Measurement Unit (PMU) on it, and by a law resembling Kirchhoff's current law, we can observe measuring points indirectly as well. More precisely, we have the following rules that tell us how nodes and edges can be measured:

1. A PMU on a node v observes v, all incident edges, and all adjacent nodes.
2. If a vertex v of degree $d \geq 2$ is incident to $d-1$ observed edges, *all* edges of v are observed.
3. If an edge $e = \{v, w\}$ is observed, v und w are observed as well.
4. If two adjacent nodes v and w are observed, the edge $\{v, w\}$ is observed as well.

The POWER DOMINATING SET problem is defined by the following question: Given an undirected graph $G = (V, E)$ and a nonnegative integer k, is there a subset $M \subseteq V$ with $|M| \leq k$ such that all nodes from V would be observed according to the four rules, if we placed a PMU on every $v \in M$?

POWER DOMINATING SET is similar to the well-known problem DOMINATING SET. In this, we look for a dominating set D of k nodes, such that every node either is an element of D or has a neighbor in D. Dominating set is itself a classical NP-complete problem [10]. What makes POWER DOMINATING SET seemingly harder to solve is its non-local structure: For dominating set the placement of a dominating node cannot influence other parts in the graph that are far away, while this is perfectly possible for POWER DOMINATING SET. A path of arbitrary length, for example, can be measured by a single PMU at one of its ends.

* Supported by the DFG under grant RO 927/6-1 (TAPI)

It is well known that Dominating Set can be solved efficiently for graphs of bounded treewidth [15]. Graphs of treewidth k are also called partial k-trees. The notion of treewidth was introduced by Robertson and Seymour [14] and measures how treelike a graph is. Bodlaender [2] and Kloks [13] give an introduction to this concept. Many graph problems that are hard in general can be efficiently solved, i.e. in polynomial and often linear time, for graphs of bounded treewidth, e.g., Hamiltonian Path, Max-Cut, Independent Set and Vertex Cover [15]. A notable exception is bandwidth minimization [9].

Because of its non-local structure, standard techniques do not easily lead to efficient algorithms for Power Dominating Set even for graphs of bounded treewidth. The first polynomial algorithm for Power Dominating Set works only on trees, i.e., on graphs with treewidth one [12]. Haynes et al. left the generalization to bounded treewidth as an open question. A small step in this direction is a new algorithm by Guo, Hüffner and Niedermeier [11] that solves Power Dominating Set in polynomial time for trees with a constant number of additional edges. This class of graphs is a subset of all graphs with bounded treewidth, but does not even contain all graphs with treewidth two; E.g., a $2 \times n$–grid has treewidth two, but is a tree with $n-1$ additional edges.

In what follows, we achieve the general result that Power Dominating Set can be solved in linear time for any fixed treewidth k, thereby solving the open problem posed in the article that incited research in this area [12].

Parameterized Complexity

In parameterized complexity every input instance has an associated natural number, called the *parameter*. Often, the parameter is part of the input, otherwise it is a — usually simple — function of the input. The time complexity of a parameterized problem is measured as a function in both the input length n and the parameter k. We say that a problem is *fixed parameter tractable* or in the complexity class FPT if there is an algorithm that can solve the problem in $f(k)n^c$ steps, where c is a constant and f is an arbitrary function. The idea behind parameterized complexity theory is that hard problems can be easy in practice if hard instances do not occur. The parameter measures how hard an instance is and the complexity "explodes" only in terms of the parameter. See the influential monograph by Downey and Fellows [7] for an introduction to parameterized complexity.

We can parameterize Power Dominating Set in several reasonable ways. Two natural parameterers are the treewidth of the graph and the number of needed PMUs.

Let k be the treewidth of a graph. If we had two algorithms that solve Power Dominating Set in n^k resp. $k^k n^3$ steps, both would imply that the problem can be solved in polynomial time for graphs of bounded treewidth, i.e., all graphs whose treewidth is bounded by some constant. The second, but not the first algorithm would also imply that Power Dominating Set is fixed parameter tractable. Please note that the second algorithm is still feasible if k has a moderate value, but the first becomes impractical for even small values of k. Hence, parameterized complexity makes a better statement than simply "polynomial for fixed k."

In this sense Guo, Hüffner and Niedermeier showed that Power Dominating Set is fixed parameter tractable if the number of edges added to a tree is the parameter.

In conventional complexity there is the class P of efficiently solvable problems, as well as NP, whose complete problems are unlikely to be in P. In parameterized complexity, these are paralleled by FPT as opposed to $W[1], W[2], \ldots, W[P]$ whose complete problems are unlikely to be fixed parameter tractable. It is known that Dominating Set is W[2]-complete if the size of the dominating set is the parameter [8]. We show in this paper that Power Dominating Set is in W[P] and is W[2]-hard if the number of PMUs is the parameter. Unfortunately, we cannot establish the complexity exactly, but there are many problems with W[2] as a lower and W[P] as an upper bound. Examples are Longest Common Subsequence [3], Maximal Irredundant Set [4] and Monochrome Cycle Cover [7].

2 A Simplified Set of Rules

To begin with, we found a way to simplify the problem description by using a smaller set of rules equivalent to the four original rules mentioned above. The idea is to measure edges implicitly so that we only need to make sure that all nodes are observed. This can be achieved by adjusting the first, contracting the second and third, and omitting the fourth rule.

Lemma 1. *The following set of rules is equivalent to the original set of rules with respect to observed nodes:*

1. *A PMU on a node v observes v and all its neighbors.*
2. *If an observed vertex v of degree $d \geq 2$ is adjacent to $d - 1$ observed nodes,* all *its neighbors are observed.*

Proof. To see that the contraction of the second and third original rule into the new second one does not change the possibilities to observe nodes, let us return to the original set of rules. There is no rule that creates an observed edge both of whose nodes are not observed. Only the second rule is capable of creating an observed edge exactly one of whose nodes is not observed. By the third rule, however, this node becomes observed immediately.

Thus, by applying the third rule immediately each time we apply the second one, we contract these two rules into one. It then never happens that an observed edge is incident to a node that is not yet observed. Thus, we do not have to consider observed edges any longer, and the modification of the first rule as well as the deletion of the fourth rule are clearly uncritical. □

3 Fixed-Treewidth Tractability

In this section, we apply a theorem by Courcelle et al. [6, Theorem 27] to show that *Power Dominating Set* can be solved in linear time for graphs of bounded treewidth.

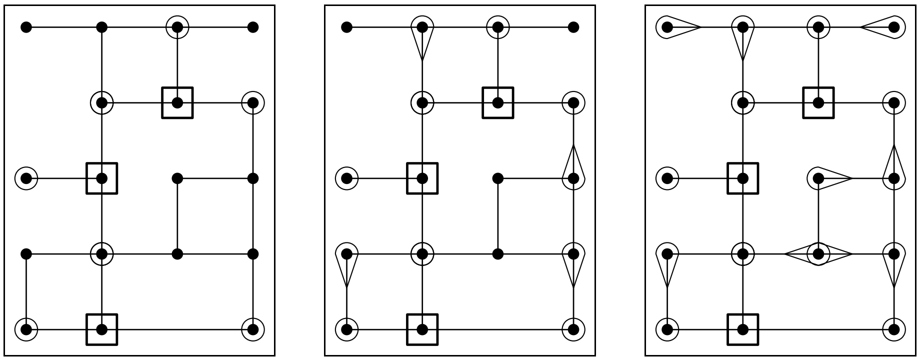

Fig. 1. A graph that is power-dominated by three PMUs. Nodes with PMUs are marked by a square, and neighbors of such nodes are marked by a circle. All these vertices are observed according to the first rule. Nodes observed due to the Kirchhoff rule are marked by a comet whose tail points at the induction source.

Proposition 1 (Courcelle et al.).
Let p and k be fixed integers. Every LinEMSOL$(\tau_{1,p})$ *optimization problem on the class of partial k-trees can be solved in $O(V)$ time and the corresponding algorithm can be derived constructively from its* LinEMSOL$(\tau_{1,p})$ *definition.*

LinEMSOL$(\tau_{1,p})$ denotes monadic second order logic (MSO) with linear evaluation functions. To begin with, recall that monadic second order logic is an extension of first order logic that allows us to quantify over unary predicate variables (that is, subsets of the universe). The vocabulary τ_1 consists of a single binary relation E over $V \times V$ that encodes the edges of a given graph. Clearly, every graph G can be expressed as a τ_1-structure $\langle V, E \rangle$.

For any fixed integer p, the vocabulary $\tau_{1,p}$ is an extension of τ_1 that introduces p additional unary predicates $U_1, \ldots, U_p$ to the language (in so far, τ_1 can be interpreted as $\tau_{1,0}$). These extended vocabularies, however, are not going to be required in this section at all, hence we omit further details.

For a vocabulary τ, we say that a graph problem is an MSO(τ) decision problem if it can be stated as a closed MSO formula over the vocabulary τ. LinEMSOL(τ) optimization problems are a bit more complicated, and for the sake of brevity we only describe the very special and restricted kind of these problems that is relevant in our context. A graph problem is a LinEMSOL(τ) optimization problem of this kind if it can be expressed as follows:

The input consists of a graph given as a τ-structure $G(\tau) = \langle V, E \rangle$ and an evaluation function $f \colon V \to \mathbf{N}$. There is a fixed MSO$(\tau)$ formula θ that contains a free set variable X whose universe is V. The problem is to find a valuation of X that fulfills $\langle G(\tau), X \rangle \models \theta(X)$ at minimal cost with respect to f, that is,

$$\arg\min_{X \subseteq V} \Big\{ \sum_{x \in X} f(x) \;\Big|\; \langle G(\tau), X \rangle \models \theta(X) \Big\}.$$

In the general case, LinEMSOL optimization problems can be a lot more complex, even for the vocabulary τ_1 alone: there can be an arbitrary number of free set variables X_i, an arbitrary number of evaluation functions f_j, and fixed integer weights as coefficients for each $f_j(X_i)$.

Lemma 2. *Power Dominating Set can be expressed as an* LinEMSOL(τ_1) *optimization problem as follows:*

$$\arg\min_{X \subseteq V} |X| : \forall V_M \subseteq V.\ V_M = \mathit{observed\_nodes}(X) \rightarrow V_M = V$$

where

$$\mathit{observed\_nodes}(X) \equiv \{\, v \in V \mid \mathit{near\_PMU}(v) \vee \mathit{kirchhoff}(v) \,\}$$

$$\mathit{near\_PMU}(v) \equiv v \in X \vee \exists u \in X.\ \mathit{adj}(v, u)$$

$$\begin{aligned}\mathit{kirchhoff}(v) \equiv \exists w \in V_M.\ (\mathit{adj}(v, w)\ \wedge \\ \forall w' \in V.\ (\mathit{adj}(w', w) \rightarrow w' = v \vee w' \in V_M))\end{aligned}$$

Proof. It is easily verified that $\mathit{near\_PMU}(v)$ holds of a node v exactly if it is directly measured by a node in X via the first rule. As well, $\mathit{kirchhoff}(v)$ if and only if v is observed using the second rule. Note that V_M is constructed as a fixed point in a quasi iterative manner: If a node w and all of his neighbors save one have been measured (and thus are part of V_M), the last remaining neighbor is also observed, by the Kirchhoff rule.

Thus, we have that under the premise $V_M = \mathit{observed\_nodes}(X)$, exactly the measured nodes are contained in V_M. That way, the conclusion $V_M = V$ is satisfied if and only if the whole graph G is power-dominated by X. We achieve the smallest such X by the min optimization. □

Corollary 1. Power Dominating Set *is in* FPT *when we choose the treewidth of the input graph as the parameter.*

Notice that Proposition 1 allows for defining the integer-weighted version of the problem as well, where placing a PMU on a node v has cost $f(v)$. By omitting f in the above lemma, we implicitly assigned a weight of 1 to each node.

4 Hardness for W[2]

The most natural parameter for the Power Dominating Set problem may not be the treewidth, but the number of PMUs required to power-dominate the input graph. In this section, we show that Power Dominating Set is W[2]-hard for this parameterization. It is already known that Power Dominating Set is NP-complete, but the reduction from 3-SAT given by Haynes et al. [12] cannot be used to show W[2]-hardness. Therefore, we take a different approach.

Theorem 1. Power Dominating Set *is* W[2]*-hard when we choose the number of PMUs as the parameter.*

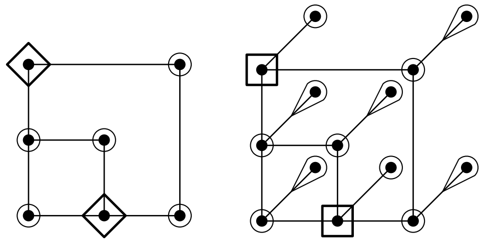

Fig. 2. A dominated graph and its corresponding power-dominated antenna graph. In the first graph, diamonds and circles denote dominators and dominated nodes, respectively. The nodes in the second graph are marked according to the notation used in Figure 1.

Proof. By reduction from DOMINATING SET, where the number of dominators is the parameter. This problem is W[2]-complete [8].

Given an input graph $G = (V, E)$ for DOMINATING SET, construct the graph $G' = (V', E')$ by copying G and adding a single edge with a new node v' to each node $v \in V$. Let us call such an egde $\{v, v'\}$ the *antenna of* v. We will now prove the following equality of the two domination numbers: G can be dominated by d nodes if and only if G' can be power-dominated by d nodes.

$\Rightarrow$: Let $D \subseteq V$ dominate G such that $|D|$ is minimal. Clearly, D also dominates all nodes in G' except for, maybe, nodes v' on antennae $\{v, v'\}$ for some nodes $v \in V$. As all neighbors of any such node v, except for v', are dominated by D, the Kirchhoff rule applies, and we have that D power-dominates the entire graph G'.

$\Leftarrow$: Let $D \subseteq V'$ power-dominate G' such that $|D|$ is minimal. If D uses the node v' of the antenna $\{v, v'\}$ for some $v \in V$, we may replace D by $D \cup \{v\}) - \{v'\}$ without losing the power domination property, as v is the only neighbor of v'. Since this operation does not change the size of D, we may assume that $D \subseteq V$ without loss of generality. It remains to show that the Kirchhoff rule never applies to any node from V, which means that D is also a dominating set for $G'[V]$ and thus for G.

Mark all nodes in D and all their neighbors, and assume there exists a node $v \in V$ that remains unmarked, which means that v is not dominated by D. The Kirchhoff rule can only be applied if v has a neighbor $w \in V$ all of whose neighbors but v are marked. As there is an antenna $\{w, w'\}$, w has a neighbor $w' \notin V$ that cannot be marked unless $w \in D$. However, if $w \in D$, then v (as a neighbor of w) must be marked. This contradicts choosing v as an unmarked node, showing that there is no node in $G'[V]$ not dominated by D. □

5 Containedness in W[P]

In the case that the number of PMUs is chosen as the parameter, POWER DOMINATING SET is in W[P]. This follows directly from a result by Cai, Chen, Downey and Fellows [5]:

Proposition 2 (Cai, Chen, Downey, Fellows). *Let Q be a parameterized problem which is in NP as a classical problem. Then $Q \in$ W[P] if and only if there is a nondeterministic Turing machine M deciding Q such that, given* *the input (x,k), M performs at most $p(|x|+k)$ steps and at most $f(k) \cdot \log n$ nondeterministic steps (for some computable f and polynomial p).*

Corollary 2. Power Dominating Set $\in$ *W[P].*

Proof. A nondeterministic Turing machine can guess a set X of k node numbers (ranging from 1 through n) in $k \cdot \log n$ nondeterministic steps. It may then in deterministic polynomial time compute the set V_M of measured nodes under the assumption that exactly the nodes in X have PMUs, and finally check whether $V_M = V$. $\square$

6 Summary

In this paper we studied the parameterized complexity of Power Dominating Set. We started out by simplifying the traditional rules used to describe the problem. Collecting the threads spun in earlier scholarship, we answered the hitherto open question as to the tractability of Power Dominating Set regarding treewidth as parameter in the positive.

Assuming another viewpoint, we showed that the problem becomes W[2]-hard when parameterized by the number of Phase Measurement Units instead of treewidth. However, this version is contained in W[P]. That leaves a more precise complexity characterization of Power Dominating Set, parameterized by the number of PMUs, as an interesting open question. To us, it seems reasonable that the inductive effect of the Kirchoff rule would make Power Dominating Set more difficult to solve than Dominating Set, possibly even as hard as Induced Formula Satisfiability, which has been shown to be W[P]-complete [1].

References

1. K. A. Abrahamson, R. G. Downey, and M. R. Fellows. Fixed-parameter tractability and completeness IV: On completeness for W[P] and PSPACE analogues. *Annals of Pure and Applied Logic*, 73:235–276, 1995.
2. H. L. Bodlaender. A tourist guide through treewidth. *Acta Cybernetica*, 11:1–21, 1993.
3. H. L. Bodlaender, R. G. Downey, M. R. Fellows, and H. T. Wareham. The parameterized complexity of sequence alignment and consensus. *Theoretical Computer Science*, 147(1–2):31–54, 1995.
4. H. L. Bodlaender and B. L. E. Fluiter. Intervalizing k-colored graphs. In *Proc. 22nd International Colloquium on Automata, Languages and Programming (ICALP'95)*, number 944 in Lecture Notes in Computer Science, pages 87–98. Springer-Verlag, 1995.
5. L. Cai, J. Chen, R. G. Downey, and M. R. Fellows. On the structure of parameterized problems in NP. *Information and Computation*, 123:38–49, 1995.
6. B. Courcelle, J. A. Makowsky, and U. Rotics. Linear time solvable optimization problems on graphs of bounded clique width. In *Proceedings of the 24th International Workshop on Graph-Theoretic Concepts in Computer Science*, number 1517 in Lecture Notes in Computer Science, pages 1–16. Springer-Verlag, 1998.
7. R. G. Downey and M. R. Fellows. Fixed parameter tractability and completeness III. In K. Ambos-Spies, S. Homer, and U. Schöning, editors, *Complexity Theory: Current Research*, pages 191–225. Cambridge University Press, 1993.
8. R. G. Downey and M. R. Fellows. *Parameterized Complexity.* Springer-Verlag, 1999.
9. M. Garey, R. Graham, D. Johnson, and D. Knuth. Complexity results for bandwidth minimization. *SIAM Journal on Applied Mathematics*, 34:477–495, 1978.
10. M. Garey and D. Johnson. *Computers and Intractability: A Guide to the Theory of NP-completeness.* Freeman, San Francisco, 1979.

11. J. Guo, F. Hüffner, and R. Niedermeier. A structural view on parameterizing problems: distance from triviality. In *Proceedings of the 1st International Workshop on Parameterized and Exact Computation*, number 3162 in Lecture Notes in Computer Science, pages 162–173. Springer-Verlag, 2004.
12. T. W. Haynes, S. M. Hedetniemi, S. T. Hedetniemi, and M. A. Henning. Domination in graphs applied to electric power networks. *SIAM Journal on Discrete Mathematics*, 15(4):519–529, 2002.
13. T. Kloks. *Treewidth*. Number 842 in Lecture Notes in Computer Science. Springer-Verlag, 1994.
14. N. Robertson and P. D. Seymour. Graph minors. I. excluding a forest. *Journal on Combinatorial Theory Series B*, 35:39–61, 1983.
15. J. A. Telle and A. Proskurowski. Algorithms for vertex partitioning problems on partial k-trees. *SIAM Journal on Discrete Mathematics*, 10(4):529–550, 1997.

Aachener Informatik-Berichte

This is a list of recent technical reports. To obtain copies of technical reports please consult http://aib.informatik.rwth-aachen.de/ or send your request to: Informatik-Bibliothek, RWTH Aachen, Ahornstr. 55, 52056 Aachen, Email: `biblio@informatik.rwth-aachen.de`

1987-01 *	Fachgruppe Informatik: Jahresbericht 1986
1987-02 *	David de Frutos Escrig, Klaus Indermark: Equivalence Relations of Non-Deterministic Ianov-Schemes
1987-03 *	Manfred Nagl: A Software Development Environment based on Graph Technology
1987-04 *	Claus Lewerentz, Manfred Nagl, Bernhard Westfechtel: On Integration Mechanisms within a Graph-Based Software Development Environment
1987-05 *	Reinhard Rinn: Über Eingabeanomalien bei verschiedenen Inferenzmodellen
1987-06 *	Werner Damm, Gert Döhmen: Specifying Distributed Computer Architectures in AADL*
1987-07 *	Gregor Engels, Claus Lewerentz, Wilhelm Schäfer: Graph Grammar Engineering: A Software Specification Method
1987-08 *	Manfred Nagl: Set Theoretic Approaches to Graph Grammars
1987-09 *	Claus Lewerentz, Andreas Schürr: Experiences with a Database System for Software Documents
1987-10 *	Herbert Klaeren, Klaus Indermark: A New Implementation Technique for Recursive Function Definitions
1987-11 *	Rita Loogen: Design of a Parallel Programmable Graph Reduction Machine with Distributed Memory
1987-12	J. Börstler, U. Möncke, R. Wilhelm: Table compression for tree automata
1988-01 *	Gabriele Esser, Johannes Rückert, Frank Wagner: Gesellschaftliche Aspekte der Informatik
1988-02 *	Peter Martini, Otto Spaniol: Token-Passing in High-Speed Backbone Networks for Campus-Wide Environments
1988-03 *	Thomas Welzel: Simulation of a Multiple Token Ring Backbone
1988-04 *	Peter Martini: Performance Comparison for HSLAN Media Access Protocols
1988-05 *	Peter Martini: Performance Analysis of Multiple Token Rings
1988-06 *	Andreas Mann, Johannes Rückert, Otto Spaniol: Datenfunknetze
1988-07 *	Andreas Mann, Johannes Rückert: Packet Radio Networks for Data Exchange
1988-08 *	Andreas Mann, Johannes Rückert: Concurrent Slot Assignment Protocol for Packet Radio Networks
1988-09 *	W. Kremer, F. Reichert, J. Rückert, A. Mann: Entwurf einer Netzwerktopologie für ein Mobilfunknetz zur Unterstützung des öffentlichen Straßenverkehrs
1988-10 *	Kai Jakobs: Towards User-Friendly Networking
1988-11 *	Kai Jakobs: The Directory - Evolution of a Standard
1988-12 *	Kai Jakobs: Directory Services in Distributed Systems - A Survey
1988-13 *	Martine Schümmer: RS-511, a Protocol for the Plant Floor

1988-14 * U. Quernheim: Satellite Communication Protocols - A Performance Comparison Considering On-Board Processing

1988-15 * Peter Martini, Otto Spaniol, Thomas Welzel: File Transfer in High Speed Token Ring Networks: Performance Evaluation by Approximate Analysis and Simulation

1988-16 * Fachgruppe Informatik: Jahresbericht 1987

1988-17 * Wolfgang Thomas: Automata on Infinite Objects

1988-18 * Michael Sonnenschein: On Petri Nets and Data Flow Graphs

1988-19 * Heiko Vogler: Functional Distribution of the Contextual Analysis in Block-Structured Programming Languages: A Case Study of Tree Transducers

1988-20 * Thomas Welzel: Einsatz des Simulationswerkzeuges QNAP2 zur Leistungsbewertung von Kommunikationsprotokollen

1988-21 * Th. Janning, C. Lewerentz: Integrated Project Team Management in a Software Development Environment

1988-22 * Joost Engelfriet, Heiko Vogler: Modular Tree Transducers

1988-23 * Wolfgang Thomas: Automata and Quantifier Hierarchies

1988-24 * Uschi Heuter: Generalized Definite Tree Languages

1989-01 * Fachgruppe Informatik: Jahresbericht 1988

1989-02 * G. Esser, J. Rückert, F. Wagner (Hrsg.): Gesellschaftliche Aspekte der Informatik

1989-03 * Heiko Vogler: Bottom-Up Computation of Primitive Recursive Tree Functions

1989-04 * Andy Schürr: Introduction to PROGRESS, an Attribute Graph Grammar Based Specification Language

1989-05 J. Börstler: Reuse and Software Development - Problems, Solutions, and Bibliography (in German)

1989-06 * Kai Jakobs: OSI - An Appropriate Basis for Group Communication?

1989-07 * Kai Jakobs: ISO's Directory Proposal - Evolution, Current Status and Future Problems

1989-08 * Bernhard Westfechtel: Extension of a Graph Storage for Software Documents with Primitives for Undo/Redo and Revision Control

1989-09 * Peter Martini: High Speed Local Area Networks - A Tutorial

1989-10 * P. Davids, Th. Welzel: Performance Analysis of DQDB Based on Simulation

1989-11 * Manfred Nagl (Ed.): Abstracts of Talks presented at the WG '89 15th International Workshop on Graphtheoretic Concepts in Computer Science

1989-12 * Peter Martini: The DQDB Protocol - Is it Playing the Game?

1989-13 * Martine Schümmer: CNC/DNC Communication with MAP

1989-14 * Martine Schümmer: Local Area Networks for Manufactoring Environments with hard Real-Time Requirements

1989-15 * M. Schümmer, Th. Welzel, P. Martini: Integration of Field Bus and MAP Networks - Hierarchical Communication Systems in Production Environments

1989-16 * G. Vossen, K.-U. Witt: SUXESS: Towards a Sound Unification of Extensions of the Relational Data Model

1989-17 * J. Derissen, P. Hruschka, M.v.d. Beeck, Th. Janning, M. Nagl: Integrating Structured Analysis and Information Modelling

1989-18 A. Maassen: Programming with Higher Order Functions

1989-19 * Mario Rodriguez-Artalejo, Heiko Vogler: A Narrowing Machine for Syntax Directed BABEL

1989-20 H. Kuchen, R. Loogen, J.J. Moreno Navarro, M. Rodriguez Artalejo: Graph-based Implementation of a Functional Logic Language

1990-01 * Fachgruppe Informatik: Jahresbericht 1989

1990-02 * Vera Jansen, Andreas Potthoff, Wolfgang Thomas, Udo Wermuth: A Short Guide to the AMORE System (Computing Automata, MOnoids and Regular Expressions)

1990-03 * Jerzy Skurczynski: On Three Hierarchies of Weak SkS Formulas

1990-04 R. Loogen: Stack-based Implementation of Narrowing

1990-05 H. Kuchen, A. Wagener: Comparison of Dynamic Load Balancing Strategies

1990-06 * Kai Jakobs, Frank Reichert: Directory Services for Mobile Communication

1990-07 * Kai Jakobs: What's Beyond the Interface - OSI Networks to Support Cooperative Work

1990-08 * Kai Jakobs: Directory Names and Schema - An Evaluation

1990-09 * Ulrich Quernheim, Dieter Kreuer: Das CCITT - Signalisierungssystem Nr. 7 auf Satellitenstrecken; Simulation der Zeichengabestrecke

1990-11 H. Kuchen, R. Loogen, J.J. Moreno Navarro, M. Rodriguez Artalejo: Lazy Narrowing in a Graph Machine

1990-12 * Kai Jakobs, Josef Kaltwasser, Frank Reichert, Otto Spaniol: Der Computer fährt mit

1990-13 * Rudolf Mathar, Andreas Mann: Analyzing a Distributed Slot Assignment Protocol by Markov Chains

1990-14 A. Maassen: Compilerentwicklung in Miranda - ein Praktikum in funktionaler Programmierung (written in german)

1990-15 * Manfred Nagl, Andreas Schürr: A Specification Environment for Graph Grammars

1990-16 A. Schürr: PROGRESS: A VHL-Language Based on Graph Grammars

1990-17 * Marita Möller: Ein Ebenenmodell wissensbasierter Konsultationen - Unterstützung für Wissensakquisition und Erklärungsfähigkeit

1990-18 * Eric Kowalewski: Entwurf und Interpretation einer Sprache zur Beschreibung von Konsultationsphasen in Expertensystemen

1990-20 Y. Ortega Mallen, D. de Frutos Escrig: A Complete Proof System for Timed Observations

1990-21 * Manfred Nagl: Modelling of Software Architectures: Importance, Notions, Experiences

1990-22 H. Fassbender, H. Vogler: A Call-by-need Implementation of Syntax Directed Functional Programming

1991-01 Guenther Geiler (ed.), Fachgruppe Informatik: Jahresbericht 1990

1991-03 B. Steffen, A. Ingolfsdottir: Characteristic Formulae for Processes with Divergence

1991-04 M. Portz: A new class of cryptosystems based on interconnection networks

1991-05 H. Kuchen, G. Geiler: Distributed Applicative Arrays
1991-06 * Ludwig Staiger: Kolmogorov Complexity and Hausdorff Dimension
1991-07 * Ludwig Staiger: Syntactic Congruences for w-languages
1991-09 * Eila Kuikka: A Proposal for a Syntax-Directed Text Processing System
1991-10 K. Gladitz, H. Fassbender, H. Vogler: Compiler-based Implementation of Syntax-Directed Functional Programming
1991-11 R. Loogen, St. Winkler: Dynamic Detection of Determinism in Functional Logic Languages
1991-12 * K. Indermark, M. Rodriguez Artalejo (Eds.): Granada Workshop on the Integration of Functional and Logic Programming
1991-13 * Rolf Hager, Wolfgang Kremer: The Adaptive Priority Scheduler: A More Fair Priority Service Discipline
1991-14 * Andreas Fasbender, Wolfgang Kremer: A New Approximation Algorithm for Tandem Networks with Priority Nodes
1991-15 J. Börstler, A. Zündorf: Revisiting extensions to Modula-2 to support reusability
1991-16 J. Börstler, Th. Janning: Bridging the gap between Requirements Analysis and Design
1991-17 A. Zündorf, A. Schürr: Nondeterministic Control Structures for Graph Rewriting Systems
1991-18 * Matthias Jarke, John Mylopoulos, Joachim W. Schmidt, Yannis Vassiliou: DAIDA: An Environment for Evolving Information Systems
1991-19 M. Jeusfeld, M. Jarke: From Relational to Object-Oriented Integrity Simplification
1991-20 G. Hogen, A. Kindler, R. Loogen: Automatic Parallelization of Lazy Functional Programs
1991-21 * Prof. Dr. rer. nat. Otto Spaniol: ODP (Open Distributed Processing): Yet another Viewpoint
1991-22 H. Kuchen, F. Lücking, H. Stoltze: The Topology Description Language TDL
1991-23 S. Graf, B. Steffen: Compositional Minimization of Finite State Systems
1991-24 R. Cleaveland, J. Parrow, B. Steffen: The Concurrency Workbench: A Semantics Based Tool for the Verification of Concurrent Systems
1991-25 * Rudolf Mathar, Jürgen Mattfeldt: Optimal Transmission Ranges for Mobile Communication in Linear Multihop Packet Radio Networks
1991-26 M. Jeusfeld, M. Staudt: Query Optimization in Deductive Object Bases
1991-27 J. Knoop, B. Steffen: The Interprocedural Coincidence Theorem
1991-28 J. Knoop, B. Steffen: Unifying Strength Reduction and Semantic Code Motion
1991-30 T. Margaria: First-Order theories for the verification of complex FSMs
1991-31 B. Steffen: Generating Data Flow Analysis Algorithms from Modal Specifications
1992-01 Stefan Eherer (ed.), Fachgruppe Informatik: Jahresbericht 1991
1992-02 * Bernhard Westfechtel: Basismechanismen zur Datenverwaltung in strukturbezogenen Hypertextsystemen
1992-04 S. A. Smolka, B. Steffen: Priority as Extremal Probability
1992-05 * Matthias Jarke, Carlos Maltzahn, Thomas Rose: Sharing Processes: Team Coordination in Design Repositories

1992-06 O. Burkart, B. Steffen: Model Checking for Context-Free Processes

1992-07 * Matthias Jarke, Klaus Pohl: Information Systems Quality and Quality Information Systems

1992-08 * Rudolf Mathar, Jürgen Mattfeldt: Analyzing Routing Strategy NFP in Multihop Packet Radio Networks on a Line

1992-09 * Alfons Kemper, Guido Moerkotte: Grundlagen objektorientierter Datenbanksysteme

1992-10 Matthias Jarke, Manfred Jeusfeld, Andreas Miethsam, Michael Gocek: Towards a logic-based reconstruction of software configuration management

1992-11 Werner Hans: A Complete Indexing Scheme for WAM-based Abstract Machines

1992-12 W. Hans, R. Loogen, St. Winkler: On the Interaction of Lazy Evaluation and Backtracking

1992-13 * Matthias Jarke, Thomas Rose: Specification Management with CAD

1992-14 Th. Noll, H. Vogler: Top-down Parsing with Simultaneous Evaluation on Noncircular Attribute Grammars

1992-15 A. Schuerr, B. Westfechtel: Graphgrammatiken und Graphersetzungssysteme(written in german)

1992-16 * Graduiertenkolleg Informatik und Technik (Hrsg.): Forschungsprojekte des Graduiertenkollegs Informatik und Technik

1992-17 M. Jarke (ed.): ConceptBase V3.1 User Manual

1992-18 * Clarence A. Ellis, Matthias Jarke (Eds.): Distributed Cooperation in Integrated Information Systems - Proceedings of the Third International Workshop on Intelligent and Cooperative Information Systems

1992-19-00 H. Kuchen, R. Loogen (eds.): Proceedings of the 4th Int. Workshop on the Parallel Implementation of Functional Languages

1992-19-01 G. Hogen, R. Loogen: PASTEL - A Parallel Stack-Based Implementation of Eager Functional Programs with Lazy Data Structures (Extended Abstract)

1992-19-02 H. Kuchen, K. Gladitz: Implementing Bags on a Shared Memory MIMD-Machine

1992-19-03 C. Rathsack, S.B. Scholz: LISA - A Lazy Interpreter for a Full-Fledged Lambda-Calculus

1992-19-04 T.A. Bratvold: Determining Useful Parallelism in Higher Order Functions

1992-19-05 S. Kahrs: Polymorphic Type Checking by Interpretation of Code

1992-19-06 M. Chakravarty, M. Köhler: Equational Constraints, Residuation, and the Parallel JUMP-Machine

1992-19-07 J. Seward: Polymorphic Strictness Analysis using Frontiers (Draft Version)

1992-19-08 D. Gärtner, A. Kimms, W. Kluge: pi-Red^+ - A Compiling Graph-Reduction System for a Full Fledged Lambda-Calculus

1992-19-09 D. Howe, G. Burn: Experiments with strict STG code

1992-19-10 J. Glauert: Parallel Implementation of Functional Languages Using Small Processes

1992-19-11 M. Joy, T. Axford: A Parallel Graph Reduction Machine

1992-19-12 A. Bennett, P. Kelly: Simulation of Multicache Parallel Reduction

1992-19-13 K. Langendoen, D.J. Agterkamp: Cache Behaviour of Lazy Functional Programs (Working Paper)
1992-19-14 K. Hammond, S. Peyton Jones: Profiling scheduling strategies on the GRIP parallel reducer
1992-19-15 S. Mintchev: Using Strictness Information in the STG-machine
1992-19-16 D. Rushall: An Attribute Grammar Evaluator in Haskell
1992-19-17 J. Wild, H. Glaser, P. Hartel: Statistics on storage management in a lazy functional language implementation
1992-19-18 W.S. Martins: Parallel Implementations of Functional Languages
1992-19-19 D. Lester: Distributed Garbage Collection of Cyclic Structures (Draft version)
1992-19-20 J.C. Glas, R.F.H. Hofman, W.G. Vree: Parallelization of Branch-and-Bound Algorithms in a Functional Programming Environment
1992-19-21 S. Hwang, D. Rushall: The nu-STG machine: a parallelized Spineless Tagless Graph Reduction Machine in a distributed memory architecture (Draft version)
1992-19-22 G. Burn, D. Le Metayer: Cps-Translation and the Correctness of Optimising Compilers
1992-19-23 S.L. Peyton Jones, P. Wadler: Imperative functional programming (Brief summary)
1992-19-24 W. Damm, F. Liu, Th. Peikenkamp: Evaluation and Parallelization of Functions in Functional + Logic Languages (abstract)
1992-19-25 M. Kesseler: Communication Issues Regarding Parallel Functional Graph Rewriting
1992-19-26 Th. Peikenkamp: Charakterizing and representing neededness in functional loginc languages (abstract)
1992-19-27 H. Doerr: Monitoring with Graph-Grammars as formal operational Models
1992-19-28 J. van Groningen: Some implementation aspects of Concurrent Clean on distributed memory architectures
1992-19-29 G. Ostheimer: Load Bounding for Implicit Parallelism (abstract)
1992-20 H. Kuchen, F.J. Lopez Fraguas, J.J. Moreno Navarro, M. Rodriguez Artalejo: Implementing Disequality in a Lazy Functional Logic Language
1992-21 H. Kuchen, F.J. Lopez Fraguas: Result Directed Computing in a Functional Logic Language
1992-22 H. Kuchen, J.J. Moreno Navarro, M.V. Hermenegildo: Independent AND-Parallel Narrowing
1992-23 T. Margaria, B. Steffen: Distinguishing Formulas for Free
1992-24 K. Pohl: The Three Dimensions of Requirements Engineering
1992-25 * R. Stainov: A Dynamic Configuration Facility for Multimedia Communications
1992-26 * Michael von der Beeck: Integration of Structured Analysis and Timed Statecharts for Real-Time and Concurrency Specification
1992-27 W. Hans, St. Winkler: Aliasing and Groundness Analysis of Logic Programs through Abstract Interpretation and its Safety
1992-28 * Gerhard Steinke, Matthias Jarke: Support for Security Modeling in Information Systems Design
1992-29 B. Schinzel: Warum Frauenforschung in Naturwissenschaft und Technik

1992-30 A. Kemper, G. Moerkotte, K. Peithner: Object-Orientation Axiomatised by Dynamic Logic

1992-32 * Bernd Heinrichs, Kai Jakobs: Timer Handling in High-Performance Transport Systems

1992-33 * B. Heinrichs, K. Jakobs, K. Lenßen, W. Reinhardt, A. Spinner: Euro-Bridge: Communication Services for Multimedia Applications

1992-34 C. Gerlhof, A. Kemper, Ch. Kilger, G. Moerkotte: Partition-Based Clustering in Object Bases: From Theory to Practice

1992-35 J. Börstler: Feature-Oriented Classification and Reuse in IPSEN

1992-36 M. Jarke, J. Bubenko, C. Rolland, A. Sutcliffe, Y. Vassiliou: Theories Underlying Requirements Engineering: An Overview of NATURE at Genesis

1992-37 * K. Pohl, M. Jarke: Quality Information Systems: Repository Support for Evolving Process Models

1992-38 A. Zuendorf: Implementation of the imperative / rule based language PROGRES

1992-39 P. Koch: Intelligentes Backtracking bei der Auswertung funktional-logischer Programme

1992-40 * Rudolf Mathar, Jürgen Mattfeldt: Channel Assignment in Cellular Radio Networks

1992-41 * Gerhard Friedrich, Wolfgang Neidl: Constructive Utility in Model-Based Diagnosis Repair Systems

1992-42 * P. S. Chen, R. Hennicker, M. Jarke: On the Retrieval of Reusable Software Components

1992-43 W. Hans, St.Winkler: Abstract Interpretation of Functional Logic Languages

1992-44 N. Kiesel, A. Schuerr, B. Westfechtel: Design and Evaluation of GRAS, a Graph-Oriented Database System for Engineering Applications

1993-01 * Fachgruppe Informatik: Jahresbericht 1992

1993-02 * Patrick Shicheng Chen: On Inference Rules of Logic-Based Information Retrieval Systems

1993-03 G. Hogen, R. Loogen: A New Stack Technique for the Management of Runtime Structures in Distributed Environments

1993-05 A. Zuendorf: A Heuristic for the Subgraph Isomorphism Problem in Executing PROGRES

1993-06 A. Kemper, D. Kossmann: Adaptable Pointer Swizzling Strategies in Object Bases: Design, Realization, and Quantitative Analysis

1993-07 * Graduiertenkolleg Informatik und Technik (Hrsg.): Graduiertenkolleg Informatik und Technik

1993-08 * Matthias Berger: k-Coloring Vertices using a Neural Network with Convergence to Valid Solutions

1993-09 M. Buchheit, M. Jeusfeld, W. Nutt, M. Staudt: Subsumption between Queries to Object-Oriented Databases

1993-10 O. Burkart, B. Steffen: Pushdown Processes: Parallel Composition and Model Checking

1993-11 * R. Große-Wienker, O. Hermanns, D. Menzenbach, A. Pollacks, S. Repetzki, J. Schwartz, K. Sonnenschein, B. Westfechtel: Das SUKITS-Projekt: A-posteriori-Integration heterogener CIM-Anwendungssysteme

1993-12 *	Rudolf Mathar, Jürgen Mattfeldt: On the Distribution of Cumulated Interference Power in Rayleigh Fading Channels
1993-13	O. Maler, L. Staiger: On Syntactic Congruences for omega-languages
1993-14	M. Jarke, St. Eherer, R. Gallersdoerfer, M. Jeusfeld, M. Staudt: ConceptBase - A Deductive Object Base Manager
1993-15	M. Staudt, H.W. Nissen, M.A. Jeusfeld: Query by Class, Rule and Concept
1993-16 *	M. Jarke, K. Pohl, St. Jacobs et al.: Requirements Engineering: An Integrated View of Representation Process and Domain
1993-17 *	M. Jarke, K. Pohl: Establishing Vision in Context: Towards a Model of Requirements Processes
1993-18	W. Hans, H. Kuchen, St. Winkler: Full Indexing for Lazy Narrowing
1993-19	W. Hans, J.J. Ruz, F. Saenz, St. Winkler: A VHDL Specification of a Shared Memory Parallel Machine for Babel
1993-20 *	K. Finke, M. Jarke, P. Szczurko, R. Soltysiak: Quality Management for Expert Systems in Process Control
1993-21	M. Jarke, M.A. Jeusfeld, P. Szczurko: Three Aspects of Intelligent Cooperation in the Quality Cycle
1994-01	Margit Generet, Sven Martin (eds.), Fachgruppe Informatik: Jahresbericht 1993
1994-02	M. Lefering: Development of Incremental Integration Tools Using Formal Specifications
1994-03 *	P. Constantopoulos, M. Jarke, J. Mylopoulos, Y. Vassiliou: The Software Information Base: A Server for Reuse
1994-04 *	Rolf Hager, Rudolf Mathar, Jürgen Mattfeldt: Intelligent Cruise Control and Reliable Communication of Mobile Stations
1994-05 *	Rolf Hager, Peter Hermesmann, Michael Portz: Feasibility of Authentication Procedures within Advanced Transport Telematics
1994-06 *	Claudia Popien, Bernd Meyer, Axel Kuepper: A Formal Approach to Service Import in ODP Trader Federations
1994-07	P. Peters, P. Szczurko: Integrating Models of Quality Management Methods by an Object-Oriented Repository
1994-08 *	Manfred Nagl, Bernhard Westfechtel: A Universal Component for the Administration in Distributed and Integrated Development Environments
1994-09 *	Patrick Horster, Holger Petersen: Signatur- und Authentifikationsverfahren auf der Basis des diskreten Logarithmusproblems
1994-11	A. Schürr: PROGRES, A Visual Language and Environment for PROgramming with Graph REwrite Systems
1994-12	A. Schürr: Specification of Graph Translators with Triple Graph Grammars
1994-13	A. Schürr: Logic Based Programmed Structure Rewriting Systems
1994-14	L. Staiger: Codes, Simplifying Words, and Open Set Condition
1994-15 *	Bernhard Westfechtel: A Graph-Based System for Managing Configurations of Engineering Design Documents
1994-16	P. Klein: Designing Software with Modula-3
1994-17	I. Litovsky, L. Staiger: Finite acceptance of infinite words

1994-18 G. Hogen, R. Loogen: Parallel Functional Implementations: Graphbased vs. Stackbased Reduction

1994-19 M. Jeusfeld, U. Johnen: An Executable Meta Model for Re-Engineering of Database Schemas

1994-20 * R. Gallersdörfer, M. Jarke, K. Klabunde: Intelligent Networks as a Data Intensive Application (INDIA)

1994-21 M. Mohnen: Proving the Correctness of the Static Link Technique Using Evolving Algebras

1994-22 H. Fernau, L. Staiger: Valuations and Unambiguity of Languages, with Applications to Fractal Geometry

1994-24 * M. Jarke, K. Pohl, R. Dömges, St. Jacobs, H. W. Nissen: Requirements Information Management: The NATURE Approach

1994-25 * M. Jarke, K. Pohl, C. Rolland, J.-R. Schmitt: Experience-Based Method Evaluation and Improvement: A Process Modeling Approach

1994-26 * St. Jacobs, St. Kethers: Improving Communication and Decision Making within Quality Function Deployment

1994-27 * M. Jarke, H. W. Nissen, K. Pohl: Tool Integration in Evolving Information Systems Environments

1994-28 O. Burkart, D. Caucal, B. Steffen: An Elementary Bisimulation Decision Procedure for Arbitrary Context-Free Processes

1995-01 * Fachgruppe Informatik: Jahresbericht 1994

1995-02 Andy Schürr, Andreas J. Winter, Albert Zündorf: Graph Grammar Engineering with PROGRES

1995-03 Ludwig Staiger: A Tight Upper Bound on Kolmogorov Complexity by Hausdorff Dimension and Uniformly Optimal Prediction

1995-04 Birgitta König-Ries, Sven Helmer, Guido Moerkotte: An experimental study on the complexity of left-deep join ordering problems for cyclic queries

1995-05 Sophie Cluet, Guido Moerkotte: Efficient Evaluation of Aggregates on Bulk Types

1995-06 Sophie Cluet, Guido Moerkotte: Nested Queries in Object Bases

1995-07 Sophie Cluet, Guido Moerkotte: Query Optimization Techniques Exploiting Class Hierarchies

1995-08 Markus Mohnen: Efficient Compile-Time Garbage Collection for Arbitrary Data Structures

1995-09 Markus Mohnen: Functional Specification of Imperative Programs: An Alternative Point of View of Functional Languages

1995-10 Rainer Gallersdörfer, Matthias Nicola: Improving Performance in Replicated Databases through Relaxed Coherency

1995-11 * M.Staudt, K.von Thadden: Subsumption Checking in Knowledge Bases

1995-12 * G.V.Zemanek, H.W.Nissen, H.Hubert, M.Jarke: Requirements Analysis from Multiple Perspectives: Experiences with Conceptual Modeling Technology

1995-13 * M.Staudt, M.Jarke: Incremental Maintenance of Externally Materialized Views

1995-14 * P.Peters, P.Szczurko, M.Jeusfeld: Oriented Information Management: Conceptual Models at Work

1995-15 * Matthias Jarke, Sudha Ram (Hrsg.): WITS 95 Proceedings of the 5th Annual Workshop on Information Technologies and Systems
1995-16 * W.Hans, St.Winkler, F.Saenz: Distributed Execution in Functional Logic Programming
1996-01 * Jahresbericht 1995
1996-02 Michael Hanus, Christian Prehofer: Higher-Order Narrowing with Definitional Trees
1996-03 * W.Scheufele, G.Moerkotte: Optimal Ordering of Selections and Joins in Acyclic Queries with Expensive Predicates
1996-04 Klaus Pohl: PRO-ART: Enabling Requirements Pre-Traceability
1996-05 Klaus Pohl: Requirements Engineering: An Overview
1996-06 * M.Jarke, W.Marquardt: Design and Evaluation of Computer–Aided Process Modelling Tools
1996-07 Olaf Chitil: The Sigma-Semantics: A Comprehensive Semantics for Functional Programs
1996-08 * S.Sripada: On Entropy and the Limitations of the Second Law of Thermodynamics
1996-09 Michael Hanus (Ed.): Proceedings of the Poster Session of ALP96 - Fifth International Conference on Algebraic and Logic Programming
1996-09-0 Michael Hanus (Ed.): Proceedings of the Poster Session of ALP 96 - Fifth International Conference on Algebraic and Logic Programming: Introduction and table of contents
1996-09-1 Ilies Alouini: An Implementation of Conditional Concurrent Rewriting on Distributed Memory Machines
1996-09-2 Olivier Danvy, Karoline Malmkjær: On the Idempotence of the CPS Transformation
1996-09-3 Víctor M. Gulías, José L. Freire: Concurrent Programming in Haskell
1996-09-4 Sébastien Limet, Pierre Réty: On Decidability of Unifiability Modulo Rewrite Systems
1996-09-5 Alexandre Tessier: Declarative Debugging in Constraint Logic Programming
1996-10 Reidar Conradi, Bernhard Westfechtel: Version Models for Software Configuration Management
1996-11 * C.Weise, D.Lenzkes: A Fast Decision Algorithm for Timed Refinement
1996-12 * R.Dömges, K.Pohl, M.Jarke, B.Lohmann, W.Marquardt: PRO-ART/CE* — An Environment for Managing the Evolution of Chemical Process Simulation Models
1996-13 * K.Pohl, R.Klamma, K.Weidenhaupt, R.Dömges, P.Haumer, M.Jarke: A Framework for Process-Integrated Tools
1996-14 * R.Gallersdörfer, K.Klabunde, A.Stolz, M.Eßmajor: INDIA — Intelligent Networks as a Data Intensive Application, Final Project Report, June 1996
1996-15 * H.Schimpe, M.Staudt: VAREX: An Environment for Validating and Refining Rule Bases
1996-16 * M.Jarke, M.Gebhardt, S.Jacobs, H.Nissen: Conflict Analysis Across Heterogeneous Viewpoints: Formalization and Visualization
1996-17 Manfred A. Jeusfeld, Tung X. Bui: Decision Support Components on the Internet

1996-18 Manfred A. Jeusfeld, Mike Papazoglou: Information Brokering: Design, Search and Transformation

1996-19 * P.Peters, M.Jarke: Simulating the impact of information flows in networked organizations

1996-20 Matthias Jarke, Peter Peters, Manfred A. Jeusfeld: Model-driven planning and design of cooperative information systems

1996-21 * G.de Michelis, E.Dubois, M.Jarke, F.Matthes, J.Mylopoulos, K.Pohl, J.Schmidt, C.Woo, E.Yu: Cooperative information systems: a manifesto

1996-22 * S.Jacobs, M.Gebhardt, S.Kethers, W.Rzasa: Filling HTML forms simultaneously: CoWeb architecture and functionality

1996-23 * M.Gebhardt, S.Jacobs: Conflict Management in Design

1997-01 Michael Hanus, Frank Zartmann (eds.): Jahresbericht 1996

1997-02 Johannes Faassen: Using full parallel Boltzmann Machines for Optimization

1997-03 Andreas Winter, Andy Schürr: Modules and Updatable Graph Views for PROgrammed Graph REwriting Systems

1997-04 Markus Mohnen, Stefan Tobies: Implementing Context Patterns in the Glasgow Haskell Compiler

1997-05 * S.Gruner: Schemakorrespondenzaxiome unterstützen die paargrammatische Spezifikation inkrementeller Integrationswerkzeuge

1997-06 Matthias Nicola, Matthias Jarke: Design and Evaluation of Wireless Health Care Information Systems in Developing Countries

1997-07 Petra Hofstedt: Taskparallele Skelette für irregulär strukturierte Probleme in deklarativen Sprachen

1997-08 Dorothea Blostein, Andy Schürr: Computing with Graphs and Graph Rewriting

1997-09 Carl-Arndt Krapp, Bernhard Westfechtel: Feedback Handling in Dynamic Task Nets

1997-10 Matthias Nicola, Matthias Jarke: Integrating Replication and Communication in Performance Models of Distributed Databases

1997-11 * R. Klamma, P. Peters, M. Jarke: Workflow Support for Failure Management in Federated Organizations

1997-13 Markus Mohnen: Optimising the Memory Management of Higher-Order Functional Programs

1997-14 Roland Baumann: Client/Server Distribution in a Structure-Oriented Database Management System

1997-15 George Botorog: High-Level Parallel Programming and the Efficient Implementation of Numerical Algorithms

1998-01 * Fachgruppe Informatik: Jahresbericht 1997

1998-02 Stefan Gruner, Manfred Nagel, Andy Schürr: Fine-grained and Structure-Oriented Document Integration Tools are Needed for Development Processes

1998-03 Stefan Gruner: Einige Anmerkungen zur graphgrammatischen Spezifikation von Integrationswerkzeugen nach Westfechtel, Janning, Lefering und Schürr

1998-04 * O. Kubitz: Mobile Robots in Dynamic Environments

1998-05 Martin Leucker, Stephan Tobies: Truth - A Verification Platform for Distributed Systems

1998-06 * Matthias Oliver Berger: DECT in the Factory of the Future
1998-07 M. Arnold, M. Erdmann, M. Glinz, P. Haumer, R. Knoll, B. Paech, K. Pohl, J. Ryser, R. Studer, K. Weidenhaupt: Survey on the Scenario Use in Twelve Selected Industrial Projects
1998-08 * H. Aust: Sprachverstehen und Dialogmodellierung in natürlichsprachlichen Informationssystemen
1998-09 * Th. Lehmann: Geometrische Ausrichtung medizinischer Bilder am Beispiel intraoraler Radiographien
1998-10 * M. Nicola, M. Jarke: Performance Modeling of Distributed and Replicated Databases
1998-11 * Ansgar Schleicher, Bernhard Westfechtel, Dirk Jäger: Modeling Dynamic Software Processes in UML
1998-12 * W. Appelt, M. Jarke: Interoperable Tools for Cooperation Support using the World Wide Web
1998-13 Klaus Indermark: Semantik rekursiver Funktionsdefinitionen mit Striktheitsinformation
1999-01 * Jahresbericht 1998
1999-02 * F. Huch: Verifcation of Erlang Programs using Abstract Interpretation and Model Checking — Extended Version
1999-03 * R. Gallersdörfer, M. Jarke, M. Nicola: The ADR Replication Manager
1999-04 María Alpuente, Michael Hanus, Salvador Lucas, Germán Vidal: Specialization of Functional Logic Programs Based on Needed Narrowing
1999-05 * W. Thomas (Ed.): DLT 99 - Developments in Language Theory Fourth International Conference
1999-06 * Kai Jakobs, Klaus-Dieter Kleefeld: Informationssysteme für die angewandte historische Geographie
1999-07 Thomas Wilke: CTL+ is exponentially more succinct than CTL
1999-08 Oliver Matz: Dot-Depth and Monadic Quantifier Alternation over Pictures
2000-01 * Jahresbericht 1999
2000-02 Jens Vöge, Marcin Jurdzinski: A Discrete Strategy Improvement Algorithm for Solving Parity Games
2000-04 Andreas Becks, Stefan Sklorz, Matthias Jarke: Exploring the Semantic Structure of Technical Document Collections: A Cooperative Systems Approach
2000-05 Mareike Schoop: Cooperative Document Management
2000-06 Mareike Schoop, Christoph Quix (eds.): Proceedings of the Fifth International Workshop on the Language-Action Perspective on Communication Modelling
2000-07 * Markus Mohnen, Pieter Koopman (Eds.): Proceedings of the 12th International Workshop of Functional Languages
2000-08 Thomas Arts, Thomas Noll: Verifying Generic Erlang Client-Server Implementations
2001-01 * Jahresbericht 2000
2001-02 Benedikt Bollig, Martin Leucker: Deciding LTL over Mazurkiewicz Traces
2001-03 Thierry Cachat: The power of one-letter rational languages

2001-04 Benedikt Bollig, Martin Leucker, Michael Weber: Local Parallel Model Checking for the Alternation Free mu-Calculus

2001-05 Benedikt Bollig, Martin Leucker, Thomas Noll: Regular MSC Languages

2001-06 Achim Blumensath: Prefix-Recognisable Graphs and Monadic Second-Order Logic

2001-07 Martin Grohe, Stefan Wöhrle: An Existential Locality Theorem

2001-08 Mareike Schoop, James Taylor (eds.): Proceedings of the Sixth International Workshop on the Language-Action Perspective on Communication Modelling

2001-09 Thomas Arts, Jürgen Giesl: A collection of examples for termination of term rewriting using dependency pairs

2001-10 Achim Blumensath: Axiomatising Tree-interpretable Structures

2001-11 Klaus Indermark, Thomas Noll (eds.): Kolloquium Programmiersprachen und Grundlagen der Programmierung

2002-01 * Jahresbericht 2001

2002-02 Jürgen Giesl, Aart Middeldorp: Transformation Techniques for Context-Sensitive Rewrite Systems

2002-03 Benedikt Bollig, Martin Leucker, Thomas Noll: Generalised Regular MSC Languages

2002-04 Jürgen Giesl, Aart Middeldorp: Innermost Termination of Context-Sensitive Rewriting

2002-05 Horst Lichter, Thomas von der Maßen, Thomas Weiler: Modelling Requirements and Architectures for Software Product Lines

2002-06 Henry N. Adorna: 3-Party Message Complexity is Better than 2-Party Ones for Proving Lower Bounds on the Size of Minimal Nondeterministic Finite Automata

2002-07 Jörg Dahmen: Invariant Image Object Recognition using Gaussian Mixture Densities

2002-08 Markus Mohnen: An Open Framework for Data-Flow Analysis in Java

2002-09 Markus Mohnen: Interfaces with Default Implementations in Java

2002-10 Martin Leucker: Logics for Mazurkiewicz traces

2002-11 Jürgen Giesl, Hans Zantema: Liveness in Rewriting

2003-01 * Jahresbericht 2002

2003-02 Jürgen Giesl, René Thiemann: Size-Change Termination for Term Rewriting

2003-03 Jürgen Giesl, Deepak Kapur: Deciding Inductive Validity of Equations

2003-04 Jürgen Giesl, René Thiemann, Peter Schneider-Kamp, Stephan Falke: Improving Dependency Pairs

2003-05 Christof Löding, Philipp Rohde: Solving the Sabotage Game is PSPACE-hard

2003-06 Franz Josef Och: Statistical Machine Translation: From Single-Word Models to Alignment Templates

2003-07 Horst Lichter, Thomas von der Maßen, Alexander Nyßen, Thomas Weiler: Vergleich von Ansätzen zur Feature Modellierung bei der Softwareproduktlinienentwicklung

2003-08 Jürgen Giesl, René Thiemann, Peter Schneider-Kamp, Stephan Falke: Mechanizing Dependency Pairs

2004-01 * Fachgruppe Informatik: Jahresbericht 2004

2004-02 Benedikt Bollig, Martin Leucker: Message-Passing Automata are expressively equivalent to EMSO logic

2004-03 Delia Kesner, Femke van Raamsdonk, Joe Wells (eds.): HOR 2004 – 2nd International Workshop on Higher-Order Rewriting

2004-04 Slim Abdennadher, Christophe Ringeissen (eds.): RULE 04 – Fifth International Workshop on Rule-Based Programming

2004-05 Herbert Kuchen (ed.): WFLP 04 – 13th International Workshop on Functional and (Constraint) Logic Programming

2004-06 Sergio Antoy, Yoshihito Toyama (eds.): WRS 04 – 4th International Workshop on Reduction Strategies in Rewriting and Programming

2004-07 Michael Codish, Aart Middeldorp (eds.): WST 04 – 7th International Workshop on Termination

* These reports are only available as a printed version.
Please contact `biblio@informatik.rwth-aachen.de` to obtain copies.