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Preface

This volume contains the papers presented at the Tenth International Conference on Automated Deduction (CADE-10) held on 24–27 July 1990 in Kaiserslautern, West Germany, a famous center of automated deduction research.

CADE is the major forum at which research on all aspects of automated deduction can be presented. Proceedings of previous CADEs are invaluable references for the field; this volume should be no exception.

There were 109 papers submitted to CADE-10. Each was reviewed by three program committee members, and 42 papers were selected for presentation at the conference. Over eighty referees outside the program committee assisted in the reviewing process.

The papers here represent the richness and diversity of the field. They range from theory to implementation and experimentation, from propositional to higher-order calculi and nonclassical logics; they refine and use a wealth of methods that includes resolution, paramodulation, rewriting, completion, unification, and induction; and they work with a variety of applications that includes program verification, logic programming, deductive databases, and theorem proving in many domains. Research in this field is conducted around the world: about half the papers are from the United States; Germany, the United Kingdom, and France are strongly represented; authors from Australia, Brazil, Finland, Japan, Korea, and Sweden are also present.

This volume also contains abstracts of 20 implementations of automated deduction systems, and descriptions of tutorials given at the conference.

I am indebted to the program committee for their effort and thought in organizing the program; to Hans-Jürgen Bärkert and Hans Jürgen Ohlbach for making the local arrangements for the conference; to the invited speakers Robert Boyer and J Moore (Keynote Address), Woody Bledsoe (Banquet Address), Wolfgang Bibel, and Alan Bundy; to the presenters of tutorials at the conference; to Fernando Pereira and Bell Laboratories for hosting the program committee meeting; and to the organizations listed below for their financial and organizational support of CADE-10.

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Table of Contents

Session 1: Keynote Address

8:30-10:00 Wednesday, 25 July 1990

A Theorem Prover for a Computational Logic <i>Robert S. Boyer, J Strother Moore</i>	1
--	---

Session 2

10:30-12:00 Wednesday

A Complete Semantic Back Chaining Proof System <i>Xumin Nie, David A. Plaisted</i>	16
Parallelizing the Closure Computation in Automated Deduction <i>John K. Slaney, Ewing L. Lusk</i>	28
PARTHEO: A High-Performance Parallel Theorem Prover <i>J. Schumann, R. Letz</i>	40

Session 3

13:30-15:30 Wednesday

Substitution-based Compilation of Extended Rules in Deductive Databases <i>Sang Ho Lee, Lawrence J. Henschen</i>	57
Automatic Theorem Proving in Paraconsistent Logics: Theory and Implementation <i>Newton C. A. da Costa, Lawrence J. Henschen, James J. Lu, V. S. Subrahmanian</i>	72
Case-Free Programs: An Abstraction of Definite Horn Programs <i>Toshiro Wakayama, T. H. Payne</i>	87
Generalized Well-founded Semantics for Logic Programs <i>Chitta Baral, Jorge Lobo, Jack Minker</i>	102

Session 4

13:30-15:30 Wednesday

Tactical Theorem Proving in Program Verification <i>M. Heisel, W. Reif, W. Stephan</i>	117
Extensions to the Rippling-Out Tactic for Guiding Inductive Proofs <i>Alan Bundy, Frank van Harmelen, Alan Smaill, Andrew Ireland</i>	132
Guiding Induction Proofs <i>Dieter Hutter</i>	147
Term Rewriting Induction <i>Uday S. Reddy</i>	162

Session 5*16:00-17:30 Wednesday*

A Resolution Principle for Clauses with Constraints

Hans-Jürgen Bürckert 178Str+ve \subseteq : The Str+ve-based Subset Prover*Larry Hines* 193

Ritt-Wu's Decomposition Algorithm and Geometry Theorem Proving

Shang-Ching Chou, Xiao-Shan Gao 207**Session 6***8:30-10:00 Thursday, 26 July 1990*Encoding a Dependent-Type λ -Calculus in a Logic Programming Language*Amy Felty, Dale Miller* 221Investigations into Proof-Search in a System of First-Order Dependent
Function Types*David Pym, Lincoln Wallen* 236Equality of Terms Containing Associative-Commutative Functions and
Commutative Binding Operators is Isomorphism Complete*David A. Basin* 251**Session 7***10:30-12:00 Thursday*An Improved General E -Unification Method*Daniel J. Dougherty, Patricia Johann* 261

Some Results on Equational Unification

Paliath Narendran, Friedrich Otto 276

Unification in a Combination of Equational Theories: an Efficient Algorithm

Alexandre Boudet 292**Session 8***13:30-15:30 Thursday*

SLIM: An Automated Reasoner for Equivalences. Applied to Set Theory

Alan F. McMichael 308

An Examination of the Prolog Technology Theorem-Prover

Mark Tarver 322

Presenting Intuitive Deductions via Symmetric Simplification

Frank Pfenning, Dan Nesmith 336

Toward Mechanical Methods for Streamlining Proofs

William Pierce 351

Session 9*13:30-15:30 Thursday*

Ordered Rewriting and Confluence

Ursula Martin, Tobias Nipkow 366

Complete Sets of Reductions with Constraints

Gerald E. Peterson 381

Rewrite Systems for Varieties of Semigroups

Franz Baader 396

Improving Associative Path Orderings

Joachim Steinbach 411**Session 10: Invited Talk***16:00-17:00 Thursday*

Perspectives on Automated Deduction

Wolfgang Bibel 426**Session 11***8:30-10:00 Friday, 27 July 1990*

On Restrictions of Ordered Paramodulation with Simplification

Leo Bachmair, Harald Ganzinger 427

Simultaneous Paramodulation

Dan Ben-El-Mechaieq 442

Hyper Resolution and Equality Axioms without Function Substitutions

Yusuf Ozturk, Lawrence Henschen 456**Session 12***10:30-12:00 Friday*

Automatic Acquisition of Search Guiding Heuristics

Christian Suttner, Wolfgang Ertel 470

Automated Reasoning Contributes to Mathematics and Logic

L. Wos, S. Winker, W. McCune, R. Overbeek, E. Lusk, R. Stevens, R. Butler ... 485

A Mechanically Assisted Constructive Proof in Category Theory

James A. Altucher, Prakash Panangaden 500

Session 13*13:30–15:30 Friday*

Dynamic Logic as a Uniform Framework for Theorem Proving in Intensional Logic <i>Heikki Tuominen</i>	514
---	-----

A Tableaux-Based Theorem Prover for a Decidable Subset of Default Logic <i>Camilla B. Schwind</i>	528
--	-----

Computing Prime Implicants <i>Peter Jackson, John Pais</i>	543
---	-----

Minimizing the Number of Clauses by Renaming <i>Thierry Boy de la Tour</i>	558
---	-----

Session 14*13:30–15:30 Friday*

Higher Order E-Unification <i>Wayne Snyder</i>	573
---	-----

Programming by Example and Proving by Example Using Higher-order Unification <i>Masami Hagiya</i>	588
--	-----

Retrieving Library Identifiers via Equational Matching of Types <i>Mikael Rüttri</i>	603
---	-----

Unification in Monoidal Theories <i>Werner Nutt</i>	618
--	-----

Session 15: Invited Talk*16:00–17:00 Friday*

A Science of Reasoning: Extended Abstract <i>Alan Bundy</i>	633
--	-----

System Abstracts

The TPS Theorem Proving System <i>Peter B. Andrews, Sunil Issar, Dan Nesmith, Frank Pfenning</i>	641
---	-----

Schemata <i>Frank M. Brown, Carlos Araya</i>	643
---	-----

Cylindric Algebra Equation Solver <i>Frank M. Brown, Carlos Araya</i>	645
--	-----

The Oyster-Clam System <i>Alan Bundy, Frank van Harmelen, Christian Horn, Alan Smuill</i>	647
--	-----

A High-Performance Parallel Theorem Prover <i>Ralph Butler, Ian Foster, Anita Jindal, Ross Overbeek</i>	649
--	-----

The Romulus Proof Checker <i>Carl Eichenlaub, Bruce Esrig, James Hook, Carl Klapper, Garrel Pottinger</i>	651
IMPS: An Interactive Mathematical Proof System <i>William M. Farmer, Joshua D. Guttman, P. Javier Thayer</i>	653
UNICOM: A Refined Completion Based Inductive Theorem Prover <i>Bernhard Gramlich</i>	655
The Theorem Prover of the Program Verifier <i>Tatzelwurm</i> <i>Thomas Käuß, Nicolas Zabel</i>	657
RCL: A Lisp Verification System <i>Matt Kaufmann</i>	659
ORME: An Implementation of Completion Procedures as Sets of Transitions Rules <i>Pierre Lescanne</i>	661
OTTER 2.0 <i>William McCune</i>	663
DISSOLVER: A Dissolution-based Theorem Prover <i>Neil V. Murray, Erik Rosenthal</i>	665
TRIP: An Implementation of Clausal Rewriting <i>Robert Nieuwenhuis, Fernando Orejas, Albert Rubio</i>	667
OSCAR <i>John L. Pollock</i>	669
EXPERT THINKER: An Adaptation of F-Prolog to Microcomputers <i>Ronald W. Satz</i>	671
A Prolog Technology Theorem Prover <i>Mark E. Stickel</i>	673
A General Clause Theorem Prover <i>Gcoff Sutcliffe</i>	675
LISS—The Logic Inference Search System <i>A. A. Voronkov</i>	677
ACE: The Abstract Clause Engine <i>D. A. Wolfram</i>	679

Tutorials

Tuesday, 24 July 1990

High-Performance Automated Theorem Proving <i>Ewing Lusk, William McCune</i>	681
Reasoning and Representation with Concept Languages <i>Jürgen Müller, Franz Baader, Bernhard Nebel, Werner Nutt, Gert Smolka</i>	681

λ Prolog <i>Amy Felty, Elsa Gunter, Dale Miller, Frank Pfenning</i>	682
Equational Unification <i>Claude Kirchner</i>	682
Compilation Techniques for Logics <i>Hans Jürgen Ohlbach, Andreas Herzig</i>	683
High-Performance Theorem Provers: Efficient Implementation and Parallelisation <i>J. Schumann, R. Letz, F. Kurfess</i>	683
Rewrite-Based Theorem Proving <i>Jieh Hsiang, Jean-Pierre Jouannaud</i>	684
Program-Synthetic Deduction <i>Richard Waldinger</i>	684
Computing Models of Propositional Logics <i>Paul Pritchard, John Slaney</i>	685
Author Index	686

Keynote Address

A Theorem Prover for a Computational Logic

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Abstract

We briefly review a mechanical theorem-prover for a logic of recursive functions over finitely generated objects including the integers, ordered pairs, and symbols. The prover, known both as NQTHM and as the Boyer-Moore prover, contains a mechanized principle of induction and implementations of linear resolution, rewriting, and arithmetic decision procedures. We describe some applications of the prover, including a proof of the correct implementation of a higher level language on a microprocessor defined at the gate level. We also describe the ongoing project of recoding the entire prover as an applicative function within its own logic.

1 Introduction

We feel honored to be invited to give the keynote address for CADE-10. We thank Mark Stickel and the program committee for the invitation.

It has been suggested that we discuss our theorem prover and its application to proving the correctness of computations. We have been working on our prover, on and off, since about 1972 [9]. This prover is known both as the *Boyer-Moore theorem prover* and as *NQTHM*. (pronounced *en-que-thum*, an acronym for "New, Quantified THEOREM Prover," an uninspired parochialism that has taken on a life of its own). The details of our prover and its applications have been extensively presented in several books and articles. In fact, from these publications the prover has been recoded by at least three other groups. In this paper, we will (a) very briefly review the prover and its applications, (b) provide pointers to the literature on the prover and its applications, and (c) discuss ACL2, a new development of the prover which involves recoding it in its own logic, a subset of applicative Common Lisp.

In the subsequent discussion, we will make reference to two books, which are the main references on NQTHM. They are (a) *A Computational Logic* [11] which we will abbreviate as "ACL" and (b) *A Computational Logic Handbook* [18] which we will abbreviate as "ACLH". Although a decade old, ACL still provides a rather accurate description of many of the prover's heuristics and some simple applications, whereas the much more recent ACLH accurately describes the current logic and user interface.

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