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10th CADE

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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 Bürckert 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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Chairman, CADE-10

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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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