



Optimising Supercompilers For Supercomputers

Robert Kevin Montoye, Walid Abdul-Karim Abu-Sufah, Roland L. Lee

Optimising Supercompilers For Supercomputers:

Optimizing Supercompilers for Supercomputers Michael Joseph Wolfe, 1989 Effective use of a supercomputer requires users to have a good algorithm and to express this algorithm in an appropriate language and requires compilers to generate efficient code This book investigates several problems facing compiler design for supercomputers including building efficient and comprehensive data dependence graphs recurrence relations the management of compiler temporary variables and WHILE loops The book first proposes an efficient means of representing the flow of data in a program by labeling the arcs in a data dependence graph with direction vectors to show how the flow of data corresponds to the loop structure of the program These data dependence direction vectors are then used in several high level compiler loop optimizations loop vectorization loop concurrentization loop fusion and loop interchanging The book shows how to perform these transformations and how to use them to optimize programs for a wide range of supercomputers The problems of recurrence relations studied include arithmetic recurrences with IF statements and recurrences involving both data and control dependence relations in a cycle The waveform method of solving recurrences is also treated The book discusses ways to make the problem of managing temporary arrays more tractable It concludes by offering several methods for executing WHILE loops and describes a general structure of an optimizing compiler for supercomputers developed from the author's experience with a test bed compiler Michael Wolfe is Associate Professor in the Computer Science and Engineering Department at the Oregon Graduate Center Optimizing Supercompilers for Supercomputers is included in the series Research Monographs in Parallel Computing Copublished with Pitman Publishing

Optimizing Supercompilers for Supercomputers Michael Joseph Wolfe, 1982 *A Systolic Array Optimizing Compiler* Monica S. Lam, 2012-12-06 This book is a revision of my Ph D thesis dissertation submitted to Carnegie Mellon University in 1987 It documents the research and results of the compiler technology developed for the Warp machine Warp is a systolic array built out of custom high performance processors each of which can execute up to 10 million floating point operations per second 10 MFLOPS Under the direction of H T Kung the Warp machine matured from an academic experimental prototype to a commercial product of General Electric The Warp machine demonstrated that the scalable architecture of high performance programmable systolic arrays represents a practical cost effective solution to the present and future computation intensive applications The success of Warp led to the follow on iWarp project a joint project with Intel to develop a single chip 20 MFLOPS processor The availability of the highly integrated iWarp processor will have a significant impact on parallel computing One of the major challenges in the development of Warp was to build an optimizing compiler for the machine First the processors in the xx A Systolic Array Optimizing Compiler array cooperate at a fine granularity of parallelism interaction between processors must be considered in the generation of code for individual processors Second the individual processors themselves derive their performance from a VLIW Very Long Instruction Word instruction set and a high degree of internal pipelining and parallelism

The compiler contains optimizations pertaining to the array level of parallelism as well as optimizations for the individual VLIW processors Compiler Optimizations for Scalable Parallel Systems Santosh Pande,Dharma P. Agrawal,2003-06-29 Scalable parallel systems or more generally distributed memory systems offer a challenging model of computing and pose fascinating problems regarding compiler optimization ranging from language design to run time systems Research in this area is foundational to many challenges from memory hierarchy optimizations to communication optimization This unique handbook like monograph assesses the state of the art in the area in a systematic and comprehensive way The 21 coherent chapters by leading researchers provide complete and competent coverage of all relevant aspects of compiler optimization for scalable parallel systems The book is divided into five parts on languages analysis communication optimizations code generation and run time systems This book will serve as a landmark source for education information and reference to students practitioners professionals and researchers interested in updating their knowledge about or active in parallel computing Languages and Compilers for Parallel Computing Utpal Banerjee,1993-12-08 The articles in this volume are revised versions of the best papers presented at the Fifth Workshop on Languages and Compilers for Parallel Computing held at Yale University August 1992 The previous workshops in this series were held in Santa Clara 1991 Irvine 1990 Urbana 1989 and Ithaca 1988 As in previous years a reasonable cross section of some of the best work in the field is presented The volume contains 35 papers mostly by authors working in the U S or Canada but also by authors from Austria Denmark Israel Italy Japan and the U K **Scheduling and Automatic Parallelization** Alain Darte,Yves. Robert,Frédéric Vivien,2012-12-06 I Unidimensional Problems 1 Scheduling DAGs without Communications 2 Scheduling DAGs with Communications 3 Cyclic Scheduling II Multidimensional Problems 4 Systems of Uniform Recurrence Equations 5 Parallelism Detection in Nested Loops Optimization and Tuning Guide for Fortran, C, and C++ ,1994 **Techniques for Optimizing Applications** Rajat P. Garg,Ilya A. Sharapov,2002 Software Programming Techniques Highly Parallel Computations M. P. Bekakos,2001 This work provides a state of the art survey of the applications of processor network architectures and of various highly parallel computational methods Because of the increasing interdependence of the research activities in these major areas of highly parallel computations it seemed appropriate to produce this reference and study text The editor believes that the contributions in this work provide a valuable pointer to the research issues in this area

Euro-Par 2014: Parallel Processing Fernando Silva,Inês Dutra,Vitor Santos Costa,2014-08-11 This book constitutes the refereed proceedings of the 20th International Conference on Parallel and Distributed Computing Euro Par 2014 held in Porto Portugal in August 2014 The 68 revised full papers presented were carefully reviewed and selected from 267 submissions The papers are organized in 15 topical sections support tools environments performance prediction and evaluation scheduling and load balancing high performance architectures and compilers parallel and distributed data management grid cluster and cloud computing green high performance computing distributed systems and algorithms

parallel and distributed programming parallel numerical algorithms multicore and manycore programming theory and algorithms for parallel computation high performance networks and communication high performance and scientific applications and GPU and accelerator computing *Optimized Code Generation for Programmable Digital Signal Processors*
Jim Kin Hung Yu,1994 *Advances in Parallel Algorithms* Lydia Kronsjö,1992 Mathematics of Computing Parallelism
Proceedings: Supercomputer design, performance evaluation, and performance education ,1987 *Optimizing Parallel Applications* William Shih-hao Hung,1998 Improving Locality and Parallelism in Nested Loops Michael Edward Wolf,Stanford University. Computer Systems Laboratory,1992 **Supercomputing** ,1988 *Languages and Compilers for Parallel Computing* ,1998 **Optimization and Testing of NMOS Arithmetic Structures** Robert Kevin Montoye,Walid Abdul-Karim Abu-Sufah,Roland L. Lee,1983 **Computer Sciences Technical Report** ,1992 **First Annual OSU Workshop on Parallel Computing** ,1990

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Optimising Supercompilers For Supercomputers Introduction

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