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Supercompilers for Parallel and Vector Computers

Hans Zima with Barbara Chapman

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Supercompilers For Parallel And Vector Computers

David E. Hudak, Santosh G. Abraham



Supercompilers For Parallel And Vector Computers:

Supercompilers for Parallel and Vector Computers Hans Zima,1990 *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 wavefront 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 [Languages and Compilers for Parallel Computing](#) Chua-Huang Huang,1996-01-24 This book presents the refereed proceedings of the Eighth Annual Workshop on Languages and Compilers for Parallel Computing held in Columbus Ohio in August 1995 The 38 full revised papers presented were carefully selected for inclusion in the proceedings and reflect the state of the art of research and advanced applications in parallel languages restructuring compilers and runtime systems The papers are organized in sections on fine grain parallelism interprocedural analysis program analysis Fortran 90 and HPF loop parallelization for HPF compilers tools and libraries loop level optimization automatic data distribution compiler models irregular computation object oriented and functional parallelism *Compiling Parallel Loops for High Performance Computers* David E. Hudak,Santosh G. Abraham,2012-12-06 4 2 Code Segments 96 4 3 Determining Communication Parameters 99 4 4 Multicast Communication Overhead 103 4 5 Partitioning 103 4 6 Experimental Results 117 4 7 Conclusion 121 5 COLLECTIVE PARTITIONING AND REMAPPING FOR MULTIPLE LOOP NESTS 125 5 1 Introduction 125 5 2 Program Enclosure Trees 128 5 3 The CPR Algorithm 132 5 4 Experimental Results 141 5 5 Conclusion 146 BIBLIOGRAPHY 149 INDEX 157 LIST OF FIGURES Figure 1 1 The Butterfly Architecture 5 1 2 Example of an iterative data parallel loop 7 1 3 Contiguous tiling and assignment of an iteration space 13 2 1 Communication along a line segment 24 2 2 Access pattern for

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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*, 1996

Supercomputing in Engineering Analysis Hojjat Adeli, 2020-08-13 The first volume in this new series has a companion in volume 2 unseen Parallel processing in computational mechanics The first six contributions present general aspects of supercomputing from both hardware and software engineering points of view Subsequent chapters discuss homotopy algorithms

Languages and Compilers for Parallel Computing Keshav Pingali, 1995-01-26 This volume presents revised versions of the 32 papers accepted for the Seventh Annual Workshop on Languages and Compilers for Parallel Computing held in Ithaca NY in August 1994 The 32 papers presented report on the leading research activities in languages and compilers for parallel computing and thus reflect the state of the art in the field The volume is organized in sections on fine grain parallelism alignment and distribution postlinear loop transformation parallel structures program analysis computer communication automatic parallelization languages for parallelism scheduling and program optimization and program evaluation

Languages and Compilers for Parallel Computing Utpal Banerjee, 1994 This book contains papers selected for presentation at the Sixth Annual Workshop on Languages and Compilers for Parallel Computing The workshop was hosted by the Oregon Graduate Institute of Science and Technology All the major research efforts in parallel languages and compilers are represented in this workshop series The 36 papers in the volume are grouped under nine headings dynamic data structures parallel languages High Performance Fortran loop transformation logic and dataflow language implementations fine grain parallelism scalar analysis parallelizing compilers and analysis of parallel programs The

book represents a valuable snapshot of the state of research in the field in 1993

Parallel Computing Michael Joseph Wolfe, 1996 *Software Operating Systems*

High Performance Compilers for Parallel Loop Transformation Techniques Viet Nhu Ngo, 1994 *Languages and Compilers for Parallel Computing* Zhiyuan Li, 1998-04-29 This book constitutes the refereed proceedings of the 12th Biennial Conference of the Canadian Society for Computational Studies of Intelligence AI 98 held in Vancouver BC Canada in June 1998 The 28 revised full papers presented together with 10 extended abstracts were carefully reviewed and selected from a total of more than twice as many submissions The book is divided in topical sections on planning constraints search and databases applications genetic algorithms learning and natural language reasoning uncertainty and learning

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

Proceedings of the 1996 International Conference on Parallel Processing, August 12-16, 1996 A. Reeves, Adam Bojanczyk, Keshav Pingali, 1996

ACM Transactions on Programming Languages and Systems Association for Computing Machinery, 1999

EURO-PAR '..., 1999

Journal of Information Science and Engineering, 2002

Tunable Shared-memory Abstractions for Distributed-memory Systems Brian Keith Totty, University of Illinois at Urbana-Champaign. Department of Computer Science, 1994

Flight-vehicle Materials, Structures, and Dynamics--assessment and Future Directions: Computational structures technology, 1995

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