

OPTIMIZING COMPILERS
for
MODERN ARCHITECTURES

Randy Allen & Ken Kennedy



Optimizing Compilers For Modern Architectures A Dependencebased Approach

Parag H. Dave, Himanshu B. Dave



Optimizing Compilers For Modern Architectures A Dependencebased Approach:

Optimizing Compilers for Modern Architectures: A Dependence-Based Approach Randy Allen, Ken Kennedy, 2001-10 Modern computer architectures designed with high performance microprocessors offer tremendous potential gains in performance over previous designs Yet their very complexity makes it increasingly difficult to produce efficient code and to realize their full potential This landmark text from two leaders in the field focuses on the pivotal role that compilers can play in addressing this critical issue The basis for all the methods presented in this book is data dependence a fundamental compiler analysis tool for optimizing programs on high performance microprocessors and parallel architectures It enables compiler designers to write compilers that automatically transform simple sequential programs into forms that can exploit special features of these modern architectures The text provides a broad introduction to data dependence to the many transformation strategies it supports and to its applications to important optimization problems such as parallelization compiler memory hierarchy management and instruction scheduling The authors demonstrate the importance and wide applicability of dependence based compiler optimizations and give the compiler writer the basics needed to understand and implement them They also offer cookbook explanations for transforming applications by hand to computational scientists and engineers who are driven to obtain the best possible performance of their complex applications The approaches presented are based on research conducted over the past two decades emphasizing the strategies implemented in research prototypes at Rice University and in several associated commercial systems Randy Allen and Ken Kennedy have provided an indispensable resource for researchers practicing professionals and graduate students engaged in designing and optimizing compilers for modern computer architectures Offers a guide to the simple practical algorithms and approaches that are most effective in real world high performance microprocessor and parallel systems Demonstrates each transformation in worked examples Examines how two case study compilers implement the theories and practices described in each chapter Presents the most complete treatment of memory hierarchy issues of any compiler text Illustrates ordering relationships with dependence graphs throughout the book Applies the techniques to a variety of languages including Fortran 77 C hardware definition languages Fortran 90 and High Performance Fortran Provides extensive references to the most sophisticated algorithms known in research

The Compiler Design Handbook Y.N. Srikant, Priti Shankar, 2018-10-03 Today s embedded devices and sensor networks are becoming more and more sophisticated requiring more efficient and highly flexible compilers Engineers are discovering that many of the compilers in use today are ill suited to meet the demands of more advanced computer architectures Updated to include the latest techniques The Compiler Design Handbook Second Edition offers a unique opportunity for designers and researchers to update their knowledge refine their skills and prepare for emerging innovations The completely revised handbook includes 14 new chapters addressing topics such as worst case execution time estimation garbage collection and energy aware compilation The editors take

special care to consider the growing proliferation of embedded devices as well as the need for efficient techniques to debug faulty code New contributors provide additional insight to chapters on register allocation software pipelining instruction scheduling and type systems Written by top researchers and designers from around the world The Compiler Design Handbook Second Edition gives designers the opportunity to incorporate and develop innovative techniques for optimization and code generation

Compilers: Principles and Practice Parag H. Dave,Himanshu B. Dave, Compilers Principles and Practice explains the phases and implementation of compilers and interpreters using a large number of real life examples It includes examples from modern software practices such as Linux GNU Compiler Collection GCC and Perl This book has been class tested and tuned to the requirements of undergraduate computer engineering courses across universities in India

Algorithms and Architectures for Parallel Processing Ting Hu,Feng Wang,Hongwei Li,Qian Wang,2018-12-29 This book constitutes the workshop proceedings of the 18th International Conference on Algorithms and Architectures for Parallel Processing ICA3PP 2018 held in Guangzhou China in November 2018 The 24 full papers presented were carefully selected and reviewed from numerous submissions to the two following workshops ICA3PP 2018 Workshop on Intelligent Algorithms for Large scale Complex Optimization Problems ICA3PP 2018 Workshop on Security and Privacy in Data Processing

Languages and Compilers for Parallel Computing James Brodman,Peng Tu,2015-04-30 This book constitutes the thoroughly refereed post conference proceedings of the 27th International Workshop on Languages and Compilers for Parallel Computing LCPC 2014 held in Hillsboro OR USA in September 2014 The 25 revised full papers were carefully reviewed and selected from 39 submissions The papers are organized in topical sections on accelerator programming algorithms for parallelism compilers debugging vectorization

Trustworthy Compilers Vladimir O. Safonov,2010-02-09 This unique guide book explains and teaches the concept of trustworthy compilers based on 50 years of worldwide experience in the area of compilers and on the author s own 30 years of expertise in development and teaching compilers It covers the key topics related to compiler development as well as compiling methods not thoroughly covered in other books The book also reveals many state of the art compiler development tools and personal experience of their use in research projects by the author and his team Software engineers of commercial companies and undergraduate graduate students will benefit from this guide

Euro-Par 2013: Parallel Processing Workshops Dieter an Mey,Michael Alexander,Bientinesi Paolo,Mario Cannataro,Carsten Clauss,Alexandru Costan,Gabor Kecskemeti,Christine Morin,Laura Ricci,Julio Sahuquillo,Martin Schulz,Vittorio Scarano,Scott Ostercamp,Josef Weidendorfer,2014-04-10 This book constitutes thoroughly refereed post conference proceedings of the workshops of the 19th International Conference on Parallel Computing Euro Par 2013 held in Aachen Germany in August 2013 The 99 papers presented were carefully reviewed and selected from 145 submissions The papers include seven workshops that have been co located with Euro Par in the previous years Big Data Cloud Second Workshop on Big Data Management in Clouds Hetero Par 11th Workshop on Algorithms Models and Tools for

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IEEE International High-Level Design Validation and Test Workshop, 2003 **Proceedings**, 2006

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