

# Software Optimization Cookbook Second Edition

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Power and Performance CRC Press  
Performance Optimization of Numerically Intensive Codes offers a comprehensive, tutorial-style, hands-on, introductory and intermediate-level treatment of all the essential ingredients for achieving high performance in numerical computations on modern computers. The authors explain computer architectures, data traffic and issues related to performance of serial and parallel code optimization exemplified by actual programs written for algorithms of wide interest. The unique hands-on style is achieved by extensive case studies using realistic computational problems. The performance gain obtained by applying the techniques described in this book can be very significant. The book bridges the gap between the literature in system architecture, the one in numerical methods and the occasional descriptions of optimization topics in computer vendors' literature. It also allows readers to better judge the suitability of certain computer architecture to their computational requirements. In contrast to standard textbooks on computer architecture and on programming techniques the book treats these topics together at the level necessary for writing high-performance programs. The book facilitates easy access to these topics for computational scientists and engineers mainly interested in practical issues related to efficient code development.

[Embedded System Design](#) CRC Press  
The Software Optimization Cookbook  
The Software Optimization Cookbook  
[Working Effectively with Legacy Code](#) No Starch Press

Written by high performance computing (HPC) experts, *Introduction to High Performance Computing for Scientists and Engineers* provides a solid introduction to current mainstream computer architecture, dominant parallel programming models, and useful optimization strategies for

scientific HPC. From working in a scientific computing center, the author  
The Software Optimization Cookbook  
The Software Optimization Cookbook  
Annotation Four Intel experts explain the techniques and tools that you can use to improve the performance of applications for IA-32 processors. Simple explanations and code examples help you to develop software that benefits from Intel® Extended Memory 64 Technology (Intel® EM64T), multi-core processing, Hyper-Threading Technology, OpenMP\*, and multimedia extensions. This book guides you through the growing collection of software tools, compiler switches, and coding optimizations, showing you efficient ways to get the best performance from software applications.  
*Introduction to High Performance Computing for Scientists and Engineers*  
A comprehensive guide to help aspiring and professional C++ developers elevate the performance of their apps by allowing them to run faster and consume fewer resources  
Key Features  
Updated to C++20 with completely revised code and more content on error handling, benchmarking, memory allocators, and concurrent programming  
Explore the latest C++20 features including concepts, ranges, and coroutines  
Utilize C++ constructs and techniques to carry out effective data structure optimization and memory management  
Book

Description C++ High Performance, Second Edition guides you through optimizing the performance of your C++ apps. This allows them to run faster and consume fewer resources on the device they're running on without compromising the readability of your codebase. The book begins by introducing the C++ language and some of its modern concepts in brief. Once you are familiar with the fundamentals, you will be ready to measure, identify, and eradicate bottlenecks in your C++ codebase. By following this process, you will gradually improve your style of writing code. The book then explores data structure optimization, memory management, and how it can be used efficiently concerning CPU caches. After laying the foundation, the book trains you to leverage algorithms, ranges, and containers from the standard library to achieve faster execution, write readable code, and use customized iterators. It provides hands-on examples of C++ metaprogramming, coroutines, reflection to reduce boilerplate code, proxy objects to perform optimizations under the hood, concurrent programming, and lock-free data structures. The book concludes with an overview of parallel algorithms. By the end of this book, you will have the ability to use every tool as needed to boost the efficiency of your C++

projects. What you will learnWrite specialized data structures for performance-critical codeUse modern metaprogramming techniques to reduce runtime calculationsAchieve efficient memory management using custom memory allocatorsReduce boilerplate code using reflection techniquesReap the benefits of lock-free concurrent programmingGain insights into subtle optimizations used by standard library algorithmsCompose algorithms using ranges libraryDevelop the ability to apply metaprogramming aspects such as `constexpr`, `constraints`, and `concepts`Implement lazy generators and asynchronous tasks using C++20 coroutinesWho this book is for If you're a C++ developer looking to improve the efficiency of your code or just keen to upgrade your skills to the next level, this book is for you.

**Introduction to Software for Chemical Engineers, Second Edition** Packt Publishing Ltd

Revealing the secrets of the software tuning process, *The Software Optimization Cookbook* provides recipes for high-performance applications on the Intel? Pentium? III and Pentium? 4 processors. Simple explanations and C language examples show you how to address performance issues with algorithms, memory access, branching, SIMD instructions, multiple threads, and floating-point calculations. With this book, you need not be a processor architect or assembly language expert to get the full power out of your software on the 32-bit Intel Architecture. Learn how to: Use performance tools and tested concepts to analyze and improve applications. Determine which portions of an application should be given highest priority for optimizations. Identify the reasons that certain portions of your application are slower than they should be. Improve an application by working directly on the root cause of a software bottleneck. Design an application from the ground up for maximum performance.

**Pyomo — Optimization Modeling in Python** Morgan Kaufmann Publishers

This book presents a structured approach to

formulate, model, and solve mathematical optimization problems for a wide range of real world situations. Among the problems covered are production, distribution and supply chain planning, scheduling, vehicle routing, as well as cutting stock, packing, and nesting. The optimization techniques used to solve the problems are primarily linear, mixed-integer linear, nonlinear, and mixed integer nonlinear programming. The book also covers important considerations for solving real-world optimization problems, such as dealing with valid inequalities and symmetry during the modeling phase, but also data interfacing and visualization of results in a more and more digitized world. The broad range of ideas and approaches presented helps the reader to learn how to model a variety of problems from process industry, paper and metals industry, the energy sector, and logistics using mathematical optimization techniques.

**Python Interactive Computing and Visualization Cookbook** SIAM

**High Performance MySQL** is the definitive guide to building fast, reliable systems with MySQL. Written by noted experts with years of real-world experience building very large systems, this book covers every aspect of MySQL performance in detail, and focuses on robustness, security, and data integrity. *High Performance MySQL* teaches you advanced techniques in depth so you can bring out MySQL's full power. Learn how to design schemas, indexes, queries and advanced MySQL features for maximum performance, and get detailed guidance for tuning your MySQL server, operating system, and hardware to their fullest potential. You'll also learn practical, safe, high-performance ways to scale your applications with replication, load balancing, high availability, and failover. This second edition is completely revised and greatly expanded, with deeper coverage in all areas. Major additions include: Emphasis throughout on both performance and reliability Thorough coverage of storage engines, including in-depth tuning and optimizations for the InnoDB storage engine Effects of new features in MySQL 5.0 and 5.1, including stored procedures, partitioned databases, triggers, and views A detailed discussion on how to build very large, highly scalable systems with MySQL New options for backups and replication Optimization of advanced querying features, such as full-text searches Four new appendices

The book also includes chapters on benchmarking, profiling, backups, security, and tools and techniques to help you measure, monitor, and manage your MySQL installations.

**Introduction to Software for Chemical Engineers** John Wiley & Sons

Optimize code for multi-core processors with Intel's Parallel Studio Parallel programming is rapidly becoming a "must-know" skill for developers. Yet, where to start? This teach-yourself tutorial is an ideal starting point for developers who already know Windows C and C++ and are eager to add parallelism to their code. With a focus on applying tools, techniques, and language extensions to implement parallelism, this essential resource teaches you how to write programs for multicore and leverage the power of multicore in your programs. Sharing hands-on case studies and real-world

examples, the authors examine the challenges of each project and show you how to overcome them. Explores conversion of serial code to parallel Focuses on implementing Intel Parallel Studio Highlights the benefits of using parallel code Addresses error and performance optimization of code Includes real-world scenarios that illustrate the techniques of advanced parallel programming situations Parallel Programming with Intel Parallel Studio dispels any concerns of difficulty and gets you started creating faster code with Intel Parallel Studio.

**Business Optimization Using Mathematical Programming** CRC Press

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.

Power Distribution Planning Reference Book, Second Edition Springer

Power and Performance: Software Analysis and Optimization is a guide to solving performance problems in modern Linux systems. Power-efficient chips are no help if the software those chips run on is inefficient. Starting with the necessary architectural background as a foundation, the book demonstrates the proper usage of performance analysis tools in order to pinpoint the cause of performance problems, and includes best practices for handling common performance issues those tools identify. Provides expert perspective from a key member of Intel 's optimization team on how processors and memory systems influence performance Presents ideas to improve architectures running mobile, desktop, or enterprise platforms Demonstrates best practices for designing experiments and benchmarking throughout the software lifecycle Explains the importance of profiling and measurement to determine the source of performance issues

Pyomo – Optimization Modeling in Python CRC Press

If you are a Python developer with some experience of working on scientific, mathematical, and statistical applications and want to gain an expert understanding of NumPy programming in relation to science, math, and finance using practical recipes, then this book is for you.

Docker Cookbook - Second Edition "O'Reilly Media, Inc."

The field of Chemical Engineering and its link to computer science is in constant evolution and new engineers have a variety of tools at their disposal to tackle their everyday problems. Introduction to Software for Chemical Engineers, Second Edition provides a quick guide to the use of various computer packages for chemical engineering applications. It covers a range of software applications from Excel and general mathematical packages such as MATLAB and MathCAD to process simulators, CHEMCAD and ASPEN, equation-based modeling languages, gProms, optimization software such as GAMS and AIMS, and specialized software like CFD or DEM codes. The different packages are introduced and applied to solve typical problems in fluid mechanics, heat and mass transfer, mass and energy balances, unit operations, reactor engineering, process and equipment design and control. This new edition offers a wider view of packages including open source software such as R, Python and Julia. It also includes complete examples in ASPEN Plus, adds ANSYS Fluent to CFD codes, Lingo to the optimization packages, and discusses Engineering Equation Solver. It offers a global idea of the capabilities of the software used in the chemical engineering field and provides examples for solving real-world problems. Written by leading experts, this book is a must-have reference for chemical engineers looking to grow in their careers through the use of

new and improving computer software. Its user-friendly approach to simulation and optimization as well as its example-based presentation of the software, makes it a perfect teaching tool for both undergraduate and master levels.

Software Optimization for High-performance Computing Packt Publishing Ltd

Explains how compilers translate high-level language source code (like code written in Python) into low-level machine code (code that the computer can understand) to help readers understand how to produce the best low-level, computer readable machine code. In the beginning, most software was written in assembly, the CPU's low-level language, in order to achieve acceptable performance on relatively slow hardware. Early programmers were sparing in their use of high-level language code, knowing that a high-level language compiler would generate crummy, low-level machine code for their software. Today, however, many programmers write in high-level languages like Python, C/C++/C#, Java, Swift. The result is often sloppy, inefficient code. But you don't need to give up the productivity and portability of high-level languages in order to produce more efficient software. In this second volume of the Write Great Code series, you'll learn:

- How to analyze the output of a compiler to verify that your code does, indeed, generate good machine code
- The types of machine code statements that compilers typically generate for common control structures, so you can choose the best statements when writing HLL code
- Just enough 80x86 and PowerPC assembly language to read compiler output
- How compilers convert various constant and variable objects into machine data, and how to use these objects to write faster and shorter programs

**NEW TO THIS EDITION, COVERAGE OF:**

- Programming languages like Swift and Java
- Code generation on modern 64-bit CPUs
- ARM processors on mobile phones and tablets
- Stack-based architectures like the Java Virtual Machine
- Modern language systems like the Microsoft Common Language Runtime

With an understanding of how compilers work, you'll be able to write source code that they can translate into elegant machine code. That understanding starts right here, with Write Great Code, Volume 2: Thinking Low-Level, Writing High-Level.

Search Engine Optimization Morgan Kaufmann Embedded Computing for High Performance: Design Exploration and Customization Using High-level Compilation and Synthesis Tools provides a set of real-life example implementations that migrate traditional desktop systems to embedded systems. Working with

popular hardware, including Xilinx and ARM, the book offers a comprehensive description of techniques for mapping computations expressed in programming languages such as C or MATLAB to high-performance embedded architectures consisting of multiple CPUs, GPUs, and reconfigurable hardware (FPGAs). The authors demonstrate a domain-specific language (LARA) that facilitates retargeting to multiple computing systems using the same source code. In this way, users can decouple original application code from transformed code and enhance productivity and program portability. After reading this book, engineers will understand the processes, methodologies, and best practices needed for the development of applications for high-performance embedded computing systems. Focuses on maximizing performance while managing energy consumption in embedded systems Explains how to retarget code for heterogeneous systems with GPUs and FPGAs Demonstrates a domain-specific language that facilitates migrating and retargeting existing applications to modern systems Includes downloadable slides, tools, and tutorials

Introduction to Software for Chemical Engineers, Second Edition Prentice Hall Professional

A comprehensive introduction to the tools, techniques and applications of convex optimization.

Parallel Programming with Intel Parallel Studio XE John Wiley & Sons

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.

The Software Optimization Cookbook Springer Science & Business Media

This book provides a complete and comprehensive reference/guide to Pyomo (Python Optimization Modeling Objects) for both beginning and advanced modelers, including students at the undergraduate and graduate levels, academic researchers, and practitioners. The text illustrates the breadth of the modeling and analysis capabilities that are supported by the software and support of complex real-world applications. Pyomo is an open source software package for formulating and solving large-scale optimization and operations research problems. The text begins with a tutorial on simple linear and integer programming models. A detailed reference of Pyomo's modeling components is illustrated with extensive examples, including a discussion of how to load data from data sources like spreadsheets and databases. Chapters describing advanced modeling capabilities for nonlinear and stochastic optimization are also included. The Pyomo software provides familiar modeling features within Python, a powerful dynamic programming language that has a very clear, readable syntax and intuitive object orientation. Pyomo includes Python classes for defining sparse sets, parameters, and variables, which can be used to formulate algebraic expressions that define objectives and constraints. Moreover, Pyomo can be used from a command-line interface and within Python's interactive command environment, which makes it easy to create Pyomo models, apply a variety of optimizers, and examine solutions. The software supports a different modeling approach than commercial AML (Algebraic Modeling Languages) tools, and is designed for flexibility, extensibility, portability, and maintainability but also maintains the central ideas in modern AMLs.

Optimization Software Guide Prentice Hall Professional

Reflects the latest applied research and features state-of-the-art software for building and solving spreadsheet optimization models Thoroughly updated to reflect the latest topical and technical advances in the field, Optimization Modeling with Spreadsheets, Second Edition continues to focus on solving real-world optimization problems through the creation of mathematical models and the use of spreadsheets to represent and analyze those models. Developed and extensively classroom-tested by the author, the book features a systematic approach that equips readers with the skills to apply optimization tools effectively without the need to rely on specialized algorithms. This new edition uses the powerful software package Risk Solver Platform (RSP) for optimization, including its Evolutionary Solver, which employs many recently developed ideas for heuristic programming. The author provides

expanded coverage of integer programming and discusses linear and nonlinear programming using a systematic approach that emphasizes the use of spreadsheet-based optimization tools. The Second Edition also features: Classifications for the various problem types, providing the reader with a broad framework for building and recognizing optimization models Network models that allow for a more general form of mass balance A systematic introduction to Data Envelopment Analysis (DEA) The identification of qualitative patterns in order to meaningfully interpret linear programming solutions An introduction to stochastic programming and the use of RSP to solve problems of this type Additional examples, exercises, and cases have been included throughout, allowing readers to test their comprehension of the material. In addition, a related website features Microsoft Office® Excel files to accompany the figures and data sets in the book. With its accessible and comprehensive presentation, Optimization Modeling with Spreadsheets, Second Edition is an excellent book for courses on deterministic models, optimization, and spreadsheet modeling at the upper-undergraduate and graduate levels. The book can also serve as a reference for researchers, practitioners, and consultants working in business, engineering, operations research, and management science.

Proceedings of the ... ACM SIGPLAN Symposium on Principles & Practice of Parallel Programming John Wiley & Sons  
This entirely revised second edition of Engineering a Compiler is full of technical updates and new material covering the latest developments in compiler technology. In this comprehensive text you will learn important techniques for constructing a modern compiler. Leading educators and researchers Keith Cooper and Linda Torczon combine basic principles with pragmatic insights from their experience building state-of-the-art compilers. They will help you fully understand important techniques such as compilation of imperative and object-oriented languages, construction of static single assignment forms, instruction scheduling, and graph-coloring register allocation. In-depth treatment of algorithms and techniques used in the front end of a modern compiler Focus on code optimization and code generation, the primary areas of recent research and development Improvements in presentation including conceptual overviews for each chapter, summaries and review questions for sections, and prominent placement of definitions for new terms Examples drawn from several different programming languages

NumPy Cookbook - Second Edition  
Springer Science & Business Media  
Last Updated: December 2020 Based on Julia

v1.3+ and JuMP v0.21+ The main motivation of writing this book was to help the author himself. He is a professor in the field of operations research, and his daily activities involve building models of mathematical optimization, developing algorithms for solving the problems, implementing those algorithms using computer programming languages, experimenting with data, etc. Three languages are involved: human language, mathematical language, and computer language. His team of students need to go over three different languages, which requires "translation" among the three languages. As this book was written to teach his research group how to translate, this book will also be useful for anyone who needs to learn how to translate in a similar situation. The Julia Language is as fast as C, as convenient as MATLAB, and as general as Python with a flexible algebraic modeling language for mathematical optimization problems. With the great support from Julia developers, especially the developers of the JuMP—Julia for Mathematical Programming—package, Julia makes a perfect tool for students and professionals in operations research and related areas such as industrial engineering, management science, transportation engineering, economics, and regional science. For more information, visit: <http://www.chkwon.net/julia>