

Software Optimization Cookbook Second Edition

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Introduction to Software for Chemical Engineers, Second Edition John Wiley & Sons

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.

Docker Cookbook - Second Edition Springer

Until the late 1980s, information processing was associated with large mainframe computers and huge tape drives. During the 1990s, this trend shifted toward information processing with personal computers, or PCs. The trend toward miniaturization continues and in the future the majority of information processing systems will be small mobile computers, many of which will be embedded into larger products and interfaced to the physical environment. Hence, these kinds of systems are called embedded systems. Embedded systems together with their physical environment are called cyber-physical systems. Examples include systems such as transportation and fabrication equipment. It is expected that the total market volume of embedded systems will be significantly larger than that of traditional information processing systems such as PCs and mainframes. Embedded systems share a number of common characteristics. For example, they must be dependable, efficient, meet real-time constraints and require customized user interfaces (instead of generic keyboard and mouse interfaces). Therefore, it makes sense to consider common principles of embedded system design. Embedded System Design starts with an introduction into the area and a survey of specification models and languages for embedded and cyber-physical systems. It provides a brief overview of hardware devices used for such systems and presents the essentials of system software for embedded systems, like real-time operating systems. The book also discusses evaluation and validation techniques for embedded systems. Furthermore, the book presents an overview of techniques for mapping applications to execution platforms. Due to the importance of resource efficiency, the book also contains a selected set of optimization techniques for embedded systems, including special compilation techniques. The book closes with a brief survey on testing. Embedded System Design can be used as a text book for courses on embedded systems and as a source which provides pointers to relevant material in the area for PhD students and teachers. It assumes a basic knowledge of information processing hardware and software. Courseware related to this book is available at <http://ls12-www.cs.tu-dortmund.de/~marwedel>.

Power and Performance Morgan Kaufmann

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 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 learn Write specialized data structures for performance-critical code Use modern metaprogramming techniques to reduce runtime calculations Achieve efficient memory management using custom memory allocators Reduce boilerplate code using reflection techniques Reap the benefits of lock-free concurrent programming Gain insights into subtle optimizations used by standard library algorithms Compose algorithms using ranges library Develop the ability to apply metaprogramming aspects such as constexpr, constraints, and concepts Implement lazy generators and asynchronous tasks using C++20 coroutines Who 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.

[Optimization Software Guide](#) Morgan Kaufmann Publishers

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.

Search Engine Optimization CRC Press

Full treatment, from model formulation to computational implementation, of optimization techniques that solve central problems in finance.

Programming Multicore and Many-core Computing Systems CRC Press

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.

Proceedings of the ... ACM SIGPLAN Symposium on Principles & Practice of Parallel Programming Springer Science & Business Media

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.

High Performance Computing for Computational Science -- VECPAR 2010 Elsevier

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.

Working Effectively with Legacy Code Morgan Kaufmann

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.

C++ High Performance The Software Optimization CookbookThe Software Optimization CookbookAnnotation 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

This book differs from traditional numerical analysis texts in that it focuses on the motivation and ideas behind the algorithms presented rather than on detailed analyses of them. It presents a broad overview of methods and software for solving mathematical problems arising in computational modeling and data analysis, including proper problem formulation, selection of effective solution algorithms, and interpretation of results.? In the 20 years since its original publication, the modern, fundamental perspective of this book has aged well, and it continues to be used in the classroom. This Classics edition has been updated to include pointers to Python software and the Chebfun package, expansions on barycentric formulation for Lagrange polynomial interpretation and stochastic methods, and the availability of about 100 interactive educational modules that dynamically illustrate the concepts and algorithms in the book. Scientific Computing: An Introductory Survey, Second Edition is intended as both a textbook and a reference for computationally oriented disciplines that need to solve mathematical problems.

Handbook of Research on Computational Science and Engineering: Theory and Practice CRC Press

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

Embedded Computing for High Performance SIAM

By using computer simulations in research and development, computational science and engineering (CSE) allows empirical inquiry where traditional experimentation and methods of inquiry are difficult, inefficient, or prohibitively expensive. The Handbook of Research on Computational Science and Engineering: Theory and Practice is a reference for interested researchers and decision-makers who want a timely introduction to the possibilities in CSE to advance their ongoing research and applications or to discover new resources and cutting edge developments. Rather than reporting results obtained using CSE models, this comprehensive survey captures the architecture of the cross-disciplinary field, explores the long term implications of technology choices, alerts readers to the hurdles facing CSE, and identifies trends in future development.

Business Optimization Using Mathematical Programming CRC Press

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.

Julia Programming for Operations Research John Wiley & Sons

Mathematics of Computing -- Numerical Analysis.

Performance Optimization of Numerically Intensive Codes John Wiley & Sons

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.

CRC Press

Leverage Docker to deploying software at scale Key Features Leverage practical examples to manage containers efficiently Integrate with orchestration tools such as Kubernetes for controlled deployments Learn to implement best practices on improving efficiency and security of containers Book Description Docker is an open source platform for building, shipping, managing, and securing containers. Docker has become the tool of choice for people willing to work with containers. Since the market is moving toward containerization, Docker will definitely have a big role to play in the future tech market. This book starts with setting up Docker in different environment, and helps you learn how to work with Docker images. Then, you will take a deep dive into network and data management for containers. The book explores the RESTful APIs provided by Docker to perform different actions, such as image/container operations. The book then explores logs and troubleshooting Docker to solve issues and bottlenecks. You will gain an understanding of Docker use cases, orchestration, security, ecosystems, and hosting platforms to make your applications easy to deploy, build, and collaborate on. The book covers the new features of Docker 18.xx (or later), such as working with AWS and Azure, Docker Engine, Docker Swarm, Docker Compose, and so on. By the end of this book, you will have gained hands-on experience of finding quick solutions to different problems encountered while working with Docker. What you will learn Install Docker on various platforms Work with Docker images and containers Container networking and data sharing Docker APIs and language bindings Various PaaS solutions for Docker Implement container orchestration using Docker Swarm and Kubernetes Container security Docker on various clouds Who this book is for Book is targeted towards developers, system administrators, and DevOps engineers who want to use Docker in his/her development, QA, or production environments. It is expected that the reader has basic Linux/Unix skills such as installing packages, editing files, managing services, and so on. Any experience in virtualization technologies such as KVM, XEN, and VMware will be an added advantage

Software Optimization for High-performance Computing Packt Publishing Ltd

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.

Pyomo – Optimization Modeling in Python "O'Reilly Media, Inc."

?This book provides a complete and comprehensive guide to Pyomo (Python Optimization Modeling Objects) for beginning and advanced modelers, including students at the undergraduate and graduate levels, academic researchers, and practitioners. Using many examples to illustrate the different techniques useful for formulating models, this text beautifully elucidates the breadth of modeling capabilities that are supported by Pyomo and its handling of complex real-world applications. This second edition provides an expanded presentation of Pyomo's modeling capabilities, providing a broader description of the software that will enable the user to develop and optimize models. Introductory chapters have been revised to extend tutorials; chapters that discuss advanced features

now include the new functionalities added to Pyomo since the first edition including generalized disjunctive programming, mathematical programming with equilibrium constraints, and bilevel programming. Pyomo is an open source software package for formulating and solving large-scale optimization problems. The software extends the modeling approach supported by modern AML (Algebraic Modeling Language) tools. Pyomo is a flexible, extensible, and portable AML that is embedded in Python, a full-featured scripting language. Python is a powerful and 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.

Optimization Modeling with Spreadsheets SIAM

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

Power Distribution Planning Reference Book, Second Edition Springer Science & Business Media

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.