

C Multithreaded And Parallel Programming

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[The Art of Writing Efficient Programs](#) - Fedor G. Pikus 2021-10-22

Become a better programmer with performance improvement techniques such as concurrency, lock-free programming, atomic operations, parallelism, and memory management Key Features Learn proven techniques from a heavyweight and recognized expert in C++ and high-performance computing Understand the limitations of modern CPUs and their performance impact Find out how you can avoid writing inefficient code and get the best optimizations from the compiler Learn the tradeoffs and costs of writing high-performance programs Book Description The great free lunch of "performance taking care of itself" is over. Until recently, programs got faster by themselves as CPUs were upgraded, but that doesn't happen anymore. The clock frequency of new processors has almost peaked, and while new architectures provide small improvements to existing programs, this only helps slightly. To write efficient software, you now have to know how to program by making good use of the available computing resources, and this book will teach you how to do that. The Art of Efficient Programming covers all the major aspects of writing efficient programs, such as using CPU resources and memory efficiently, avoiding unnecessary computations, measuring performance, and how to put concurrency and multithreading to good use. You'll also learn about compiler optimizations and how to use the programming language (C++) more efficiently. Finally, you'll understand how design decisions impact performance. By the end of this book, you'll not only have enough knowledge of processors and compilers to write efficient programs, but you'll also be able to understand which techniques to use and what to measure while improving performance. At its core, this book is about learning how to learn. What you will learn Discover how to use the hardware computing resources in your programs effectively Understand the relationship between memory order and memory barriers Familiarize yourself with the performance implications of different data structures and organizations Assess the performance impact of concurrent memory accessed and how to minimize it Discover when to use and when not to use lock-free programming techniques Explore different ways to improve the effectiveness of compiler optimizations Design APIs for concurrent data structures and high-performance data structures to avoid inefficiencies Who this book is for This book is for experienced developers and programmers who work on performance-critical projects and want to learn new techniques to improve the performance of their code. Programmers in algorithmic trading, gaming, bioinformatics, computational genomics, or computational fluid dynamics communities will get the most out of the examples in this book, but the techniques are fairly universal. Although this book uses the C++ language, the concepts demonstrated in the book can be easily transferred or applied to other compiled languages such as C, Java, Rust, Go, and more.

[Parallel Programming with C# and .NET Core](#) - Verma Neha Rishabh, Shrivastava Ravindra Akella 2020-09-03

Learn, understand, and code parallel programs with confidence using C# 8 and .NET Core 3.0 Key Features a- Explore and work with the new features and enhancements in .NET Core 3.1 and C# 8. a- Understand the fundamentals of parallel programming. a- Learn various threading patterns and synchronization constructs. a- Build concurrent applications using C# and .NET Core 3.1 from the ground up. a- Understand the principles of unit testing and debugging in concurrent applications. Description Application development has evolved over the last decade, and with the advent of the latest technologies like Angular, React on client-side, and ASP.NET Core, Spring on the server-side, the consumer expectations have risen like never before. The primary objective of this book is to help readers understand the importance of asynchronous programming and various ways it can be achieved using .NET Core 3.1 and C# 8 to successfully build concurrent applications. Along the way reader will learn the fundamentals of threading, asynchronous

programming, various asynchronous patterns, synchronisation constructs, unit testing parallel methods, debugging enterprise applications, and cool tips and tricks. There are samples based on practical examples that will help the reader effectively use parallel programming. By the end of this book, you will be equipped with all the knowledge needed to understand, code, and debug multithreaded, concurrent and parallel programs with confidence. What will you learn a- Understand the internals of async/await. a- Learn how to build applications using async/await. a- Write unit tests for asynchronous methods. a- Explore various debugging techniques for enterprise applications. a- Discover cool tips, tricks, and best practices to help you avoid common mistakes. Who this book is for Beginners and intermediate developers who build enterprise applications using .NET Core platform and tools. Advanced users can also use this book for brushing up fundamentals and for learning debugging tools, techniques, tips, and tricks. TABLE OF CONTENTS 1. Getting Started 2. What's new in C# 8? 3. .NET Core 3.1 4. Demystifying Threading 5. Parallel Programming 6. The Threading Patterns 7. Synchronization Constructs 8. Unit Testing Parallel and Asynchronous Programs 9. Debugging and Troubleshooting (Its spelling is incorrect in pdf) 10. Tips and Tricks ABOUT THE AUTHORS Rishabh Verma is a Microsoft certified professional and works at Microsoft as a senior development consultant, helping the customers to design, develop, and deploy enterprise-level applications. An electronic engineer by education, he has 12+ years of hardcore development experience on the .NET technology stack. He is passionate about creating tools, Visual Studio extensions, and utilities to increase developer productivity. His interests are .NET Compiler Platform (Roslyn), Visual Studio Extensibility, code generation, and .NET Core. He is a member of the .NET Foundation (<https://www.dotnetfoundation.org>). He occasionally blogs at <https://rishabhverma.net/>. He has authored a book on .NET Core 2.0 prior to this title. His twitter id is @VermaRishabh, and his LinkedIn page is <https://www.linkedin.com/in/rishabhverma/> Neha Shrivastava is a Microsoft certified professional and works as a software engineer for the Cloud & AI group at Microsoft India Development Center. She has about 10 years' development experience and has expertise in the financial, healthcare, and e-commerce domains. Neha did her bachelor's in electronics engineering. Her interests are the ASP.NET stack, Azure, and cross-platform development. She is passionate about learning new technologies and keeps herself up to date with the latest advancements. She has already written a book on .NET Core 2.0 last year. Her LinkedIn profile page is <https://www.linkedin.com/in/neh-shrivastava-99a80135/> Ravindra Akella works as a Senior Consultant at Microsoft with more than 13 years of software development experience. Specializing in .NET and web-related technologies, his current role involves end to end ownership of products right from architecture to delivery. He has lead software architecture, design, development, and delivery of large complex solutions with >80 software engineers using Azure Cloud and related technologies. He is a tech-savvy developer who is passionate about embracing new technologies. He has delivered talks and sessions on Azure and other technologies in international conferences. His LinkedIn profile is <https://www.linkedin.com/in/ravindra-akella/> [Intel Threading Building Blocks](#) - James Reinders 2007-07-12 Book explains how to maximize the benefits of Intel's new dual-core and multi-core processors through a portable C++ library that works on Windows, Linux, Macintosh, and Unix systems. [Programming in C#: Exam 70-483 \(MCSD\) Guide](#) - Simaranjit Singh Bhalla 2019-10-31 Acquire necessary skills in preparing for Microsoft certification and enhance your software development career by learning the concepts of C# programming Key Features Prepare for the certification using step-by-step examples, and mock tests with standard solutions Understand the

concepts of data security for secure programming with C# Learn to scale and optimize your application codebase using best practices and patterns Book Description Programming in C# is a certification from Microsoft that measures the ability of developers to use the power of C# in decision making and creating business logic. This book is a certification guide that equips you with the skills that you need to crack this exam and promote your problem-solving acumen with C#. The book has been designed as preparation material for the Microsoft specialization exam in C#. It contains examples spanning the main focus areas of the certification exam, such as debugging and securing applications, and managing an application's code base, among others. This book will be full of scenarios that demand decision-making skills and require a thorough knowledge of C# concepts. You will learn how to develop business logic for your application types in C#. This book is exam-oriented, considering all the patterns for Microsoft certifications and practical solutions to challenges from Microsoft-certified authors. By the time you've finished this book, you will have had sufficient practice solving real-world application development problems with C# and will be able to carry your newly-learned skills to crack the Microsoft certification exam to level up your career. What you will learn Explore multi-threading and asynchronous programming in C# Create event handlers for effective exception handling Use LINQ queries for data serialization and deserialization Manage filesystems and understand I/O operations Test, troubleshoot, and debug your C# programs Understand the objectives of Exam 70-483 and apply common solutions Who this book is for The book is intended to the aspirants of Microsoft certifications and C# developers wanting to become a Microsoft specialist. The book does not require the knowledge of C#, basic knowledge of software development concepts will be beneficial

Computer Organization and Design MIPS Edition - David A. Patterson 2013-09-30

Computer Organization and Design, Fifth Edition, is the latest update to the classic introduction to computer organization. The text now contains new examples and material highlighting the emergence of mobile computing and the cloud. It explores this generational change with updated content featuring tablet computers, cloud infrastructure, and the ARM (mobile computing devices) and x86 (cloud computing) architectures. The book uses a MIPS processor core to present the fundamentals of hardware technologies, assembly language, computer arithmetic, pipelining, memory hierarchies and I/O. Because an understanding of modern hardware is essential to achieving good performance and energy efficiency, this edition adds a new concrete example, Going Faster, used throughout the text to demonstrate extremely effective optimization techniques. There is also a new discussion of the Eight Great Ideas of computer architecture. Parallelism is examined in depth with examples and content highlighting parallel hardware and software topics. The book features the Intel Core i7, ARM Cortex-A8 and NVIDIA Fermi GPU as real-world examples, along with a full set of updated and improved exercises. This new edition is an ideal resource for professional digital system designers, programmers, application developers, and system software developers. It will also be of interest to undergraduate students in Computer Science, Computer Engineering and Electrical Engineering courses in Computer Organization, Computer Design, ranging from Sophomore required courses to Senior Electives. Winner of a 2014 Texty Award from the Text and Academic Authors Association Includes new examples, exercises, and material highlighting the emergence of mobile computing and the cloud Covers parallelism in depth with examples and content highlighting parallel hardware and software topics Features the Intel Core i7, ARM Cortex-A8 and NVIDIA Fermi GPU as real-world examples throughout the book Adds a new concrete example, "Going Faster," to demonstrate how understanding hardware can inspire software optimizations that improve performance by 200 times Discusses and highlights the "Eight Great Ideas" of computer architecture: Performance via Parallelism; Performance via Pipelining; Performance via Prediction; Design for Moore's Law; Hierarchy of Memories; Abstraction to Simplify Design; Make the Common Case Fast; and Dependability via Redundancy Includes a full set of updated and improved exercises

Introduction to Parallel Computing - Zbigniew J. Czech 2017-01-11

The constantly increasing demand for more computing power can seem impossible to keep up with. However, multicore processors capable of performing computations in parallel allow computers to tackle ever larger problems in a wide variety of applications. This book provides a comprehensive introduction to parallel computing, discussing theoretical issues such as the fundamentals of concurrent processes, models of

parallel and distributed computing, and metrics for evaluating and comparing parallel algorithms, as well as practical issues, including methods of designing and implementing shared- and distributed-memory programs, and standards for parallel program implementation, in particular MPI and OpenMP interfaces. Each chapter presents the basics in one place followed by advanced topics, allowing novices and experienced practitioners to quickly find what they need. A glossary and more than 80 exercises with selected solutions aid comprehension. The book is recommended as a text for advanced undergraduate or graduate students and as a reference for practitioners.

Is Parallel Programming Hard - Paul E. McKenney 2015-06-13

OpenMP Shared Memory Parallel Programming - Michael J. Voss 2007-03-05

The refereed proceedings of the International Workshop on OpenMP Applications and Tools, WOMPAT 2003, held in Toronto, Canada in June 2003. The 20 revised full papers presented were carefully reviewed and selected for inclusion in the book. The papers are organized in sections on tools and tool technology, OpenMP implementations, OpenMP experience, and OpenMP on clusters.

Parallel and Distributed Programming Using C++ - Cameron Hughes 2004

This text takes complicated and almost unapproachable parallel programming techniques and presents them in a simple, understandable manner. It covers the fundamentals of programming for distributed environments like Internets and Intranets as well as the topic of Web Based Agents.

C++17 STL Cookbook - Jacek Galowicz 2017-06-28

Over 90 recipes that leverage the powerful features of the Standard Library in C++17 About This Book Learn the latest features of C++ and how to write better code by using the Standard Library (STL). Reduce the development time for your applications. Understand the scope and power of STL features to deal with real-world problems. Compose your own algorithms without forfeiting the simplicity and elegance of the STL way. Who This Book Is For This book is for intermediate-to-advanced C++ programmers who want to get the most out of the Standard Template Library of the newest version of C++: C++ 17. What You Will Learn Learn about the new core language features and the problems they were intended to solve Understand the inner workings and requirements of iterators by implementing them Explore algorithms, functional programming style, and lambda expressions Leverage the rich, portable, fast, and well-tested set of well-designed algorithms provided in the STL Work with strings the STL way instead of handcrafting C-style code Understand standard support classes for concurrency and synchronization, and how to put them to work Use the filesystem library addition available with the C++17 STL In Detail C++ has come a long way and is in use in every area of the industry. Fast, efficient, and flexible, it is used to solve many problems. The upcoming version of C++ will see programmers change the way they code. If you want to grasp the practical usefulness of the C++17 STL in order to write smarter, fully portable code, then this book is for you. Beginning with new language features, this book will help you understand the language's mechanics and library features, and offers insight into how they work. Unlike other books, ours takes an implementation-specific, problem-solution approach that will help you quickly overcome hurdles. You will learn the core STL concepts, such as containers, algorithms, utility classes, lambda expressions, iterators, and more, while working on practical real-world recipes. These recipes will help you get the most from the STL and show you how to program in a better way. By the end of the book, you will be up to date with the latest C++17 features and save time and effort while solving tasks elegantly using the STL. Style and approach This recipe-based guide will show you how to make the best use of C++ together with the STL to squeeze more out of the standard language

Languages and Compilers for Parallel Computing - Gheorghe Almási 2007-05-25

This book constitutes the thoroughly refereed post-proceedings of the 19th International Workshop on Languages and Compilers for Parallel Computing, LCPC 2006, held in New Orleans, LA, USA in November 2006. The 24 revised full papers presented together with two keynote talks cover programming models, code generation, parallelism, compilation techniques, data structures, register allocation, and memory management.

Programming with POSIX Threads - David R. Butenhof 1993-05-15

With this practical book, you will attain a solid understanding of threads

and will discover how to put this powerful mode of programming to work in real-world applications. The primary advantage of threaded programming is that it enables your applications to accomplish more than one task at the same time by using the number-crunching power of multiprocessor parallelism and by automatically exploiting I/O concurrency in your code, even on a single processor machine. The result: applications that are faster, more responsive to users, and often easier to maintain. Threaded programming is particularly well suited to network programming where it helps alleviate the bottleneck of slow network I/O. This book offers an in-depth description of the IEEE operating system interface standard, POSIXAE (Portable Operating System Interface) threads, commonly called Pthreads. Written for experienced C programmers, but assuming no previous knowledge of threads, the book explains basic concepts such as asynchronous programming, the lifecycle of a thread, and synchronization. You then move to more advanced topics such as attributes objects, thread-specific data, and realtime scheduling. An entire chapter is devoted to "real code," with a look at barriers, read/write locks, the work queue manager, and how to utilize existing libraries. In addition, the book tackles one of the thorniest problems faced by thread programmers-debugging-with valuable suggestions on how to avoid code errors and performance problems from the outset. Numerous annotated examples are used to illustrate real-world concepts. A Pthreads mini-reference and a look at future standardization are also included.

Solving Irregularly Structured Problems in Parallel - Gianfranco Bilardi 1997-06-04

This book constitutes the refereed proceedings of the 4th International Symposium on Solving Irregularly Structured Problems in Parallel, IRREGULAR'97, held in Paderborn, Germany, in June 1997. The 18 revised full papers presented were carefully selected by the program committee for inclusion in the volume; also included are full papers by the five invited speakers. Among the topics covered are discrete algorithms, randomized methods and approximation algorithms, implementations, programming environments, systems and applications, and scheduling and load balancing.

Euro-Par 2003 Parallel Processing - Harald Kosch 2004-06-01

Euro-Par Conference Series The European Conference on Parallel Computing (Euro-Par) is an international conference series dedicated to the promotion and advancement of all aspects of parallel and distributed computing. The major themes fall into the categories of hardware, software, algorithms, and applications. This year, new and interesting topics were introduced, like Peer-to-Peer Computing, Distributed Multimedia Systems, and Mobile and Ubiquitous Computing. For the first time, we organized a Demo Session showing many challenging applications. The general objective of Euro-Par is to provide a forum promoting the development of parallel and distributed computing both as an industrial technique and an academic discipline, extending the frontiers of both the state of the art and the state of the practice. The industrial importance of parallel and distributed computing is supported this year by a special Industrial Session as well as a vendors' exhibition. This is particularly important as currently parallel and distributed computing is evolving into a globally important technology; the buzzword Grid Computing clearly expresses this move. In addition, the trend to a mobile world is clearly visible in this year's Euro-Par.

The main audience for and participants at Euro-Par are researchers in academic departments, industrial organizations, and government laboratories. Euro-Par aims to become the primary choice of such professionals for the presentation of new results in their specific areas. Euro-Par has its own Internet domain with a permanent Web site where the history of the conference series is described: <http://www.euro-par.org>. The Euro-Par conference series is sponsored by the Association for Computer Machinery (ACM) and the International Federation for Information Processing (IFIP).

Parallel and Distributed Processing - José D. P. Rolim 1999-03-30

This book constitutes the refereed proceedings of 11 IPSP/SPDP '98 Workshops held in conjunction with the 13th International Parallel Processing Symposium and the 10th Symposium on Parallel and Distributed Processing in San Juan, Puerto Rico, USA in April 1999. The 126 revised papers presented were carefully selected from a wealth of papers submitted. The papers are organized in topical sections on biologically inspired solutions to parallel processing problems: High-Level Parallel Programming Models and Supportive Environments; Biologically Inspired Solutions to Parallel Processing; Parallel and Distributed Real-Time Systems; Run-Time Systems for Parallel Programming; Reconfigurable Architectures; Java for Parallel and

Distributed Computing; Optics and Computer Science; Solving Irregularly Structured Problems in Parallel; Personal Computer Based Workstation Networks; Formal Methods for Parallel Programming; Embedded HPC Systems and Applications.

Hands-On Parallel Programming with C# 8 and .NET Core 3 - Shakti Tanwar 2019-12-20

Enhance your enterprise application development skills by mastering parallel programming techniques in .NET and C# Key Features Write efficient, fine-grained, and scalable parallel code with C# and .NET Core Experience how parallel programming works by building a powerful application Learn the fundamentals of multithreading by working with IIS and Kestrel Book Description In today's world, every CPU has a multi-core processor. However, unless your application has implemented parallel programming, it will fail to utilize the hardware's full processing capacity. This book will show you how to write modern software on the optimized and high-performing .NET Core 3 framework using C# 8. Hands-On Parallel Programming with C# 8 and .NET Core 3 covers how to build multithreaded, concurrent, and optimized applications that harness the power of multi-core processors. Once you've understood the fundamentals of threading and concurrency, you'll gain insights into the data structure in .NET Core that supports parallelism. The book will then help you perform asynchronous programming in C# and diagnose and debug parallel code effectively. You'll also get to grips with the new Kestrel server and understand the difference between the IIS and Kestrel operating models. Finally, you'll learn best practices such as test-driven development, and run unit tests on your parallel code. By the end of the book, you'll have developed a deep understanding of the core concepts of concurrency and asynchrony to create responsive applications that are not CPU-intensive. What you will learn Analyze and break down a problem statement for parallelism Explore the APM and EAP patterns and how to move legacy code to Task Apply reduction techniques to get aggregated results Create PLINQ queries and study the factors that impact their performance Solve concurrency problems caused by producer-consumer race conditions Discover the synchronization primitives available in .NET Core Understand how the threading model works with IIS and Kestrel Find out how you can make the most of server resources Who this book is for If you want to learn how task parallelism is used to build robust and scalable enterprise architecture, this book is for you. Whether you are a beginner to parallelism in C# or an experienced architect, you'll find this book useful to gain insights into the different threading models supported in .NET Standard and .NET Core. Prior knowledge of C# is required to understand the concepts covered in this book.

C++ Concurrency in Action - Anthony Williams 2019-02-07

Summary This bestseller has been updated and revised to cover all the latest changes to C++ 14 and 17! C++ Concurrency in Action, Second Edition teaches you everything you need to write robust and elegant multithreaded applications in C++17. Purchase of the print book includes a free eBook in PDF, Kindle, and ePub formats from Manning Publications. About the Technology You choose C++ when your applications need to run fast. Well-designed concurrency makes them go even faster. C++ 17 delivers strong support for the multithreaded, multiprocessor programming required for fast graphic processing, machine learning, and other performance-sensitive tasks. This exceptional book unpacks the features, patterns, and best practices of production-grade C++ concurrency. About the Book C++ Concurrency in Action, Second Edition is the definitive guide to writing elegant multithreaded applications in C++. Updated for C++ 17, it carefully addresses every aspect of concurrent development, from starting new threads to designing fully functional multithreaded algorithms and data structures. Concurrency master Anthony Williams presents examples and practical tasks in every chapter, including insights that will delight even the most experienced developer. What's inside Full coverage of new C++ 17 features Starting and managing threads Synchronizing concurrent operations Designing concurrent code Debugging multithreaded applications About the Reader Written for intermediate C and C++ developers. No prior experience with concurrency required. About the Author Anthony Williams has been an active member of the BSI C++ Panel since 2001 and is the developer of the just.thread Pro extensions to the C++ 11 thread library. Table of Contents Hello, world of concurrency in C++! Managing threads Sharing data between threads Synchronizing concurrent operations The C++ memory model and operations on atomic types Designing lock-based concurrent data structures Designing lock-free concurrent data structures Designing concurrent code Advanced thread management Parallel algorithms

Testing and debugging multithreaded applications

C++ High Performance - Björn Andrist 2018-01-31

Write code that scales across CPU registers, multi-core, and machine clusters Key Features Explore concurrent programming in C++ Identify memory management problems Use SIMD and STL containers for performance improvement Book Description C++ is a highly portable language and can be used to write both large-scale applications and performance-critical code. It has evolved over the last few years to become a modern and expressive language. This book will guide you through optimizing the performance of your C++ apps by allowing them to run faster and consume fewer resources on the device they're running on without compromising the readability of your code base. The book begins by helping you measure and identify bottlenecks in a C++ code base. It then moves on by teaching you how to use modern C++ constructs and techniques. You'll see how this affects the way you write code. Next, you'll see the importance of data structure optimization and memory management, and how it can be used efficiently with respect to CPU caches. After that, you'll see how STL algorithm and composable Range V3 should be used to both achieve faster execution and more readable code, followed by how to use STL containers and how to write your own specialized iterators. Moving on, you'll get hands-on experience in making use of modern C++ metaprogramming and reflection to reduce boilerplate code as well as in working with proxy objects to perform optimizations under the hood. After that, you'll learn concurrent programming and understand lock-free data structures. The book ends with an overview of parallel algorithms using STL execution policies, Boost Compute, and OpenCL to utilize both the CPU and the GPU. What you will learn Benefits of modern C++ constructs and techniques Identify hardware bottlenecks, such as CPU cache misses, to boost performance 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 Perform under-the-hood optimizations with preserved readability using proxy objects Gain insights into subtle optimizations used by STL algorithms Utilize the Range V3 library for expressive C++ code Parallelize your code over CPU and GPU, without compromising readability Who this book is for If you're a C++ developer looking to improve the speed of your code or simply wanting to take your skills up to the next level, then this book is perfect for you.

Parallel Processing and Applied Mathematics - Roman Wyrzykowski 2004-04-26

This book constitutes the thoroughly refereed post-proceedings of the 5th International Conference on Parallel Processing and Applied Mathematics, PPAM 2003, held in Czestochowa, Poland, in September 2003. The 149 papers presented were carefully selected and improved during two rounds of reviewing and revision. The papers are organized in topical sections on parallel and distributed architectures, scheduling and load balancing, performance analysis and prediction, parallel and distributed non-numerical algorithms, parallel and distributed programming, tools and environments, applications, evolutionary computing, soft computing data and knowledge management, numerical methods and their applications, multi-dimensional systems, grid computing, heterogeneous platforms, high performance numerical computation, large-scale scientific computation, and bioinformatics applications.

Intel Threading Building Blocks - James Reinders 2007-07-12

Multi-core chips from Intel and AMD offer a dramatic boost in speed and responsiveness, and plenty of opportunities for multiprocessing on ordinary desktop computers. But they also present a challenge: More than ever, multithreading is a requirement for good performance. This guide explains how to maximize the benefits of these processors through a portable C++ library that works on Windows, Linux, Macintosh, and Unix systems. With it, you'll learn how to use Intel Threading Building Blocks (TBB) effectively for parallel programming -- without having to be a threading expert. Written by James Reinders, Chief Evangelist of Intel Software Products, and based on the experience of Intel's developers and customers, this book explains the key tasks in multithreading and how to accomplish them with TBB in a portable and robust manner. With plenty of examples and full reference material, the book lays out common patterns of uses, reveals the gotchas in TBB, and gives important guidelines for choosing among alternatives in order to get the best performance. You'll learn how Intel Threading Building Blocks: Enables you to specify tasks instead of threads for better portability, easier

programming, more understandable source code, and better performance and scalability in general Focuses on the goal of parallelizing computationally intensive work to deliver high-level solutions Is compatible with other threading packages, and doesn't force you to pick one package for your entire program Emphasizes scalable, data-parallel programming, which allows program performance to increase as you add processors Relies on generic programming, which enables you to write the best possible algorithms with the fewest constraints Any C++ programmer who wants to write an application to run on a multi-core system will benefit from this book. TBB is also very approachable for a C programmer or a C++ programmer without much experience with templates. Best of all, you don't need experience with parallel programming or multi-core processors to use this book.

High Performance IOS Apps - Gaurav Vaish 2016-06-16

Now that more people spend more time interacting with mobile apps than with their desktop counterparts, you need to think about your iOS app's performance the moment you write your first line of code. This practical hands-on guide shows you how. Through specific and concise tips for designing and optimizing your apps, author Gaurav Vaish provides solutions to many common performance scenarios, including reusable code that you can put to work right away.

Algorithms and Architectures for Parallel Processing - Arrems Hua 2009-07-31

This book constitutes the refereed proceedings of the 9th International Conference on Algorithms and Architectures for Parallel Processing, ICA3PP 2009, held in Taipei, Taiwan, in June 2009. The 80 revised full papers were carefully reviewed and selected from 243 submissions. The papers are organized in topical sections on bioinformatics in parallel computing; cluster, grid and fault-tolerant computing; cluster distributed parallel operating systems; dependability issues in computer networks and communications; dependability issues in distributed and parallel systems; distributed scheduling and load balancing, industrial applications; information security internet; multi-core programming software tools; multimedia in parallel computing; parallel distributed databases; parallel algorithms; parallel architectures; parallel IO systems and storage systems; performance of parallel distributed computing systems; scientific applications; self-healing, self-protecting and fault-tolerant systems; tools and environments for parallel and distributed software development; and Web service.

Multi-Threaded Programming in C++ - Mark Walmsley 2012-12-06

This is a clear introduction to the basic concepts of multi-threading complemented by a detailed description of the multi-threading facilities available under the UNIX and Windows operating systems. The implementation mechanisms are hidden within C++ classes, which then provide standardized interfaces to the functionality. With traditional single-threaded programming, objects serve as passive repositories of functionality that are invoked by external code multi-threading allows objects to become active entities that independently perform their own processing.

C# Multithreaded and Parallel Programming - Rodney Ringle 2014-12-24

If you are a C# developer and want to learn how to take advantage of the features of .NET for concurrent and multithreaded applications, then this book is for you. If you are already comfortable with C# but want to learn more about parallel design patterns, threads, tasks, and async, then look no further!

C++ High Performance - Björn Andrist 2020-12-30

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 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.

Modern Multithreading - Richard H. Carver 2005-11-28

Master the essentials of concurrent programming, including testing and debugging. This textbook examines languages and libraries for multithreaded programming. Readers learn how to create threads in Java and C++, and develop essential concurrent programming and problem-solving skills. Moreover, the textbook sets itself apart from other comparable works by helping readers to become proficient in key testing and debugging techniques. Among the topics covered, readers are introduced to the relevant aspects of Java, the POSIX Pthreads library, and the Windows Win32 Applications Programming Interface. The authors have developed and fine-tuned this book through the concurrent programming courses they have taught for the past twenty years. The material, which emphasizes practical tools and techniques to solve concurrent programming problems, includes original results from the authors' research. Chapters include:

- * Introduction to concurrent programming
- * The critical section problem
- * Semaphores and locks
- * Monitors
- * Message-passing
- * Message-passing in distributed programs
- * Testing and debugging concurrent programs

As an aid to both students and instructors, class libraries have been implemented to provide working examples of all the material that is covered. These libraries and the testing techniques they support can be used to assess student-written programs. Each chapter includes exercises that build skills in program writing and help ensure that readers have mastered the chapter's key concepts. The source code for all the listings in the text and for the synchronization libraries is also provided, as well as startup files and test cases for the exercises. This textbook is designed for upper-level undergraduates and graduate students in computer science. With its abundance of practical material and inclusion of working code, coupled with an emphasis on testing and debugging, it is also a highly useful reference for practicing programmers.

C++ Concurrency in Action - Anthony Williams 2019

C++ Concurrency in Action, Second Edition is the definitive guide to writing elegant multithreaded applications in C++. Updated for C++ 17, it carefully addresses every aspect of concurrent development, from starting new threads to designing fully functional multithreaded algorithms and data structures. Concurrency master Anthony Williams presents examples and practical tasks in every chapter, including insights that will delight even the most experienced developer. -- Provided by publisher.

Parallel and Concurrent Programming in Haskell - Simon Marlow 2013-07-12

If you have a working knowledge of Haskell, this hands-on book shows you how to use the language's many APIs and frameworks for writing both parallel and concurrent programs. You'll learn how parallelism exploits multicore processors to speed up computation-heavy programs, and how concurrency enables you to write programs with threads for multiple interactions. Author Simon Marlow walks you through the process with lots of code examples that you can run, experiment with, and extend. Divided into separate sections on Parallel and Concurrent Haskell, this book also includes exercises to help you become familiar with the concepts presented: Express parallelism in Haskell with the Eval monad and Evaluation Strategies Parallelize ordinary Haskell code with the Par monad Build parallel array-based computations, using the Repa library Use the Accelerate library to run computations directly on the

GPU Work with basic interfaces for writing concurrent code Build trees of threads for larger and more complex programs Learn how to build high-speed concurrent network servers Write distributed programs that run on multiple machines in a network

Concurrency in C# Cookbook - Stephen Cleary 2014-05-15

If you're one of the many developers uncertain about concurrent and multithreaded development, this practical cookbook will change your mind. With more than 75 code-rich recipes, author Stephen Cleary demonstrates parallel processing and asynchronous programming techniques, using libraries and language features in .NET 4.5 and C# 5.0. Concurrency is becoming more common in responsive and scalable application development, but it's been extremely difficult to code. The detailed solutions in this cookbook show you how modern tools raise the level of abstraction, making concurrency much easier than before. Complete with ready-to-use code and discussions about how and why the solution works, you get recipes for using: `async` and `await` for asynchronous operations Parallel programming with the Task Parallel Library The TPL Dataflow library for creating dataflow pipelines Capabilities that Reactive Extensions build on top of LINQ Unit testing with concurrent code Interop scenarios for combining concurrent approaches Immutable, threadsafe, and producer/consumer collections Cancellation support in your concurrent code Asynchronous-friendly Object-Oriented Programming Thread synchronization for accessing data

Parallel Computing Technologies - Malyshkin Victor 2005-09-07

The PaCT 2005 (Parallel Computing Technologies) conference was a four-day conference held in Krasnoyarsk, September 5-9, 2005.

Parallel Programming - Bertil Schmidt 2017-11-20

Parallel Programming: Concepts and Practice provides an upper level introduction to parallel programming. In addition to covering general parallelism concepts, this text teaches practical programming skills for both shared memory and distributed memory architectures. The authors' open-source system for automated code evaluation provides easy access to parallel computing resources, making the book particularly suitable for classroom settings. Covers parallel programming approaches for single computer nodes and HPC clusters: OpenMP, multithreading, SIMD vectorization, MPI, UPC++ Contains numerous practical parallel programming exercises Includes access to an automated code evaluation tool that enables students the opportunity to program in a web browser and receive immediate feedback on the result validity of their program Features an example-based teaching of concept to enhance learning outcomes

PThreads Programming - Bradford Nichols 1996-09

With threads programming, multiple tasks run concurrently within the same program. They can share a single CPU as processes do or take advantage of multiple CPUs when available. They provide a clean way to divide the tasks of a program while sharing data.

Encyclopedia of Parallel Computing - David Padua 2011-09-08

Containing over 300 entries in an A-Z format, the Encyclopedia of Parallel Computing provides easy, intuitive access to relevant information for professionals and researchers seeking access to any aspect within the broad field of parallel computing. Topics for this comprehensive reference were selected, written, and peer-reviewed by an international pool of distinguished researchers in the field. The Encyclopedia is broad in scope, covering machine organization, programming languages, algorithms, and applications. Within each area, concepts, designs, and specific implementations are presented. The highly-structured essays in this work comprise synonyms, a definition and discussion of the topic, bibliographies, and links to related literature. Extensive cross-references to other entries within the Encyclopedia support efficient, user-friendly searches for immediate access to useful information. Key concepts presented in the Encyclopedia of Parallel Computing include; laws and metrics; specific numerical and non-numerical algorithms; asynchronous algorithms; libraries of subroutines; benchmark suites; applications; sequential consistency and cache coherency; machine classes such as clusters, shared-memory multiprocessors, special-purpose machines and dataflow machines; specific machines such as Cray supercomputers, IBM's cell processor and Intel's multicore machines; race detection and auto parallelization; parallel programming languages, synchronization primitives, collective operations, message passing libraries, checkpointing, and operating systems. Topics covered: Speedup, Efficiency, Isoefficiency, Redundancy, Amdahl's law, Computer Architecture Concepts, Parallel Machine Designs, Benchmarks, Parallel Programming concepts & design, Algorithms, Parallel applications. This authoritative reference will be published in two formats: print and online. The online edition features

hyperlinks to cross-references and to additional significant research.
Related Subjects: supercomputing, high-performance computing, distributed computing

Parallel Computing on Heterogeneous Networks - Alexey L.

Lastovetsky 2008-05-02

New approaches to parallel computing are being developed that make better use of the heterogeneous cluster architecture Provides a detailed introduction to parallel computing on heterogenous clusters All concepts and algorithms are illustrated with working programs that can be compiled and executed on any cluster The algorithms discussed have practical applications in a range of real-life parallel computing problems, such as the N-body problem, portfolio management, and the modeling of oil extraction

Mastering C++ Multithreading - Maya Posch 2017-07-28

Master multithreading and concurrent processing with C++ About This Book Delve into the fundamentals of multithreading and concurrency and find out how to implement them Explore atomic operations to optimize code performance Apply concurrency to both distributed computing and GPGPU processing Who This Book Is For This book is for intermediate C++ developers who wish to extend their knowledge of multithreading and concurrent processing. You should have basic experience with multithreading and be comfortable using C++ development toolchains on the command line. What You Will Learn Deep dive into the details of the how various operating systems currently implement multithreading Choose the best multithreading APIs when designing a new application Explore the use of mutexes, spin-locks, and other synchronization concepts and see how to safely pass data between threads Understand the level of API support provided by various C++ toolchains Resolve common issues in multithreaded code and recognize common pitfalls using tools such as Memcheck, CacheGrind, DRD, Helgrind, and more Discover the nature of atomic operations and understand how they can be useful in optimizing code Implement a multithreaded application in a distributed computing environment Design a C++-based GPGPU application that employs multithreading In Detail Multithreaded applications execute multiple threads in a single processor environment, allowing developers achieve concurrency. This book will teach you the finer points of multithreading and concurrency concepts and how to apply them efficiently in C++. Divided into three modules, we start with a brief introduction to the fundamentals of multithreading and concurrency concepts. We then take an in-depth look at how these concepts work at the hardware-level as well as how both operating systems and frameworks use these low-level functions. In the next module, you will learn about the native multithreading and concurrency support available in C++ since the 2011 revision, synchronization and communication between threads, debugging concurrent C++ applications, and the best programming practices in C++. In the final module, you will learn about atomic operations before moving on to apply concurrency to distributed and GPGPU-based processing. The comprehensive coverage of essential multithreading concepts means you will be able to efficiently apply multithreading concepts while coding in C++. Style and approach This book is filled with examples that will help you become a master at writing robust concurrent and parallel applications in C++.

Job Scheduling Strategies for Parallel Processing - Hawaii) Ipps 96

Workshop (1996 Honolulu 1996-10-16

This book constitutes the strictly refereed post-workshop proceedings of the International Workshop on Job Scheduling Strategies for Parallel Processing, held in conjunction with IPPS '96 symposium in Honolulu,

Hawaii, in April 1996. The book presents 15 thoroughly revised full papers accepted for inclusion on the basis of the reports of at least five program committee members. The volume is a highly competent contribution to advancing the state-of-the-art in the area of job scheduling for parallel supercomputers. Among the topics addressed are job scheduler, workload evolution, gang scheduling, multiprocessor scheduling, parallel processor allocation, and distributed memory environments.

Proceedings of the Second Workshop on Environments and Tools for Parallel Scientific Computing - J. J. Dongarra 1994-01-01

The editors provide a review of the programming environments for parallel computers with the help of worldwide specialists in each domain. Four different domains were discussed at the workshop, and they each form a part of this book.

C++ Concurrency in Action - Anthony Williams 2012

With the new C++ Standard and Technical Report 2 (TR2), multi-threading is coming to C++ in a big way. TR2 will provide higher-level synchronization facilities that allow for a much greater level of abstraction, and make programming multi-threaded applications simpler and safer. Concurrent programming is required if programmers are to take advantage of the multi-core microprocessors increasingly available from Intel and others. The new standard for C++ has extensions to the language that make concurrent programming more accessible to regular developers. As a guide and reference to the new concurrency features in the upcoming C++ Standard and TR2, this book is invaluable for existing programmers familiar with writing multi-threaded code in C++ using platform-specific APIs, or in other languages, as well as C++ programmers who have never written multithreaded code before.

Multithreading for Visual Effects - Martin Watt 2014-07-29

Tackle the Challenges of Parallel Programming in the Visual Effects Industry In Multithreading for Visual Effects, developers from DreamWorks Animation, Pixar, Side Effects, Intel, and AMD share their successes and failures in the messy real-world application area of production software. They provide practical advice on multithreading techniques and

Foundations of Multithreaded, Parallel, and Distributed Programming - Gregory R. Andrews 2000

Foundations of Multithreaded, Parallel, and Distributed Programming covers, and then applies, the core concepts and techniques needed for an introductory course in this subject. Its emphasis is on the practice and application of parallel systems, using real-world examples throughout. Greg Andrews teaches the fundamental concepts of multithreaded, parallel and distributed computing and relates them to the implementation and performance processes. He presents the appropriate breadth of topics and supports these discussions with an emphasis on performance. Features Emphasizes how to solve problems, with correctness the primary concern and performance an important, but secondary, concern Includes a number of case studies which cover such topics as pthreads, MPI, and OpenMP libraries, as well as programming languages like Java, Ada, high performance Fortran, Linda, Occam, and SR Provides examples using Java syntax and discusses how Java deals with monitors, sockets, and remote method invocation Covers current programming techniques such as semaphores, locks, barriers, monitors, message passing, and remote invocation Concrete examples are executed with complete programs, both shared and distributed Sample applications include scientific computing and distributed systems 0201357526B04062001