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Parallel Programming with Microsoft.NET

The CPU meter shows the problem. One core is running at 100 percent, but all the other cores are idle. Your application is CPU-bound, but you are using only a fraction of the computing power of your multicore system. What next? The answer, in a nutshell, is parallel programming. Where you once would have written the kind of sequential code that is familiar to all programmers, you now find that this no longer meets your performance goals. To use your system's CPU resources efficiently, you need to split your application into pieces that can run at the same time. This is easier said than done. Parallel programming has a reputation for being the domain of experts and a minefield of subtle, hard-to-reproduce software defects. Everyone seems to have a favorite story about a parallel program that did not behave as expected because of a mysterious bug. These stories should inspire a healthy respect for the difficulty of the problems you face in writing your own parallel programs. Fortunately, help has arrived. Microsoft Visual Studio(R) 2010 introduces a new programming model for parallelism that significantly simplifies the job. Behind the scenes are supporting libraries with sophisticated algorithms that dynamically distribute computations on multicore architectures. Proven design patterns are another source of help. A Guide to Parallel Programming introduces you to the most important and frequently used patterns of parallel programming and gives executable code samples for them, using the Task Parallel Library (TPL) and Parallel LINQ (PLINQ).

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Parallel Programming with Microsoft .Net

Learn the art of building intricate, modern, scalable, and concurrent applications using Scala About This Book Make the most of Scala by understanding its philosophy and harnessing the power of multicores Get acquainted with cutting-edge technologies in the field of concurrency, through practical, real-world applications Get this step-by-step guide packed with pragmatic examples Who This Book Is For If you are a Scala programmer with no prior knowledge about concurrent programming, or seeking to broaden your existing knowledge about concurrency, this book is for you. Basic knowledge of the Scala programming language will be helpful. Also if you have a solid knowledge in another programming language, such as Java, you should find this book easily accessible. What You Will Learn Get to grips with the fundamentals of concurrent programming on modern multiprocessor systems Build high-performance concurrent systems from simple, low-level concurrency primitives Express asynchrony in concurrent computations with futures and promises Seamlessly accelerate sequential programs by using data-parallel collections Design safe, scalable, and easy-to-comprehend in-memory transactional data models Transparently create distributed applications that scale across multiple machines Integrate different concurrency frameworks together in large applications Develop and implement scalable and easy-to-understand concurrent applications in Scala 2.12 In Detail Scala is a modern, multiparadigm programming language designed to express common programming patterns in a concise, elegant, and type-safe way. Scala smoothly integrates the features of object-oriented and functional languages. In this second edition, you will find updated coverage of the Scala 2.12 platform. The Scala 2.12 series targets Java 8 and requires it for execution. The book starts by introducing you to the foundations of concurrent programming on the JVM, outlining the basics of the Java Memory Model, and then shows some of the classic building blocks of concurrency, such as the atomic variables, thread pools, and concurrent data structures, along with the caveats of traditional concurrency. The book then walks you through different high-level concurrency abstractions, each tailored toward a specific class of programming tasks, while touching on the latest advancements of async programming capabilities of Scala. It also covers some useful patterns and idioms to use with the techniques described. Finally, the book presents an overview of when to use which concurrency library and demonstrates how they all work together, and then presents new exciting approaches to building concurrent and distributed systems. Style and approach The book provides a step-by-step introduction to concurrent programming. It focuses on easy-to-understand examples that are pragmatic and applicable to real-world applications. Different topics are approached in a bottom-up fashion, gradually going from the simplest foundations to the most advanced features.

Learning Concurrent Programming in Scala

About The Book: The CPU meter shows the problem. One core is running at 100 percent, but all the other cores are idle. Your application is CPU-bound, but you are using only a fraction of the computing power of your multicore system. What next?The answer, in a nutshell, is parallel programming. Where you once would have written the kind of sequential code that is familiar to all programmers, you now find that this no longer meets your performance goals. To use your system s CPU resources efficiently, you need to split your application into pieces that can run at the same time. This is easier said than done. Parallel programming has a reputation for being the domain of experts and a minefield of subtle,

hard-to-reproduce software defects.Everyone seems to have a favorite story about a parallel program that did not behave as expected because of a mysterious bug. These stories should inspire a healthy respect for the difficulty of the problems you face in writing your own parallel programs. Fortunately, help has arrived. Microsoft Visual Studio® 2010 introduces a new programming model for parallelism that significantly simplifies the job. Behind the scenes are supporting libraries with sophisticated algorithms that dynamically distribute computations on multicore architectures. Proven design patterns are another source of help. A Guide to Parallel Programming introduces you to the most important and frequently used patterns of parallel programming and gives executable code samples for them, using the Task Parallel Library (TPL) and Parallel LINQ (PLINQ).

PARALLEL PROGRAMMING WITH MICROSOFT .NET, DESIGN PATTERNS FOR DECOMPOSITION AND COOORDINATION ON MUL (With CD)

With multicore processors now in every computer, server, and embedded device, the need for cost-effective, reliable parallel software has never been greater. By explaining key aspects of multicore programming, Fundamentals of Multicore Software Development helps software engineers understand parallel programming and master the multicore challenge.

Fundamentals of Multicore Software Development

An overview of the most prominent contemporary parallel processing programming models, written in a unique tutorial style. With the coming of the parallel computing era, computer scientists have turned their attention to designing programming models that are suited for high-performance parallel computing and supercomputing systems. Programming parallel systems is complicated by the fact that multiple processing units are simultaneously computing and moving data. This book offers an overview of some of the most prominent parallel programming models used in high-performance computing and supercomputing systems today. The chapters describe the programming models in a unique tutorial style rather than using the formal approach taken in the research literature. The aim is to cover a wide range of parallel programming models, enabling the reader to understand what each has to offer. The book begins with a description of the Message Passing Interface (MPI), the most common parallel programming model for distributed memory computing. It goes on to cover one-sided communication models, ranging from low-level runtime libraries (GASNet, OpenSHMEM) to high-level programming models (UPC, GA, Chapel); task-oriented programming models (Charm++, ADLB, Scioto, Swift, CnC) that allow users to describe their computation and data units as tasks so that the runtime system can manage computation and data movement as necessary; and parallel programming models intended for on-node parallelism in the context of multicore architecture or attached accelerators (OpenMP, Cilk Plus, TBB, CUDA, OpenCL). The book will be a valuable resource for graduate students, researchers, and any scientist who works with data sets and large computations. Contributors Timothy Armstrong, Michael G. Burke, Ralph Butler, Bradford L. Chamberlain, Sunita Chandrasekaran, Barbara Chapman, Jeff Daily, James Dinan, Deepak Eachempati, Ian T. Foster, William D. Gropp, Paul Hargrove, Wen-mei Hwu, Nikhil Jain, Laxmikant Kale, David Kirk, Kath Knobe, Ariram Krishnamoorthy, Jeffery A. Kuehn, Alexey Kukanov, Charles E. Leiserson, Jonathan Lifflander, Ewing Lusk, Tim Mattson, Bruce Palmer, Steven C. Pieper, Stephen W. Poole, Arch D. Robison, Frank Schlimbach, Rajeev Thakur, Abhinav Vishnu, Justin M. Wozniak, Michael Wilde, Kathy Yelick, Yili Zheng

Programming Models for Parallel Computing

Implementation of technology into social and economic developments have provided key strengths in improving competitiveness and meeting the demands of modern society for life and the economy; including adapting to green development as a means to confront the economic crisis. E-Innovation for Sustainable Development of Rural Resources During Global Economic Crisis brings together a multidisciplinary exchange of knowledge on the application of electronic and mobile innovations towards the sustainable development of the economy. Providing an opportunity to identify effective e-innovation and successful practices, this book is essential for researchers, students, rural developers, and academics in the fields of economics, sustainable development, informatics, and the environment.

E-Innovation for Sustainable Development of Rural Resources During Global Economic Crisis

Expert guidance for those programming today’s dual-core processors PCs As PC processors explode from one or two to now eight processors, there is an urgent need for programmers to master concurrent programming. This book dives deep into the latest technologies available to programmers

for creating professional parallel applications using C#, .NET 4, and Visual Studio 2010. The book covers task-based programming, coordination data structures, PLINQ, thread pools, asynchronous programming model, and more. It also teaches other parallel programming techniques, such as SIMD and vectorization. Teaches programmers professional-level, task-based, parallel programming with C#, .NET 4, and Visual Studio 2010 Covers concurrent collections, coordinated data structures, PLINQ, thread pools, asynchronous programming model, Visual Studio 2010 debugging, and parallel testing and tuning Explores vectorization, SIMD instructions, and additional parallel libraries Master the tools and technology you need to develop thread-safe concurrent applications for multi-core systems, with Professional Parallel Programming with C#.

Professional Parallel Programming with C#

Capitalize on the faster GPU processors in today's computers with the C++ AMP code library—and bring massive parallelism to your project. With this practical book, experienced C++ developers will learn parallel programming fundamentals with C++ AMP through detailed examples, code snippets, and case studies. Learn the advantages of parallelism and get best practices for harnessing this technology in your applications. Discover how to: Gain greater code performance using graphics processing units (GPUs) Choose accelerators that enable you to write code for GPUs Apply thread tiles, tile barriers, and tile static memory Debug C++ AMP code with Microsoft Visual Studio Use profiling tools to track the performance of your code

C++ AMP

Scala – A>2@5<5=Scala ?@>3@0<<8@>20=8O.

>Scala@5=B=>5 ?@>3@0<<8@>20=85 =0

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.

Parallel Programming with Intel Parallel Studio XE

Professional Multicore Programming: Design and Implementation for C++ Developers presents the basics of multicore programming in a simple, easy-to-understand manner so that you can easily apply the concepts to your everyday projects. Learn the fundamentals of programming for multiprocessor and multithreaded architecture, progress to multi-core programming and eventually become comfortable with programming techniques that otherwise can be difficult to understand. Anticipate the pitfalls and traps of concurrency programming and synchronization before you encounter them yourself by finding them outlined in this indispensable guide to multicore programming.

Professional Multicore Programming

Presents a guide to the parallel programming techniques of Microsoft Visual Studio, covering such topics as task paralellism, PLINQ, concurrent collections, customization, and debugging.

Parallel Programming with Microsoft Visual Studio 2010

The Parallel Programming Guide for Every Software Developer From grids and clusters to next-generation game consoles, parallel computing is going mainstream. Innovations such as Hyper-Threading Technology, HyperTransport Technology, and multicore microprocessors from IBM, Intel, and Sun are accelerating the movement's growth. Only one thing is missing: programmers with the skills to meet

the soaring demand for parallel software. That's where Patterns for Parallel Programming comes in. It's the first parallel programming guide written specifically to serve working software developers, not just computer scientists. The authors introduce a complete, highly accessible pattern language that will help any experienced developer "think parallel"-and start writing effective parallel code almost immediately. Instead of formal theory, they deliver proven solutions to the challenges faced by parallel programmers, and pragmatic guidance for using today's parallel APIs in the real world. Coverage includes: Understanding the parallel computing landscape and the challenges faced by parallel developers Finding the concurrency in a software design problem and decomposing it into concurrent tasks Managing the use of data across tasks Creating an algorithm structure that effectively exploits the concurrency you've identified Connecting your algorithmic structures to the APIs needed to implement them Specific software constructs for implementing parallel programs Working with today's leading parallel programming environments: OpenMP, MPI, and Java Patterns have helped thousands of programmers master object-oriented development and other complex programming technologies. With this book, you will learn that they're the best way to master parallel programming too.

Parallel Programming with Microsoft Visual Studio 2010, Step by Step

Explore the world of .NET design patterns and bring the benefits that the right patterns can offer to your toolkit today About This Book Dive into the powerful fundamentals of .NET framework for software development The code is explained piece by piece and the application of the pattern is also showcased. This fast-paced guide shows you how to implement the patterns into your existing applications Who This Book Is For This book is for those with familiarity with .NET development who would like to take their skills to the next level and be in the driver's seat when it comes to modern development techniques. Basic object-oriented C# programming experience and an elementary familiarity with the .NET framework library is required. What You Will Learn Put patterns and pattern catalogs into the right perspective Apply patterns for software development under C#/.NET Use GoF and other patterns in real-life development scenarios Be able to enrich your design vocabulary and well articulate your design thoughts Leverage object/functional programming by mixing OOP and FP Understand the reactive programming model using Rx and RxJs Writing compositional code using C# LINQ constructs Be able to implement concurrent/parallel programming techniques using idioms under .NET Avoiding pitfalls when creating compositional, readable, and maintainable code using imperative, functional, and reactive code. In Detail Knowing about design patterns enables developers to improve their code base, promoting code reuse and making their design more robust. This book focuses on the practical aspects of programming in .NET. You will learn about some of the relevant design patterns (and their application) that are most widely used. We start with classic object-oriented programming (OOP) techniques, evaluate parallel programming and concurrency models, enhance implementations by mixing OOP and functional programming, and finally to the reactive programming model where functional programming and OOP are used in synergy to write better code. Throughout this book, we'll show you how to deal with architecture/design techniques, GoF patterns, relevant patterns from other catalogs, functional programming, and reactive programming techniques. After reading this book, you will be able to convincingly leverage these design patterns (factory pattern, builder pattern, prototype pattern, adapter pattern, facade pattern, decorator pattern, observer pattern and so on) for your programs. You will also be able to write fluid functional code in .NET that would leverage concurrency and parallelism! Style and approach This tutorial-based book takes a step-by-step approach. It covers the major patterns and explains them in a detailed manned along with code examples.

Patterns for Parallel Programming

Leverage the latest parallel and concurrency features in .NET 6 when building your next application and explore the benefits and challenges of asynchrony, parallelism, and concurrency in .NET via practical examples Key Features: Learn to implement parallel programming and handle concurrency in .NET efficiently Switch threads while debugging and learn how to monitor specific threads in Visual Studio Discover how to cancel tasks with callbacks, by polling, or by using a task with wait handles Book Description: .NET has included managed threading capabilities since the beginning, but early techniques had inherent risks: memory leaks, thread synchronization issues, and deadlocks. This book will help you avoid those pitfalls and leverage the modern constructs available in .NET 6 and C# 10, while providing recommendations on patterns and best practices for parallelism and concurrency. Parallel, concurrent, and asynchronous programming are part of every .NET application today, and it becomes imperative for modern developers to understand how to effectively use these techniques. This book will teach intermediate-level .NET developers how to make their applications faster and more

responsive with parallel programming and concurrency in .NET and C# with practical examples. The book starts with the essentials of multi-threaded .NET development and explores how the language and framework constructs have evolved along with .NET. You will later get to grips with the different options available today in .NET 6, followed by insights into best practices, debugging, and unit testing. By the end of this book, you will have a deep understanding of why, when, and how to employ parallelism and concurrency in any .NET application. What You Will Learn: Prevent deadlocks and race conditions with managed threading Update Windows app UIs without causing exceptions Explore best practices for introducing asynchronous constructs to existing code Avoid pitfalls when introducing parallelism to your code Implement the producer-consumer pattern with Dataflow blocks Enforce data sorting when processing data in parallel and safely merge data from multiple sources Use concurrent collections that help synchronize data across threads Debug an everyday parallel app with the Parallel Stacks and Parallel Tasks windows Who this book is for: This book is for beginner to intermediate-level .NET developers who want to employ the latest parallel and concurrency features in .NET when building their applications. Readers should have a solid understanding of the C# language and any version of the .NET Framework or .NET Core.

.NET Design Patterns

Programming Massively Parallel Processors: A Hands-on Approach, Second Edition, teaches students how to program massively parallel processors. It offers a detailed discussion of various techniques for constructing parallel programs. Case studies are used to demonstrate the development process, which begins with computational thinking and ends with effective and efficient parallel programs. This guide shows both student and professional alike the basic concepts of parallel programming and GPU architecture. Topics of performance, floating-point format, parallel patterns, and dynamic parallelism are covered in depth. This revised edition contains more parallel programming examples, commonly-used libraries such as Thrust, and explanations of the latest tools. It also provides new coverage of CUDA 5.0, improved performance, enhanced development tools, increased hardware support, and more; increased coverage of related technology, OpenCL and new material on algorithm patterns, GPU clusters, host programming, and data parallelism; and two new case studies (on MRI reconstruction and molecular visualization) that explore the latest applications of CUDA and GPUs for scientific research and high-performance computing. This book should be a valuable resource for advanced students, software engineers, programmers, and hardware engineers. New coverage of CUDA 5.0, improved performance, enhanced development tools, increased hardware support, and more Increased coverage of related technology, OpenCL and new material on algorithm patterns, GPU clusters, host programming, and data parallelism Two new case studies (on MRI reconstruction and molecular visualization) explore the latest applications of CUDA and GPUs for scientific research and high-performance computing

Parallel Programming and Concurrency with C# 10 and .NET 6

This is a textbook that teaches the bridging topics between numerical analysis, parallel computing, code performance, large scale applications.

Programming Massively Parallel Processors

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.

Introduction to High Performance Scientific Computing

Parallelism is the key to achieving high performance in computing. However, writing efficient and scalable parallel programs is notoriously difficult, and often requires significant expertise. To address this challenge, it is crucial to provide programmers with high-level tools to enable them to develop solutions easily, and at the same time emphasize the theoretical and practical aspects of algorithm design to allow the solutions developed to run efficiently under many different settings. This thesis addresses this challenge using a three-pronged approach consisting of the design of shared-memory programming techniques, frameworks, and algorithms for important problems in computing. The thesis provides evidence that with appropriate programming techniques, frameworks, and algorithms, shared-memory programs can be simple, fast, and scalable, both in theory and in practice. The results developed in this thesis serve to ease the transition into the multicore era. The first part of this thesis introduces tools and

techniques for deterministic parallel programming, including means for encapsulating nondeterminism via powerful commutative building blocks, as well as a novel framework for executing sequential iterative loops in parallel, which lead to deterministic parallel algorithms that are efficient both in theory and in practice. The second part of this thesis introduces Ligra, the first high-level shared memory framework for parallel graph traversal algorithms. The framework allows programmers to express graph traversal algorithms using very short and concise code, delivers performance competitive with that of highly-optimized code, and is up to orders of magnitude faster than existing systems designed for distributed memory. This part of the thesis also introduces Ligra+, which extends Ligra with graph compression techniques to reduce space usage and improve parallel performance at the same time, and is also the first graph processing system to support in-memory graph compression. The third and fourth parts of this thesis bridge the gap between theory and practice in parallel algorithm design by introducing the first algorithms for a variety of important problems on graphs and strings that are efficient both in theory and in practice. For example, the thesis develops the first linear-work and polylogarithmic-depth algorithms for suffix tree construction and graph connectivity that are also practical, as well as a work-efficient, polylogarithmic-depth, and cache-efficient shared-memory algorithm for triangle computations that achieves a 2–5x speedup over the best existing algorithms on 40 cores. This is a revised version of the thesis that won the 2015 ACM Doctoral Dissertation Award.

Parallel and Distributed Programming Using C++

4. 2 Code Segments . . . . . 96 4. 3 Determining Communication Parameters . 99 4. 4 Multicast Communication Overhead · 103 4. 5 Partitioning . . . . . · 103 4. 6 Experimental Results . 117 4. 7 Conclusion. . . . . · 121 5 COLLECTIVE PARTITIONING AND REMAPPING FOR MULTIPLE LOOP NESTS 125 5. 1 Introduction. . . . . 125 5. 2 Program Enclosure Trees. . 128 5. 3 The CPR Algorithm . . 132 5. 4 Experimental Results. . 141 5. 5 Conclusion. . 146 BIBLIOGRAPHY. 149 INDEX . . . . . 157 LIST OF FIGURES Figure 1. 1 The Butterfly Architecture. . . . . 5 1. 2 Example of an iterative data-parallel loop . . 7 1. 3 Contiguous tiling and assignment of an iteration space. 13 2. 1 Communication along a line segment. . . 24 2. 2 Access pattern for the access offset, (3,2). 25 2. 3 Decomposing an access vector along an orthogonal basis set of vectors. . . . . 26 2. 4 An analysis of communication patterns. 29 2. 5 Decomposing a vector along two separate basis sets of vectors. 31 2. 6 Cache lines aligning with borders. 33 2. 7 Cache lines not aligned with borders. 34 2. 8 nh is the difference of nd and nb. 42 2. 9 nh is the sum of nd and nb. 42 2. 10 The ADAPT system. 44 2. 11 Code segment used in experiments. . 46 2. 12 Execution rates for various partitions. 47 2. 13 Execution time of partitions on Multimax. 48 2. 14 Performance increase as processing power increases. 49 2. 15 Percentage miss ratios for various aspect ratios and line sizes.

Shared-Memory Parallelism Can be Simple, Fast, and Scalable

Hailed as a "must-have textbook" (CHOICE, January 2010), the first edition of Game Engine Architecture provided readers with a complete guide to the theory and practice of game engine software development. Updating the content to match today’s landscape of game engine architecture, this second edition continues to thoroughly cover the major components that make up a typical commercial game engine. New to the Second Edition Information on new topics, including the latest variant of the C++ programming language, C++11, and the architecture of the eighth generation of gaming consoles, the Xbox One and PlayStation 4 New chapter on audio technology covering the fundamentals of the physics, mathematics, and technology that go into creating an AAA game audio engine Updated sections on multicore programming, pipelined CPU architecture and optimization, localization, pseudovectors and Grassman algebra, dual quaternions, SIMD vector math, memory alignment, and anti-aliasing Insight into the making of Naughty Dog’s latest hit, The Last of Us The book presents the theory underlying various subsystems that comprise a commercial game engine as well as the data structures, algorithms, and software interfaces that are typically used to implement them. It primarily focuses on the engine itself, including a host of low-level foundation systems, the rendering engine, the collision system, the physics simulation, character animation, and audio. An in-depth discussion on the "gameplay foundation layer" delves into the game’s object model, world editor, event system, and scripting system. The text also touches on some aspects of gameplay programming, including player mechanics, cameras, and AI. An awareness-building tool and a jumping-off point for further learning, Game Engine Architecture, Second Edition gives readers a solid understanding of both the theory and common practices employed within each of the engineering disciplines covered. The book will help readers on their journey through this fascinating and multifaceted field.

Compiling Parallel Loops for High Performance Computers

This book constitutes a carefully arranged selection of revised full papers chosen from the presentations given at the Second International Conference on Vector and Parallel Processing - Systems and Applications, VECPAR'96, held in Porto, Portugal, in September 1996. Besides 10 invited papers by internationally leading experts, 17 papers were accepted from the submitted conference papers for inclusion in this documentation following a second round of refereeing. A broad spectrum of topics and applications for which parallelism contributes to progress is covered, among them parallel linear algebra, computational fluid dynamics, data parallelism, implementational issues, optimization, finite element computations, simulation, and visualisation.

Game Engine Architecture

This book presents 5 tutorial lectures given by leading researchers at the 15th edition of the International School on Formal Methods for the Design of Computer, Communication and Software Systems, SFM 2015, held in Bertinoro, Italy, in June 2015. SFM 2015 was devoted to multicore programming and covered topics such as concurrency and coordination mechanisms, architecture and memory models and type systems.

Vector and Parallel Processing - VECPAR'96

Architect and design highly scalable, robust, clean and highly performant applications in .NET Core About This Book Incorporate architectural soft-skills such as DevOps and Agile methodologies to enhance program-level objectives Gain knowledge of architectural approaches on the likes of SOA architecture and microservices to provide traceability and rationale for architectural decisions Explore a variety of practical use cases and code examples to implement the tools and techniques described in the book Who This Book Is For This book is for experienced .NET developers who are aspiring to become architects of enterprise-grade applications, as well as software architects who would like to leverage .NET to create effective blueprints of applications. What You Will Learn Grasp the important aspects and best practices of application lifecycle management Leverage the popular ALM tools, application insights, and their usage to monitor performance, testability, and optimization tools in an enterprise Explore various authentication models such as social media-based authentication, 2FA and OpenID Connect, learn authorization techniques Explore Azure with various solution approaches for Microservices and Serverless architecture along with Docker containers Gain knowledge about the recent market trends and practices and how they can be achieved with .NET Core and Microsoft tools and technologies In Detail If you want to design and develop enterprise applications using .NET Core as the development framework and learn about industry-wide best practices and guidelines, then this book is for you. The book starts with a brief introduction to enterprise architecture, which will help you to understand what enterprise architecture is and what the key components are. It will then teach you about the types of patterns and the principles of software development, and explain the various aspects of distributed computing to keep your applications effective and scalable. These chapters act as a catalyst to start the practical implementation, and design and develop applications using different architectural approaches, such as layered architecture, service oriented architecture, microservices and cloud-specific solutions. Gradually, you will learn about the different approaches and models of the Security framework and explore various authentication models and authorization techniques, such as social media-based authentication and safe storage using app secrets. By the end of the book, you will get to know the concepts and usage of the emerging fields, such as DevOps, BigData, architectural practices, and Artificial Intelligence. Style and approach Filled with examples and use cases, this guide takes a no-nonsense approach to show you the best tools and techniques required to become a successful software architect.

Formal Methods for Multicore Programming

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!

Enterprise Application Architecture with .NET Core

Capitalize on the faster GPU processors in today's computers with the C++ AMP code library -- and bring massive parallelism to your project. We are now at the dawn of the heterogeneous parallel com-

puting era. With all applications being power-sensitive and all computing systems being power-limited, from mobile to cloud, future computing platforms must embrace heterogeneity. With this practical book, experienced C++ developers will learn parallel programming fundamentals with C++ AMP through detailed examples, code snippets, and case studies. - Publisher.

C# Multithreaded and Parallel Programming

This book constitutes the refereed proceedings of the 6th International Workshop on High-Level Parallel Programming Models and Supportive Environments, HIPS 2001, held in San Francisco, CA, USA in April 2001. The 10 revised full papers presented were carefully reviewed and selected out of 20 submissions. The focus of the book is on high-level programming of networks of workstations, computing clusters, and massively parallel machines. Among the issues addressed are language design, compilers, system architectures, programming tools, and advanced applications.

C++ AMP

This open access book is a modern guide for all C++ programmers to learn Threading Building Blocks (TBB). Written by TBB and parallel programming experts, this book reflects their collective decades of experience in developing and teaching parallel programming with TBB, offering their insights in an approachable manner. Throughout the book the authors present numerous examples and best practices to help you become an effective TBB programmer and leverage the power of parallel systems. Pro TBB starts with the basics, explaining parallel algorithms and C++'s built-in standard template library for parallelism. You'll learn the key concepts of managing memory, working with data structures and how to handle typical issues with synchronization. Later chapters apply these ideas to complex systems to explain performance tradeoffs, mapping common parallel patterns, controlling threads and overhead, and extending TBB to program heterogeneous systems or system-on-chips. What You'll Learn Use Threading Building Blocks to produce code that is portable, simple, scalable, and more understandableReview best practices for parallelizing computationally intensive tasks in your applications Integrate TBB with other threading packages Create scalable, high performance data-parallel programs Work with generic programming to write efficient algorithms Who This Book Is For C++ programmers learning to run applications on multicore systems, as well as C or C++ programmers without much experience with templates. No previous experience with parallel programming or multicore processors is required.

High-Level Parallel Programming Models and Supportive Environments

Multi-core Programming deals with computers/software.

Pro TBB

A complete source of information on almost all aspects of parallel computing from introduction, to architectures, to programming paradigms, to algorithms, to programming standards. It covers traditional Computer Science algorithms, scientific computing algorithms and data intensive algorithms.

Multi-core Programming

Summary Reactive Design Patterns is a clearly written guide for building message-driven distributed systems that are resilient, responsive, and elastic. In this book you'll find patterns for messaging, flow control, resource management, and concurrency, along with practical issues like test-friendly designs. All patterns include concrete examples using Scala and Akka. Foreword by Jonas Bonér. Purchase of the print book includes a free eBook in PDF, Kindle, and ePub formats from Manning Publications. About the Technology Modern web applications serve potentially vast numbers of users - and they need to keep working as servers fail and new ones come online, users overwhelm limited resources, and information is distributed globally. A Reactive application adjusts to partial failures and varying loads, remaining responsive in an ever-changing distributed environment. The secret is message-driven architecture - and design patterns to organize it. About the Book Reactive Design Patterns presents the principles, patterns, and best practices of Reactive application design. You'll learn how to keep one slow component from bogging down others with the Circuit Breaker pattern, how to shepherd a many-staged transaction to completion with the Saga pattern, how to divide datasets by Sharding, and more. You'll even see how to keep your source code readable and the system testable despite many potential interactions and points of failure. What's Inside The definitive guide to the Reactive

Manifesto Patterns for flow control, delimited consistency, fault tolerance, and much more Hard-won lessons about what doesn't work Architectures that scale under tremendous load About the Reader Most examples use Scala, Java, and Akka. Readers should be familiar with distributed systems. About the Author Dr. Roland Kuhn led the Akka team at Lightbend and coauthored the Reactive Manifesto. Brian Hanafee and Jamie Allen are experienced distributed systems architects. Table of Contents PART 1 - INTRODUCTION Why Reactive? A walk-through of the Reactive Manifesto Tools of the trade PART 2 - THE PHILOSOPHY IN A NUTSHELL Message passing Location transparency Divide and conquer Principled failure handling Delimited consistency Nondeterminism by need Message flow PART 3 - PATTERNS Testing reactive applications Fault tolerance and recovery patterns Replication patterns Resource-management patterns Message flow patterns Flow control patterns State management and persistence patterns

Introduction to Parallel Computing

The end of dramatic exponential growth in single-processor performance marks the end of the dominance of the single microprocessor in computing. The era of sequential computing must give way to a new era in which parallelism is at the forefront. Although important scientific and engineering challenges lie ahead, this is an opportune time for innovation in programming systems and computing architectures. We have already begun to see diversity in computer designs to optimize for such considerations as power and throughput. The next generation of discoveries is likely to require advances at both the hardware and software levels of computing systems. There is no guarantee that we can make parallel computing as common and easy to use as yesterday's sequential single-processor computer systems, but unless we aggressively pursue efforts suggested by the recommendations in this book, it will be "game over" for growth in computing performance. If parallel programming and related software efforts fail to become widespread, the development of exciting new applications that drive the computer industry will stall; if such innovation stalls, many other parts of the economy will follow suit. The Future of Computing Performance describes the factors that have led to the future limitations on growth for single processors that are based on complementary metal oxide semiconductor (CMOS) technology. It explores challenges inherent in parallel computing and architecture, including ever-increasing power consumption and the escalated requirements for heat dissipation. The book delineates a research, practice, and education agenda to help overcome these challenges. The Future of Computing Performance will guide researchers, manufacturers, and information technology professionals in the right direction for sustainable growth in computer performance, so that we may all enjoy the next level of benefits to society.

Reactive Design Patterns

Learn the fundamentals of x86 Single instruction multiple data (SIMD) programming using C++ intrinsic functions and x86-64 assembly language. This book emphasizes x86 SIMD programming topics and technologies that are relevant to modern software development in applications which can exploit data level parallelism, important for the processing of big data, large batches of data and related important in data science and much more. Modern Parallel Programming with C++ and Assembly Language is an instructional text that explains x86 SIMD programming using both C++ and assembly language. The book’s content and organization are designed to help you quickly understand and exploit the SIMD capabilities of x86 processors. It also contains an abundance of source code that is structured to accelerate learning and comprehension of essential SIMD programming concepts and algorithms. After reading this book, you will be able to code performance-optimized AVX, AVX2, and AVX-512 algorithms using either C++ intrinsic functions or x86-64 assembly language. What You Will Learn Understand the essential details about x86 SIMD architectures and instruction sets including AVX, AVX2, and AVX-512. Master x86 SIMD data types, arithmetic instructions, and data management operations using both integer and floating-point operands. Code performance-enhancing functions and algorithms that fully exploit the SIMD capabilities of a modern x86 processor. Employ C++ intrinsic functions and x86-64 assembly language code to carry out arithmetic calculations using common programming constructs including arrays, matrices, and user-defined data structures. Harness the x86 SIMD instruction sets to significantly accelerate the performance of computationally intense algorithms in applications such as machine learning, image processing, computer graphics, statistics, and matrix arithmetic. Apply leading-edge coding strategies and techniques to optimally exploit the x86 SIMD instruction sets for maximum possible performance. Who This Book Is For Intermediate to advanced programmers/developers in general. Readers of this book should have previous programming experience with modern C++ (i.e., ANSI C++11 or later) and Assembly. Some familiarity with Microsoft’s Visual Studio or the GNU

toolchain will be helpful. The target audience for Modern X86 SIMD Programming are experienced software developers, programmers and maybe some hobbyists.

ParaPLoP 2010

Foreword by Bjarne Stroustrup Software is generally acknowledged to be the single greatest obstacle preventing mainstream adoption of massively-parallel computing. While sequential applications are routinely ported to platforms ranging from PCs to mainframes, most parallel programs only ever run on one type of machine. One reason for this is that most parallel programming systems have failed to insulate their users from the architectures of the machines on which they have run. Those that have been platform-independent have usually also had poor performance. Many researchers now believe that object-oriented languages may offer a solution. By hiding the architecture-specific constructs required for high performance inside platform-independent abstractions, parallel object-oriented programming systems may be able to combine the speed of massively-parallel computing with the comfort of sequential programming. Parallel Programming Using C++ describes fifteen parallel programming systems based on C++, the most popular object-oriented language of today. These systems cover the whole spectrum of parallel programming paradigms, from data parallelism through dataflow and distributed shared memory to message-passing control parallelism. For the parallel programming community, a common parallel application is discussed in each chapter, as part of the description of the system itself. By comparing the implementations of the polygon overlay problem in each system, the reader can get a better sense of their expressiveness and functionality for a common problem. For the systems community, the chapters contain a discussion of the implementation of the various compilers and runtime systems. In addition to discussing the performance of polygon overlay, several of the contributors also discuss the performance of other, more substantial, applications. For the research community, the contributors discuss the motivations for and philosophy of their systems. As well, many of the chapters include critiques that complete the research arc by pointing out possible future research directions. Finally, for the object-oriented community, there are many examples of how encapsulation, inheritance, and polymorphism can be used to control the complexity of developing, debugging, and tuning parallel software.

The Future of Computing Performance

Based on newest version of Visual Studio .NET (2005) and .NET Framework version 2.0 All topic areas include specific code examples Bridges the gap between classic C++ and Visual C++ .NET Update of a highly successful first edition

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