
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.

This book outlines a set of issues that are critical to all parallel architecture—communication latency, communication bandwidth, and coordination of cooperative work (across modern designs). It describes the set of techniques available in hardware and in software to address each issue and explore how the various techniques interact.

Intelligent readers who want to build their own embedded computer systems-- installed in everything from cell phones to cars to handheld organizers to refrigerators-- will find this book to be the most in-depth, practical, and up-to-date guide on the market. Designing Embedded Hardware carefully steers between the practical and philosophical aspects, so developers can both create their own devices and gadgets and customize and extend off-the-shelf systems. There are hundreds of books to choose from if you need to learn programming, but only a few are available if you want to learn to create hardware. Designing Embedded Hardware provides software and hardware engineers with no prior experience in embedded systems with the necessary conceptual and design building blocks to understand the architectures of embedded systems. Written to provide the depth of coverage and real-world examples developers need, Designing Embedded Hardware also provides a road-map to the pitfalls and traps to avoid in designing embedded systems. Designing Embedded Hardware covers such essential topics as: The principles of developing computer hardware Core hardware designs Assembly language concepts Parallel I/O Analog-digital conversion Timers (internal and external) UART Serial Peripheral Interface Inter-Integrated Circuit Bus Controller Area Network (CAN) Data Converter Interface (DCI) Low-power operation This invaluable and eminently useful book gives you the practical tools and skills to develop, build, and program your own application-specific computers.

Microsoft has introduced a large number of changes to the way that the .NET Framework operates. Familiar technologies have been altered, best practices replaced, and developer methodologies adjusted. Many developers find it hard to keep up with the pace of change across the .NET's ever-widening array of technologies. You may know what's happening in C#, but how about the Azure cloud? How is that going to affect your work? What are the limitations of the pLinq syntax? What you need is a roadmap. A guide to help you see the innovations that matter and to give you a head start on the opportunities available in the new framework. Introducing .NET 4.0: with Visual Studio 2010 is designed to provide you with just that roadmap. It serves as a no-nonsense primer that will help experienced .NET developers understand the impact of the new framework and its associated technologies. This book will keep you updated on the changes and help you to seize new opportunities confidently and quickly.

"When you begin using multi-threading throughout an application, the importance of clean architecture and design is critical. . . . This places an emphasis on understanding not only the platform's capabilities but also emerging best practices. Joe does a great job interspersing best practices alongside theory throughout his book." - From the Foreword by Craig Mundie, Chief Research and Strategy Officer, Microsoft Corporation Author Joe Duffy has risen to the challenge of explaining how to write software that takes full advantage of concurrency and hardware. In his book Concurrent Programming with .NET, he explains how to design, implement, and maintain large-scale concurrent programs, primarily using C# and C++ for Windows. Duffy aims to give application, system, and library developers the tools and techniques needed to write efficient, safe code for multicore processors. This is important not only for the kinds of problems where concurrency is inherent and easily exploitable—such as server applications, compute-intensive image manipulation, financial analysis, simulations, and AI algorithms—but also for problems that can be speeded up using parallelism but require more effort—such as math libraries, sort routines, report generation, XML manipulation, and stream processing algorithms. Concurrent Programming on Windows has four major sections: The first introduces concurrency at a high level, followed by a section that focuses on the fundamental platform features, inner workings, and API details. Next, there is a section that describes common patterns, best practices, algorithms, and data structures that emerge while writing concurrent software. The final section covers many of the common system-wide architectural and process concerns of concurrent programming. This is the only book you'll need in order to learn the best practices and common patterns for programming with concurrency on
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).

The two volume set LNCS 7439 and 7440 comprises the proceedings of the 12th International Conference on Algorithms and Architectures for Parallel Processing, ICA3PP 2012, as well as some workshop papers of the CDCN 2012 workshop which was held in conjunction with this conference. The 40 regular paper and 26 short papers included in these proceedings were carefully reviewed and selected from 156 submissions. The CDCN workshop attracted a total of 19 original submissions, 8 of which are included in part II of these proceedings. The papers cover many dimensions of parallel algorithms and architectures, encompassing fundamental theoretical approaches, practical experimental results, and commercial components and systems.

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.

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, Parallize 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.

The 1982 statistics on the use of family planning and infertility services presented in this report are preliminary results from Cycle III of the National Survey of Family Growth (NSFG), conducted by the National Center for Health Statistics. Data were collected through personal interviews with a multistage area probability sample of 7969 women aged 15-44. A detailed series of questions was asked to obtain relatively complete estimates of the extent and type of family planning services received. Statistics on family planning services are limited to women who were able to conceive 3 years before the interview date. Overall, 79% of currently married nonsterile women reported using some type of family planning service during the previous 3 years. There were no statistically significant differences between white (79%), black (75%) or Hispanic (77%) wives, or between the 2 income groups. The 1982 survey questions were more comprehensive than those of earlier cycles of the survey. The annual rate of visits for family planning services in 1982 was 1077 visits /1000 women. Teenagers had the highest annual visit rate (1581/1000) of any age group for all sources of family planning services combined. Visit rates declined sharply with age from 1447 at ages 15-24 to 479 at ages 35-44. Similar declines with age also were found in the visit rates for white and black women separately. Nevertheless, the annual visit rate for black women (1334/1000) was significantly higher than that for white women (1033). The highest overall visit rate was for black women 15-19 years of age (1867/1000). Nearly 2/3 of all family planning visits were to private medical sources. Teenagers once all races had higher family planning service visit rates to clinics than to private medical sources, as did black women age 15-24. White women age 20 and older had higher visit rates to private medical services than to clinics. Never married women had higher visit rates to clinics than currently or formerly married women. Data were also collected in 1982 on use of medical services for infertility by women who had difficulty in conceiving or carrying a pregnancy to term. About 1 million ever married women had 1 or more infertility visits in the 12 months before the interview. During the 3 years before interview, about 1.9 million women had infertility visits. For all ever married women, as well as for white and black women separately, infertility services were more likely to be secured from private medical sources than from clinics. The survey design, reliability of the estimates and the terms used are explained in the technical notes.

Multicore Processors and Systems provides a comprehensive overview of emerging multicore processors and systems. It covers technology trends affecting multicores, multicore architecture innovations, multicore software innovations, and case studies of state-of-the-art commercial multicore systems. A cross-cutting theme of the book is the challenges associated with scaling up multicore systems to hundreds of cores. The book provides an overview of significant developments in the architectures for multicore processors and systems. It includes chapters on fundamental requirements for multicore systems, including processing, memory systems, and interconnect. It also includes several case
studies on commercial multicore systems that have recently been developed and deployed across multiple application domains. The architecture chapters focus on innovative multicore execution models as well as infrastructure for multicores, including memory systems and on-chip interconnections. The case studies examine multicore implementations across different application domains, including general purpose, server, media/broadband, network processing, and signal processing. Multicore Processors and Systems is the first book that focuses solely on multicore processors and systems, and in particular on the unique technology implications, architectures, and implementations. The book has contributing authors that are from both the academic and industrial communities.

Written by The American Institute of Architects, this is the definitive textbook on practice issues written specifically for architecture students. Specifically written for emerging architects, this is the first unabridged guide specifically for architecture students about to begin their careers. It is required reading in a professional practice course that architecture students must take within their final two years of school.

A variety of programming models relevant to scientists explained, with an emphasis on how programming constructs map to parts of the computer. What makes computer programs fast or slow? To answer this question, we have to get behind the abstractions of programming languages and look at how a computer really works. This book examines and explains a variety of scientific programming models (programming models relevant to scientists) with an emphasis on how programming constructs map to different parts of the computer's architecture. Two themes emerge: program speed and program modularity. Throughout this book, the premise is to "get under the hood," and the discussion is tied to specific programs. The book digs into linkers, compilers, operating systems, and computer architecture to understand how the different parts of the computer interact with programs. It begins with a review of C/C++ and explanations of how libraries, linkers, and Makefiles work. Programming models covered include Pthreads, OpenMP, MPI, TCP/IP, and CUDA. The emphasis on how computers work leads the reader into computer architecture and occasionally into the operating system kernel. The operating system studied is Linux, the preferred platform for scientific computing. Linux is also open source, which allows users to peer into its inner workings. A brief appendix provides a useful table of machines used to time programs. The book's website (https://github.com/divakarvi/bk-spca) has all the programs described in the book as well as a link to the html text.

It is our great pleasure to present the proceedings of the second Russia–Taiwan Symposium on Methods and Tools of Parallel Programming (MTPP 2010). MTPP is the main regular event of the Russia–Taiwan scientific forum that covers the many dimensions of methods and tools of parallel programming, algorithms and architectures, encompassing fundamental theoretical approaches, practical experimental projects, and commercial components and systems. As applications of computing systems have permeated every aspect of daily life, the power of computing systems has become increasingly critical. Therefore, MTPP is intended to play an important role allowing researchers to exchange information regarding advancements in the state of the art and practice of IT-driven services and applications, as well as to identify emerging research topics and define the future directions of parallel computing. We received a large number of high-quality submissions this year. In the first stage, all papers submitted were screened for their relevance and general submission requirements. These manuscripts then underwent a rigorous peer-review process with at least three reviewers per paper. At the end, 33 papers were accepted for presentation and included in the main proceedings. To encourage and promote the work presented at MTPP 2010, we are delighted to inform the authors that some of the papers will be accepted in special issues of the Journal of Supercomputing, which has played a prominent role in promoting the development and use of parallel and distributed processing.

Advances in Parallel Computing series presents the theory and use of parallel computer systems, including vector, pipeline, array, fifth and future generation computers and neural computers. This volume features original research work, as well as accounts on practical experience with and techniques for the use of parallel computers.

"The bulk of the book is a complete ordered reference to the Delphi language set. Each reference item includes: the syntax, using standard code conventions; a description; a list of arguments, if any, accepted by the function or procedure; tips and tricks of usage - practical information on using the language feature in real programs; a brief example; and a cross-reference to related keywords."—Jacket.

Innovations in hardware architecture, like hyper-threading or multicore processors, mean that parallel computing resources are available for inexpensive desktop computers. In only a few years, many standard software products will be based on concepts of parallel programming implemented on such hardware, and the range of applications will be much broader than that of scientific computing, up to now the main application area for parallel computing. Rauber and Rünger take up these recent developments in processor architecture by giving detailed descriptions of parallel programming techniques that are necessary for developing efficient programs for multicore processors as well as for parallel cluster systems and supercomputers. Their book is structured in three main parts, covering all areas of parallel computing: the architecture of parallel systems, parallel programming models and environments, and the implementation of efficient application algorithms. The emphasis lies on parallel programming techniques needed for different architectures. For this second edition, all chapters have been carefully revised. The chapter on architecture of parallel systems has been updated considerably, with a greater emphasis on the architecture of multicore systems and adding new material on the latest developments in computer architecture. Lastly, a completely new chapter on general-purpose GPUs and the corresponding programming techniques has been added. The main goal of the book is to present parallel programming techniques that can be used in many situations for a broad range of application areas and which enable the reader to develop correct and efficient parallel programs. Many examples and exercises are provided to show how to apply the techniques. The book can be used as both a textbook for students and a reference book for professionals. The material presented has been used for courses in parallel programming at different universities for many years.

Computer architecture deals with the physical configuration, logical structure, formats, protocols, and operational sequences for processing data, controlling the configuration, and controlling the operations over a computer. It also encompasses word lengths, instruction codes, and the interrelationships among the main parts of a computer or group of computers. This two-volume set offers a comprehensive coverage of the field of computer organization and architecture.

Offers information on how to exploit the parallel architectures in a computer's GPU to improve code performance, scalability, and resilience.

This book assumes familiarity with threads (in a language such as Ada, C#, or Java) and introduces the entity-life modeling (ELM) design approach for certain kinds of multithreaded software. ELM focuses on "reactive systems," which continuously interact with the problem environment. These "reactive systems" include embedded systems, as well as such interactive systems as cruise controllers and automated teller machines. Part I covers two fundamentals: program-language thread support and state diagramming. These are necessary for understanding ELM and are provided primarily for reference. Part II covers ELM from different angles. Part III positions ELM relative to other design approaches.
Multicore Application Programming is a comprehensive, practical guide to high-performance multicore programming that any experienced developer can use. Author Darryl Gove covers the leading approaches to parallelization on Windows, Linux, and Oracle Solaris. Through practical examples, he illuminates the challenges involved in writing applications that fully utilize multicore processors, helping you produce applications that are functionally correct, offer superior performance, and scale well to eight cores, sixteen Cores, and beyond. The book reveals how specific hardware implementations impact application performance and shows how to avoid common pitfalls. Step by step, you’ll write applications that can handle large numbers of parallel threads, and you’ll master advanced parallelization techniques. Multicore Application Programming isn’t wedded to a single approach or platform: It is for every experienced C programmer working with any contemporary multicore processor in any leading operating system environment.

A number of widely used contemporary processors have instruction-set extensions for improved performance in multi-media applications. The aim is to allow operations to proceed on multiple pixels each clock cycle. Such instruction-sets have been incorporated both in specialist DSPchips such as the Texas C62xx (Texas Instruments, 1998) and in general purpose CPU chips like the Intel IA32 (Intel, 2000) or the AMD K6 (Advanced Micro Devices, 1999). These instruction-set extensions are typically based on the Single Instruc tion-stream Multiple Data-stream (SIMD) model in which a single instruction causes the same mathematical operation to be carried out on several operands, or pairs of operands, at the same time. The level or parallelism supported ranges from two floating point operations, at a time on the AMD K6 architecture to 16 byte operations at a time on the Intel P4 architecture. Whereas processor architectures are moving towards greater levels of parallelism, the most widely used programming languages such as C, Java and Delphi are structured around a model of computation in which operations take place on a single value at a time. This was appropriate when processors worked this way, but has become an impediment to programmers seeking to make use of the performance offered by multi-media instruction -sets. The introduction of SIMD instruction sets (Peleg et al.

Parallel Language and Compiler Research in Japan offers the international community an opportunity to learn in-depth about key Japanese research efforts in the particular software domains of parallel programming and parallelizing compilers. These are important topics that strongly bear on the effectiveness and affordability of high performance computing systems. The chapters of this book convey a comprehensive and current depiction of leading edge research efforts in Japan that focus on parallel software design, development, and optimization that could be obtained only through direct and personal interaction with the researchers themselves.


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#. f- 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, synchronization 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 tools 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/nea-shrivastava-99a80135/ Raviendra Akelia 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
To large organizations, business intelligence (BI) promises the capability of collecting and analyzing internal and external data to generate knowledge and value, thus providing decision support at the strategic, tactical, and operational levels. BI is now impacted by the “Big Data” phenomenon and the evolution of society and users. In particular, BI applications must cope with additional heterogeneous (often Web-based) sources, e.g., from social networks, blogs, competitors’, suppliers’, or distributors’ data, network-based or NGO-based analysis and papers, or from research publications. In addition, they must be able to provide their results also on mobile devices, taking into account location-based or time-based environmental data. The lectures held at the Second European Business Intelligence Summer School (eBISS), which are presented here in an extended and refined format, cover not only established BI and BPM technologies, but extend into innovative aspects that are important in this new environment and for novel applications, e.g., machine learning, logic networks, graph mining, business semantics, large-scale data management and analysis, and multicriteria and collaborative decision making. Combining papers by leading researchers in the field, this volume equips the reader with the state-of-the-art background necessary for creating the future of BI. It also provides the reader with an excellent basis and many pointers for further research in this growing field.

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.

Both theory and practice are blended together in order to learn how to build real operating systems that function within a distributed environment. An introduction to standard operating system topics is combined with newer topics such as security, microkernels and embedded systems. This book also provides an overview of operating system fundamentals. For programmers who want to refresh their basic skills and be brought up-to-date on those topics related to operating systems.

Beginning and experienced programmers will use this comprehensive guide to persistent memory programming. You will understand how persistent memory brings together several new software/hardware requirements, and offers great promise for better performance and faster application startup times—a huge leap forward in byte-addressable capacity compared with current DRAM offerings. This revolutionary new technology gives applications significant performance and capacity improvements over existing technologies. It requires a new way of thinking and developing, which makes this highly disruptive to the IT/Computing industry. The full spectrum of industry sectors that will benefit from this technology include, but are not limited to, in-memory and traditional databases, AI, analytics, HPC, virtualization, and big data. Programming Persistent Memory describes the technology and why it is exciting the industry. It covers the operating system and hardware requirements as well as how to create development environments using emulated or real persistent memory hardware. The book explains fundamental concepts; provides an introduction to persistent memory programming APIs for C, C++, JavaScript, and other languages; discusses RMDA with persistent memory; reviews security features; and presents many examples. Source code and examples that you can run on your own systems are included. What You'll Learn Understand what persistent memory is, what it does, and the value it brings to the industry Become familiar with the operating system and hardware requirements to use persistent memory Know the fundamentals of persistent memory programming: why it is different from current programming methods, and what developers need to keep in mind when programming for persistence Look at persistent memory application development by example using the Persistent Memory Development Kit (PMDK) Design and optimize data structures for persistent memoryStudy how real-world applications are modified to leverage persistent memory Utilize the tools available for persistent memory programming, application performance profiling, and debugging Who This Book Is For C, C++, Java, and Python developers, but will also be useful to software, cloud, and hardware architects across a broad spectrum of sectors, including cloud service providers, independent software vendors, high performance compute, artificial intelligence, data analytics, big data, etc.

Concurrent Programming ML (CML), included as part of the SML of New Jersey (SML/NJ) distribution, combines the best features of concurrent programming and functional programming. This practical, "how-to" book focuses on the use of concurrency to implement naturally concurrent applications. In addition to a tutorial introduction to programming in CML, the book presents three extended examples using CML for practical systems programming: a parallel software build system, a simple concurrent window manager, and an implementation of distributed tuple spaces. This book also illustrates advanced SML programming techniques, and includes a chapter on the implementation of concurrency using features provided by the SML/NJ system. It will be of interest to programmers, students, and professional researchers working in computer language development.

This book constitutes the strictly refereed proceedings of the Second International Workshop on Communication and Architectural Support for Network-Based Parallel Computing, CANPC'98, held in Las Vegas, Nevada, USA, in January/February 1998. The 18 revised full papers presented were selected from 38 submissions on the basis of four to five reviews per paper. The volume comprises a representative compilation of state-of-the-art solutions for network-based parallel computing. Several new interconnection technologies, new software schemes and standards are studied and developed to provide low-latency and high-bandwidth interconnections for network-based parallel computing.

Build on your existing programming skills and upskill to professional-level C# programming. Summary In Code Like A Pro in C# you will learn: Unit testing and test-driven development Refactor a legacy .NET codebase Principles of clean code Essential backend architecture skills Query and manipulate databases with LINQ and Entity Framework Core Critical business applications worldwide are written in the versatile C# language and the powerful .NET platform, running on desktops, cloud systems, and Windows or Linux servers. Code Like a Pro in C# makes it easy to turn your existing abilities in C# or another OO language (such as Java) into practical C# mastery. There’s no “Hello World” or Computer Science 101 basics—you’ll learn by refactoring an out-of-date legacy codebase, using new techniques, tools, and best practices to bring it up to modern C# standards. Purchase of the print book includes a free eBook in PDF, Kindle, and ePub formats from Manning Publications. About the technology You know the basics, now get ready for the next step: Pro-quality C# code is efficient, clean, and fast. Whether you’re building user-facing business applications or writing data-intensive backend services, the experience-based, practical techniques in this book will take your C# skills to a new level. About the book Code Like a Pro in C# teaches you to how write clean C# code that’s suitable for enterprise applications. In this book, you’ll refactor a legacy codebase by applying modern C# techniques. You’ll explore tools like Entity Framework Core, design techniques like dependency injection, and key practices like testing and clean coding. It’s a perfect
path to upgrade your existing C# skills or shift from another OO language into C# and the .NET ecosystem. What's inside Unit testing and test-driven development Refactor a legacy .NET codebase Principles of clean code Query and manipulate databases with LINQ and Entity Framework Core About the reader For developers experienced with object-oriented programming. No C# experience required. About the author Jort Rodenburg is a software engineer who has taught numerous courses on getting up to speed with C# and .NET. Table of Contents PART 1 USING C# AND .NET 1 Introducing C# and .NET 2 .NET and how it compiles PART 2 THE EXISTING CODEBASE 3 How bad is this code? 4 Manage your unmanaged resources! PART 3 THE DATABASE ACCESS LAYER 5 Setting up a project and database with Entity Framework Core PART 4 THE REPOSITORY LAYER 6 Test-driven development and dependency injection 7 Comparing objects 8 Stupping, generics, and coupling 9 Extension methods, streams, and abstract classes PART 5 THE SERVICE LAYER 10 Reflection and mocks 11 Runtime type checking revisited and error handling 12 Using IAsyncEnumerable and yield return PART 6 THE CONTROLLER LAYER 13 Middleware, HTTP routing, and HTTP responses 14 JSON serialization/deserialization and custom model binding

Expert guidance for those programming today’s dual-core processors PCs As PC processors explode from one to 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#.

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, thread-safe, and producer/consumer collections Cancellation support in your concurrent code Asynchronous-friendly Object-Oriented Programming Thread synchronization for accessing data

Covers Win32 multithreading techniques that make the Windows NT software faster and more responsive. This book explains how multithreading works, and the fundamentals of the Windows NT Thread Interface, including processes, thread management, creation, termination, and prioritization.

This workshop was a continuation of the PCRCW ‘94 workshop that focused on issues in parallel communication and routing in support of parallel processing. The workshop series provides a forum for researchers and designers to exchange ideas with respect to challenges and issues in supporting communication for high-performance parallel computing. Within the last few years we have seen the scope of interconnection network technology expand beyond traditional multiprocessor systems to include high-availability clusters and the emerging class of system area networks. New application domains are creating new requirements for interconnection network services, e.g., real-time video, on-line data mining, etc. The emergence of quality-of-service guarantees within these domains challenges existing approaches to interconnection network design. In the recent past we have seen the emphasis on low-latency software layers, the application of multicomputer interconnection technology to distributed shared-memory multiprocessors and LAN interconnects, and the shift toward the use of commodity clusters and standard components. There is a continuing evolution toward powerful and inexpensive network interfaces, and low-cost, high-speed routers and switches from commercial vendors. The goal is to address the above issues in the context of networks of workstations, multicomputers, distributed shared-memory multiprocessors, and traditional tightly-coupled multiprocessor interconnects. The PCRCW ’97 workshop presented 20 regular papers and two short papers covering a range of topics dealing with modern interconnection networks. It was hosted by the Georgia Institute of Technology and sponsored by the Atlanta Chapter of the IEEE Computer Society.

Cloud applications have a unique set of characteristics. They run on commodity hardware, provide services to untrusted users, and deal with unpredictable workloads. These factors impose a range of problems that you, as a designer or developer, need to resolve. Your applications must be resilient so that they can recover from failures, secure to protect services from malicious attacks, and elastic in order to respond to an ever changing workload. This guide demonstrates design patterns that can help you to solve the problems you might encounter in many different areas of cloud application development. Each pattern discusses design considerations, and explains how you can implement it using the features of Windows Azure. The patterns are grouped into categories: availability, data management, design and implementation, messaging, performance and scalability, resilience, management and monitoring, and security. You will also see more general guidance related to these areas of concern. It explains key concepts such as data consistency and asynchronous messaging. In addition, there is useful guidance and explanation of the key considerations for designing features such as data partitioning, telemetry, and hosting in multiple datacenters. These patterns and guidance can help you to improve the quality of applications and services you create, and make the development process more efficient. Enjoy!

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