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Modern Fortran teaches you to develop fast, efficient parallel applications using twenty-first-century Fortran. In this guide, you'll dive into Fortran by creating fun apps, including a tsunami simulator and a stock price analyzer. Filled with real-world use cases, insightful illustrations, and hands-on exercises, Modern Fortran helps you see this classic language in a whole new light. Summary Using Fortran, early and accurate forecasts for hurricanes and other major storms have saved thousands of lives. Better designs for ships, planes, and automobiles have made travel safer, more efficient, and less expensive than ever before. Using Fortran, low-level machine learning and deep learning libraries provide incredibly easy, fast, and insightful analysis of massive data. Fortran is an amazingly powerful and flexible programming language that forms the foundation of high performance computing for research, science, and industry. And it's come a long, long way since starting life on IBM mainframes in 1956. Modern Fortran is natively parallel, so it's uniquely suited for efficiently handling problems like complex simulations, long-range predictions, and ultra-precise designs. If you're working on tasks where speed, accuracy, and efficiency matter, it's time to discover—or re-

discover—Fortran.. About the technology For over 60 years Fortran has been powering mission-critical scientific applications, and it isn't slowing down yet! Rock-solid reliability and new support for parallel programming make Fortran an essential language for next-generation high-performance computing. Simply put, the future is in parallel, and Fortran is already there. Purchase of the print book includes a free eBook in PDF, Kindle, and ePub formats from Manning Publications. About the book Modern Fortran teaches you to develop fast, efficient parallel applications using twenty-first-century Fortran. In this guide, you'll dive into Fortran by creating fun apps, including a tsunami simulator and a stock price analyzer. Filled with real-world use cases, insightful illustrations, and hands-on exercises, Modern Fortran helps you see this classic language in a whole new light. What's inside Fortran's place in the modern world Working with variables, arrays, and functions Module development Parallelism with coarrays, teams, and events Interoperating Fortran with C About the reader For developers and computational scientists. No experience with Fortran required. About the author Milan Curcic is a meteorologist, oceanographer, and author of several general-purpose Fortran libraries and applications. Table of Contents PART 1 - GETTING STARTED WITH MODERN FORTRAN 1 Introducing Fortran 2 Getting started: Minimal working app PART 2 - CORE ELEMENTS OF FORTRAN 3 Writing reusable code with functions and subroutines 4 Organizing your Fortran code using modules 5 Analyzing time series data with arrays 6 Reading, writing, and formatting your data PART 3 - ADVANCED FORTRAN USE 7 Going parallel with Fortan coarrays 8 Working with abstract data using derived types 9 Generic procedures and operators for any data type 10 User-defined operators for derived types PART 4 - THE FINAL STRETCH 11 Interoperability with C: Exposing your app to the web 12 Advanced parallelism with teams, events, and collectives This exercise and solutions manual accompanies the main edition of Introduction to Computational Economics Using Fortran. It enables students of all levels to practice the skills and knowledge needed to conduct economic research using Fortran. Introduction to Computational Economics Using Fortran is the essential guide to conducting economic research on a computer. Aimed at students of all levels of education as well as advanced economic researchers, it facilitates the first steps into writing programming language. This exercise and solutions manual is accompanied by a program database that readers are able to download. This text examines the impact of drug-taking behavior on our society and our daily lives. The use and abuse of a wide range of licit and illicit drugs are discussed from historical, biological, psychological, and sociological perspectives. For undergraduate Drugs and Behavior courses . In today's world, drugs and their use present a social paradox, combining the potential for good and for bad. As a

society and as individuals, we can be the beneficiaries of drugs or their victims. Drugs, Behavior, and Modern Society, Sixth Edition features a comprehensive review of psychoactive drugs, and is notable for the attention it gives to two aspects of drug-taking behavior that have been underreported in other texts: steroid abuse and inhalant abuse. From its earliest days, the Fortran programming language has been designed with computing efficiency in mind. The latest standard, Fortran 2008, incorporates a host of modern features, including object-orientation, array operations, user-defined types, and provisions for parallel computing. This tutorial guide shows Fortran programmers how to apply these features in twenty-first-century style: modular, concise, object-oriented, and resource-efficient, using multiple processors. It offers practical real-world examples of interfacing to C, memory management, graphics and GUIs, and parallel computing using MPI, OpenMP, and coarrays. The author also analyzes several numerical algorithms and their implementations and illustrates the use of several open source libraries. Full source code for the examples is available on the book's website. This book is a description of why and how to do Scientific Computing for fundamental models of fluid flow. It contains introduction, motivation, analysis, and algorithms and is closely tied to freely available MATLAB codes that implement the methods described. The focus is on finite element approximation methods and fast iterative solution methods for the consequent linear(ized) systems arising in important problems that model incompressible fluid flow. The problems addressed are the Poisson equation, Convection-Diffusion problem, Stokes problem and Navier-Stokes problem, including new material on time-dependent problems and models of multi-physics. The corresponding iterative algebra based on preconditioned Krylov subspace and multigrid techniques is for symmetric and positive definite, nonsymmetric positive definite, symmetric indefinite and nonsymmetric indefinite matrix systems respectively. For each problem and associated solvers there is a description of how to compute together with theoretical analysis that guides the choice of approaches and describes what happens in practice in the many illustrative numerical results throughout the book (computed with the freely downloadable IFISS software). All of the numerical results should be reproducible by readers who have access to MATLAB and there is considerable scope for experimentation in the "computational laboratory" provided by the software. Developments in the field since the first edition was published have been represented in three new chapters covering optimization with PDE constraints (Chapter 5); solution of unsteady Navier-Stokes equations (Chapter 10); solution of models of buoyancy-driven flow (Chapter 11). Each chapter has many theoretical problems and practical computer exercises that involve the use of the IFISS software. This book is suitable as an introduction to iterative linear solvers or more generally as a model of Scientific Computing at an advanced undergraduate or beginning graduate level. This textbook provides an accessible introduction to the most important features of Fortran 2008. Features: presents a complete discussion of all the basic features needed to write complete Fortran programs; makes extensive use of examples

and case studies to illustrate the practical use of features of Fortran 08, and supplies simple problems for the reader; provides a detailed exploration of control constructs, modules, procedures, arrays, character strings, data structures and derived types, pointer variables, and object-oriented programming; includes coverage of such major new features in Fortran 08 as coarrays, submodules, parameterized derived types, and derived-type input and output; highlights the topic of modules as the framework for organizing data and procedures for a Fortran program; investigates the excellent input/output facilities available in Fortran; contains appendices listing the many intrinsic procedures and providing a brief informal syntax specification for the language. Fortran is one of the oldest high-level languages and remains the premier language for writing code for science and engineering applications. This book is for anyone who uses Fortran, from the novice learner to the advanced expert. It describes best practices for programmers, scientists, engineers, computer scientists and researchers who want to apply good style and incorporate rigorous usage in their own Fortran code or to establish guidelines for a team project. The presentation concentrates primarily on the characteristics of Fortran 2003, while also describing methods in Fortran 90/95 and valuable new features in Fortran 2008. The authors draw on more than a half century of experience writing production Fortran code to present clear succinct guidelines on formatting, naming, documenting, programming and packaging conventions and various programming paradigms such as parallel processing (including OpenMP, MPI and coarrays), OOP, generic programming and C language interoperability. Douglas Crockford starts by looking at the fundamentals: names, numbers, booleans, characters, and bottom values. JavaScript's number type is shown to be faulty and limiting, but then Crockford shows how to repair those problems. He then moves on to data structures and functions, exploring the underlying mechanisms and then uses higher order functions to achieve class-free object oriented programming. The book also looks at eventual programming, testing, and purity, all the while looking at the requirements of The Next Language. Most of our languages are deeply rooted in the paradigm that produced FORTRAN. Crockford attacks those roots, liberating us to consider the next paradigm. He also presents a strawman language and develops a complete transpiler to implement it. The book is deep, dense, full of code, and has moments when it is intentionally funny. A famed political scientist's classic argument for a more cooperative world We assume that, in a world ruled by natural selection, selfishness pays. So why cooperate? In The Evolution of Cooperation, political scientist Robert Axelrod seeks to answer this question. In 1980, he organized the famed Computer Prisoners Dilemma Tournament, which sought to find the optimal strategy for survival in a particular game. Over and over, the simplest strategy, a cooperative program called Tit for Tat, shut out the competition. In other words, cooperation, not unfettered competition, turns out to be our best chance for survival. A vital book for leaders and decision makers, The Evolution of Cooperation reveals how cooperative principles help us think better about everything from

military strategy, to political elections, to family dynamics. An introduction to the venerable computer language, based on the interactive environment it is now used in--microcomputers, linked terminals of a mainframe--rather than on the off-line program preparation (punch cards) it was designed for. Sets out the desiderata of modular programming and structured program design, then shows how to accomplish them with Fortran 77. Updated to reflect the language's evolution since the 1984 first edition. Annotation copyrighted by Book News, Inc., Portland, OR A new edition of this work on FORTRAN 8X, covering language, programming and procedures. It is aimed at FORTRAN users and programming language specialists. This easy-to-read textbook/reference presents an essential guide to object-oriented C++ programming for scientific computing. With a practical focus on learning by example, the theory is supported by numerous exercises. Features: provides a specific focus on the application of C++ to scientific computing, including parallel computing using MPI; stresses the importance of a clear programming style to minimize the introduction of errors into code; presents a practical introduction to procedural programming in C++, covering variables, flow of control, input and output, pointers, functions, and reference variables; exhibits the efficacy of classes, highlighting the main features of object-orientation; examines more advanced C++ features, such as templates and exceptions; supplies useful tips and examples throughout the text, together with chapter-ending exercises, and code available to download from Springer. A clear and thorough description of the latest versions of Fortran by leading experts in the field. It is intended for new and existing users of the language, and for all those involved in scientific and numerical computing. It is suitable as a textbook for teaching and as a handy reference for practitioners. CUDA Fortran for Scientists and Engineers shows how high-performance application developers can leverage the power of GPUs using Fortran, the familiar language of scientific computing and supercomputer performance benchmarking. The authors presume no prior parallel computing experience, and cover the basics along with best practices for efficient GPU computing using CUDA Fortran. To help you add CUDA Fortran to existing Fortran codes, the book explains how to understand the target GPU architecture, identify computationally intensive parts of the code, and modify the code to manage the data and parallelism and optimize performance. All of this is done in Fortran, without having to rewrite in another language. Each concept is illustrated with actual examples so you can immediately evaluate the performance of your code in comparison. Leverage the power of GPU computing with PGI's CUDA Fortran compiler Gain insights from members of the CUDA Fortran language development team Includes multi-GPU programming in CUDA Fortran, covering both peer-to-peer and message passing interface (MPI) approaches Includes full source code for all the examples and several case studies Download source code and slides from the book's companion website The Portable, Extensible Toolkit for Scientific Computation (PETSc) is an open-source library of advanced data structures and methods for solving linear and nonlinear equations and

for managing discretizations. This book uses these modern numerical tools to demonstrate how to solve nonlinear partial differential equations (PDEs) in parallel. It starts from key mathematical concepts, such as Krylov space methods, preconditioning, multigrid, and Newton's method. In PETSc these components are composed at run time into fast solvers. Discretizations are introduced from the beginning, with an emphasis on finite difference and finite element methodologies. The example C programs of the first 12 chapters, listed on the inside front cover, solve (mostly) elliptic and parabolic PDE problems. Discretization leads to large, sparse, and generally nonlinear systems of algebraic equations. For such problems, mathematical solver concepts are explained and illustrated through the examples, with sufficient context to speed further development. PETSc for Partial Differential Equations addresses both discretizations and fast solvers for PDEs, emphasizing practice more than theory. Well-structured examples lead to run-time choices that result in high solver performance and parallel scalability. The last two chapters build on the reader's understanding of fast solver concepts when applying the Firedrake Python finite element solver library. This textbook, the first to cover PETSc programming for nonlinear PDEs, provides an on-ramp for graduate students and researchers to a major area of high-performance computing for science and engineering. It is suitable as a supplement for courses in scientific computing or numerical methods for differential equations. Fortran marches on, remaining one of the principal programming languages used in high-performance scientific, numerical, and engineering computing. A series of significant revisions to the standard versions of the language have progressively enhanced its capabilities, and the latest standard - Fortran 2018 - includes many additions and improvements. This edition of Modern Fortran Explained expands on the last. Given the release of updated versions of Fortran compilers, the separate descriptions of Fortran 2003 and Fortran 2008 have been incorporated into the main text, which thereby becomes a unified description of the full Fortran 2008 version of the language. This clearer standard has allowed many deficiencies and irregularities in the earlier language versions to be resolved. Four new chapters describe the additional features of Fortran 2018, with its enhancements to coarrays for parallel programming, interoperability with C, IEEE arithmetic, and various other improvements. Written by leading experts in the field, two of whom have actively contributed to Fortran 2018, this is a complete and authoritative description of Fortran in its latest form. It is intended for new and existing users of the language, and for all those involved in scientific and numerical computing. It is suitable as a textbook for teaching and, with its index, as a handy reference for practitioners. The introduction of the Fortran 90 standard is the first significant change in the Fortran language in over 20 years. this book is designed for anyone wanting to learn Fortran for the first time or a programmer who needs to upgrade from Fortran 77 to Fortran 90. Employing a practical, problem-based approach this book provides a comprehensive introduction to the language. More experienced programmers will find it a useful update to the new standard and will benefit from the emphasis on science and

engineering applications. The programming language Fortran dates back to 1957 when a team of IBM engineers released the first Fortran Compiler. During the past 60 years, the language had been revised and updated several times to incorporate more features to enable writing clean and structured computer programs. The present version is Fortran 2018. Since the dawn of the computer era, there had been a constant demand for a "larger" and "faster" machine. To increase the speed there are three hurdles. The density of the active components on a VLSI chip cannot be increased indefinitely and with the increase of the density heat dissipation becomes a major problem. Finally, the speed of any signal cannot exceed the velocity of the light. However, by using several inexpensive processors in parallel coupled with specialized software and hardware, programmers can achieve computing speed similar to a supercomputer. This book can be used to learn the modern Fortran from the beginning and the technique of developing parallel programs using Fortran. It is for anyone who wants to learn Fortran. Knowledge beyond high school mathematics is not required. There is not another book on the market yet which deals with Fortran 2018 as well as parallel programming. FEATURES Descriptions of majority of Fortran 2018 instructions Numerical Model String with Variable Length IEEE Arithmetic and Exceptions Dynamic Memory Management Pointers Bit handling C-Fortran Interoperability Object Oriented Programming Parallel Programming using Coarray Parallel Programming using OpenMP Parallel Programming using Message Passing Interface (MPI) THE AUTHOR Dr Subrata Ray, is a retired Professor, Indian Association for the Cultivation of Science, Kolkata. This is the second edition of the first introductory textbook written for the FORTRAN 90 standard. It remains suitable for the novice scientific programmer, drawing on a larger number of examples and exercises in this new edition. Cryptography is a vital technology that underpins the security of information in computer networks. This book presents a comprehensive introduction to the role that cryptography plays in providing information security for everyday technologies such as the Internet, mobile phones, Wi-Fi networks, payment cards, Tor, and Bitcoin. This book is intended to be introductory, self-contained, and widely accessible. It is suitable as a first read on cryptography. Almost no prior knowledge of mathematics is required since the book deliberately avoids the details of the mathematics techniques underpinning cryptographic mechanisms. Instead our focus will be on what a normal user or practitioner of information security needs to know about cryptography in order to understand the design and use of everyday cryptographic applications. By focusing on the fundamental principles of modern cryptography rather than the technical details of current cryptographic technology, the main part this book is relatively timeless, and illustrates the application of these principles by considering a number of contemporary applications of cryptography. Following the revelations of former NSA contractor Edward Snowden, the book considers the wider societal impact of use of cryptography and strategies for addressing this. A reader of this book will not only be able to understand the everyday use of cryptography, but also be able to

interpret future developments in this fascinating and crucially important area of technology. Fortran Is The Pioneer Computer Language Originally Designed To Suit Numerical, Scientific And Engineering Computations. In Spite Of The Birth Of Several Computer Languages, Fortran Is Still Used As A Primary Tool For Programming Numerical Computations. In This Book All The Features Of Fortran 77 Have Been Elaborately Explained With The Support Of Examples And Illustrations. Programs Have Been Designed And Developed In A Systematic Way For All The Classical Problems. All The Topics Of Numerical Methods Have Been Presented In A Simple Style And Algorithms Developed. Complete Fortran 77 Programs And More Than One Sets Of Sample Data Have Been Given For Each Method. The Content Of The Book Have Been Carefully Tailored For A Course Material Of A One Semester Course For The Computer Science, Mathematics And Physics Students. Classical FORTRAN: Programming for Engineering and Scientific Applications, Second Edition teaches how to write programs in the Classical dialect of FORTRAN, the original and still most widely recognized language for numerical computing. This edition retains the conversational style of the original, along with its simple, carefully chosen subset language and its focus on floating-point calculations. New to the Second Edition Additional case study on file I/O More about CPU timing on Pentium processors More about the g77 compiler and Linux With numerous updates and revisions throughout, this second edition continues to use case studies and examples to introduce the language elements and design skills needed to write graceful, correct, and efficient programs for real engineering and scientific applications. After reading this book, students will know what statements to use and where as well as why to avoid the others, helping them become expert FORTRAN programmers. The mathematical tradition at Oxford is one of the oldest in Britain, and Oxford scholars have been at the forefront of mathematical research for the past eight centuries. This is the story of the intellectual and social life of this community, and of its interactions with the wider world. The subject of sparse matrices has its root in such diverse fields as management science, power systems analysis, surveying, circuit theory, and structural analysis. Efficient use of sparsity is a key to solving large problems in many fields. This second edition is a complete rewrite of the first edition published 30 years ago. Much has changed since that time. Problems have grown greatly in size and complexity; nearly all examples in the first edition were of order less than 5,000 in the first edition, and are often more than a million in the second edition. Computer architectures are now much more complex, requiring new ways of adapting algorithms to parallel environments with memory hierarchies. Because the area is such an important one to all of computational science and engineering, a huge amount of research has been done in the last 30 years, some of it by the authors themselves. This new research is integrated into the text with a clear explanation of the underlying mathematics and algorithms. New research that is described includes new techniques for scaling and error control, new orderings, new combinatorial techniques for partitioning both symmetric and unsymmetric

problems, and a detailed description of the multifrontal approach to solving systems that was pioneered by the research of the authors and colleagues. This includes a discussion of techniques for exploiting parallel architectures and new work for indefinite and unsymmetric systems. A comprehensive introduction which will be essential to the complete beginner who wants to learn the fundamentals of programming using a modern, powerful and expressive language; as well as those wanting to update their programming skills by making the move from earlier versions of Fortran. The F programming language is a dramatic new development in scientific programming. Building on the well-established strengths of the Fortran family of languages, it is carefully crafted to be both safe and regular, whilst retaining the enormously powerful numerical capabilities of its parent language, Fortran 90, as well as its data abstraction capability. Thus, an array language becomes available as part of a medium-size, widely-available language for the first time. In this respect, the language is clearly superior to older ones such as Pascal, C, and Basic. The book begins with an introductory chapter, then describes, in turn, the features of the language: language elements, expressions and assignments, control constructs, program units and procedures, array features, intrinsic procedures, and the input/output facilities. It is completed by six appendices, including the difference between F and Fortran 90, and solutions to most of the exercises. In the absence of a formal standard for F, this book is the defining document for the language, setting out the complete syntax and semantics of the language in a readable but thorough way. It is essential reading for users of F. Chapman's Fortran for Scientists and Engineers is intended for both first year engineering students and practicing engineers. It simultaneously teaches the Fortran 90/95 programming language, structured programming techniques, and good programming practice. Among its strengths are its concise, clear explanations of Fortran syntax and programming procedures, the inclusion of a wealth of examples and exercises to help students grasp difficult concepts, and its explanations about how to understand code written for older versions of Fortran. This work provides a short "getting started" guide to Fortran 90/95. The main target audience consists of newcomers to the field of numerical computation within Earth system sciences (students, researchers or scientific programmers). Furthermore, readers accustomed to other programming languages may also benefit from this work, by discovering how some programming techniques they are familiar with map to Fortran 95. The main goal is to enable readers to quickly start using Fortran 95 for writing useful programs. It also introduces a gradual discussion of Input/Output facilities relevant for Earth system sciences, from the simplest ones to the more advanced netCDF library (which has become a de facto standard for handling the massive datasets used within Earth system sciences). While related works already treat these disciplines separately (each often providing much more information than needed by the beginning practitioner), the reader finds in this book a shorter guide which links them. Compared to other books, this work provides a much more compact view of the

language, while also placing the language-elements in a more applied setting, by providing examples related to numerical computing and more advanced Input/Output facilities for Earth system sciences. Naturally, the coverage of the programming language is relatively shallow, since many details are skipped. However, many of these details can be learned gradually by the practitioner, after getting an overview and some practice with the language through this book. Covers the nature of language, syntax, modeling objects, names, expressions, functions, control structures, global control, logic programming, representation and semantics of types, modules, generics, and domains The success of Fortran as the predominant programming language in the field of scientific and numerical computing is due, in part, to its steady evolution. Following the publication of standards in 1966 and 1978, the committee responsible for their development, X3J3, worked in conjunction with an ISO committee to develop a standard suitable for use in the 1990's and beyond. This standard, ISO Fortran 90, contained new features for large-scale computing and data abstraction, but still retained all the old familiar features. Fortran 90/95 Explained is a thorough examination of Fortran in 1995. It represents a complete revision of the original 1990 text Fortran 90 Explained, in particular a more detailed explanation of many features, more examples, and new appendices. One completely new chapter discusses Fortran 95, a revision of the ISO Fortran 90 standard based on the interpretations that have been requested following its implementation and use. In addition, new features to keep ISO Fortran aligned with High Performance Fortran have been added, along with a number of minor improvements. All of these are fully described for programmers wanting to update their skills. Software -- Programming Languages. The Fortran language standard has undergone significant upgrades in recent years (1990, 1995, 2003, and 2008). Numerical Computing with Modern Fortran illustrates many of these improvements through practical solutions to a number of scientific and engineering problems. Readers will discover techniques for modernizing algorithms written in Fortran; examples of Fortran interoperating with C or C++ programs, plus using the IEEE floating-point standard for efficiency; illustrations of parallel Fortran programming using coarrays, MPI, and OpenMP; and a supplementary website with downloadable source codes discussed in the book. The Fortran 2003 Handbook is a definitive and comprehensive guide to Fortran 2003 and its use. Fortran 2003, the latest standard version of Fortran, has many excellent features that assist the programmer in writing efficient, portable and maintainable programs. This all-inclusive volume offers a reader-friendly, easy-to-follow and informal description of Fortran 2003, and has been developed to provide not only a readable explanation of features, but also some rationale for the inclusion of features and their use. This highly versatile handbook is intended for anyone who wants a comprehensive survey of Fortran 2003. Fortran remains one of the principal languages used in scientific, numerical, and engineering programming, and a series of revisions to the standard versions of the language have progressively enhanced its power. The latest standard - Fortran 2003 - greatly

extends the power of the language, by introducing object-oriented concepts, interoperability with C, better integration with operating systems and many other enhancements. This text details all these new features. Fortran 95/2003 Explained, significantly expands on the second edition of Fortran 90/95 Explained (also published by Oxford University Press): the opening chapters contain a complete description of the Fortran 95 language and are followed by descriptions of three formally approved extensions; six completely new chapters describe in detail the features that are new in Fortran 2003, but the distinction between the various language levels is kept clear throughout. Authored by three leading experts in the development of the language, this is a complete and authoritative description of the two languages (Fortran 95 and Fortran 2003). It is intended for new and existing users of Fortran, and for all those involved in scientific and numerical computing. It is suitable as textbook for teaching and, with its extensive index, as a handy reference for practitioners. Offering a clear tutorial guide for the new Fortran 90 language, this book highlights Fortran 90's role as a powerful tool for problem-solving in engineering and science. Having been involved in the development of the new standard, the authors provide (as a bonus) an inside perspective on the design rationale behind the major features of Fortran 90. Features comprehensive coverage of all the major language features, with clear guidelines on the differences between the 77 and 90 standards case studies illustrating its applications in scientific problem-solving two authoritative chapters in coding numerical methods in Fortran 90 an early introduction to procedures and modules to encourage a structural approach to programming 0201544466B04062001 This book offers a new approach to introductory scientific computing. It aims to make students comfortable using computers to do science, to provide them with the computational tools and knowledge they need throughout their college careers and into their professional careers, and to show how all the pieces can work together. Rubin Landau introduces the requisite mathematics and computer science in the course of realistic problems, from energy use to the building of skyscrapers to projectile motion with drag. He is attentive to how each discipline uses its own language to describe the same concepts and how computations are concrete instances of the abstract. Landau covers the basics of computation, numerical analysis, and programming from a computational science perspective. The first part of the printed book uses the problem-solving environment Maple as its context, with the same material covered on the accompanying CD as both Maple and Mathematica programs; the second part uses the compiled language Java, with equivalent materials in Fortran90 on the CD; and the final part presents an introduction to LaTeX replete with sample files. Providing the essentials of computing, with practical examples, A First Course in Scientific Computing adheres to the principle that science and engineering students learn computation best while sitting in front of a computer, book in hand, in trial-and-error mode. Not only is it an invaluable learning text and an essential reference for students of mathematics, engineering, physics, and other sciences, but it is also a

consummate model for future textbooks in computational science and engineering courses. A broad spectrum of computing tools and examples that can be used throughout an academic career Practical computing aimed at solving realistic problems Both symbolic and numerical computations A multidisciplinary approach: science + math + computer science Maple and Java in the book itself; Mathematica, Fortran90, Maple and Java on the accompanying CD in an interactive workbook format Building upon the wide-ranging success of the first edition, Parallel Scientific Computation presents a single unified approach to using a range of parallel computers, from a small desktop computer to a massively parallel computer. The author explains how to use the bulk synchronous parallel (BSP) model to design and implement parallel algorithms in the areas of scientific computing and big data, and provides a full treatment of core problems in these areas, starting from a high-level problem description, via a sequential solution algorithm to a parallel solution algorithm and an actual parallel program written in BSPlib. Every chapter of the book contains a theoretical section and a practical section presenting a parallel

program and numerical experiments on a modern parallel computer to put the theoretical predictions and cost analysis to the test. Every chapter also presents extensive bibliographical notes with additional discussions and pointers to relevant literature, and numerous exercises which are suitable as graduate student projects. The second edition provides new material relevant for big-data science such as sorting and graph algorithms, and it provides a BSP approach towards new hardware developments such as hierarchical architectures with both shared and distributed memory. A single, simple hybrid BSP system suffices to handle both types of parallelism efficiently, and there is no need to master two systems, as often happens in alternative approaches. Furthermore, the second edition brings all algorithms used up to date, and it includes new material on high-performance linear system solving by LU decomposition, and improved data partitioning for sparse matrix computations. The book is accompanied by a software package BSPedupack, freely available online from the author's homepage, which contains all programs of the book and a set of test driver programs. This package written in C can be run using modern BSPlib implementations such as MulticoreBSP for C or

BSPonMPI. A Guidebook to Fortran on Supercomputers presents in detail both the underlying architecture of supercomputers and the manner by which a compiler maps Fortran code onto that architecture. This book outlines the constructs preventing full optimization and provides specific strategies for restructuring a program. Organized into four chapters, this book begins with an overview of the basic concepts of vector, scalar, and parallel processing. This text then provides an in-depth look at the architectural features of a variety of existing machines, with emphasis to the features common to many of them. Other chapters consider the optimization techniques used by compilers and how a programmer can take advantage of this knowledge in restructuring existing programs and in the development of new applications. The final chapter presents examples of loops from real-world programs, with a discussion of the inherent problems. This book is a valuable resource for scientists, engineers, students, and research workers.

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