A Programmers View Of Computer Architecture With Assembly Language Examples From The Mips Risc Architecture 1st First Edition

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Designing Embedded Hardware - John Catsoulis 2002

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.

Write Great Code, Volume 1 - Randall Hyde

2004-11-01

Today's programmers are often narrowly trained because the industry moves too fast. That's where Write Great Code, Volume 1: Understanding the Machine comes in. This, the first of four volumes by author Randall Hyde, teaches important concepts of machine organization in a language-independent fashion, giving programmers what they need to know to write great code in any language, without the usual overhead of learning assembly language to master this topic. A solid foundation in software engineering, The Write Great Code series will help programmers make wiser choices with respect to programming statements and data types when writing software.

Computer Architecture: A Minimalist Perspective - William F. Gilreath 2012-12-06 This book examines computer architecture, computability theory, and the history of computers from the perspective of minimalist computing - a framework in which the instruction set consists of a single instruction. This approach is different than that taken in any other computer architecture text, and it is a bold step. The audience for this book is researchers, computer hardware engineers, software engineers, and systems engineers who are looking for a fresh, unique perspective on computer architecture. Upper division undergraduate students and early graduate students studying computer architecture, computer organization, or embedded systems will also find this book useful. A typical course title might be "Special Topics in Computer Architecture." The organization ofthe book is as follows. First, the reasons for studying such an "esoteric" subject are given. Then, the history and evolution of instruction sets is studied with an emphasis on how modern computing has features ofone instruction computing. Also, previous computer systems are reviewed to show how their features relate to one instruction computers. Next, the primary forms of one

instruction set computing are examined. The theories of computation and of Turing machines are also reviewed to examine the theoretical nature of one instruction computers. Other processor architectures and instruction sets are then mapped into single instructions to illustrate the features of both types of one instruction computers. In doing so, the features of the processor being mapped are highlighted.

Computer Organization and Design RISC-V Edition - David A. Patterson 2017-05-12
The new RISC-V Edition of Computer Organization and Design features the RISC-V open source instruction set architecture, the first open source architecture designed to be used in modern computing environments such as cloud computing, mobile devices, and other embedded systems. With the post-PC era now upon us, Computer Organization and Design moves forward to explore this generational change with examples, exercises, and material highlighting the emergence of mobile computing and the Cloud. Updated content featuring tablet computers, Cloud infrastructure, and the x86 (cloud computing) and ARM (mobile computing devices) architectures is included. An online companion Web site provides advanced content for further study, appendices, glossary, references, and recommended reading. Features RISC-V, the first such architecture designed to be used in modern computing environments, such as cloud computing, mobile devices, and other embedded systems Includes relevant examples, exercises, and material highlighting the emergence of mobile computing and the cloud

Computer Architecture - John L. Hennessy 2012
The computing world today is in the middle of a revolution: mobile clients and cloud computing have emerged as the dominant paradigms driving programming and hardware innovation today. The Fifth Edition of Computer Architecture focuses on this dramatic shift,

exploring the ways in which software and technology in the cloud are accessed by cell phones, tablets, laptops, and other mobile computing devices. Each chapter includes two real-world examples, one mobile and one datacenter, to illustrate this revolutionary change. Updated to cover the mobile computing revolution Emphasizes the two most important topics in architecture today: memory hierarchy and parallelism in all its forms. Develops common themes throughout each chapter: power, performance, cost, dependability, protection, programming models, and emerging trends ("What's Next") Includes three review appendices in the printed text. Additional reference appendices are available online. Includes updated Case Studies and completely new exercises.

Programming Massively Parallel Processors - David B. Kirk 2012-12-31
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

Scientific Programming and Computer Architecture - Divakar Viswanath 2017-07-28 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.

Basic Computer Architecture - Smruti R. Sarangi 2021-09
This book is a comprehensive text on basic, undergraduate-level computer architecture. It starts from theoretical preliminaries and simple Boolean algebra. After a quick discussion on logic gates, it describes three classes of assembly languages: a custom RISC ISA called SimpleRisc, ARM, and x86. In the next part, a processor is designed for the SimpleRisc ISA from scratch. This includes the combinational units, ALUs, processor, basic 5-stage pipeline, and a microcode-based design. The last part of the book discusses caches, virtual memory, parallel programming, multiprocessors, storage devices and modern I/O systems. The book's website has links to slides for each chapter and video lectures hosted on YouTube.

Computer Architecture - John Y. Hsu 2017-12-19
With the new developments in computer architecture, fairly recent publications can quickly become outdated. Computer Architecture: Software Aspects, Coding, and Hardware takes a modern approach. This comprehensive, practical text provides that critical understanding of a central processor by clearly detailing fundamentals, and cutting edge design features. With its balanced software/hardware perspective and its description of Pentium processors, the book allows readers to acquire practical PC software experience. The text presents a foundation-level

set of ideas, design concepts, and applications that fully meet the requirements of computer organization and architecture courses. The book features a "bottom up" computer design approach, based upon the author's thirty years experience in both academe and industry. By combining computer engineering with electrical engineering, the author describes how logic circuits are designed in a CPU. The extensive coverage of a micprogrammed CPU and new processor design features gives the insight of current computer development. Computer Architecture: Software Aspects, Coding, and Hardware presents a comprehensive review of the subject, from beginner to advanced levels. Topics include: o Two's complement numbers o Integer overflow o Exponent overflow and underflow o Looping o Addressing modes o Indexing o Subroutine linking o I/O structures o Memory mapped I/O o Cycle stealing o Interrupts o Multitasking o Microprogrammed CPU o Multiplication tree o Instruction queue o Multimedia instructions o Instruction cache o Virtual memory o Data cache o Alpha chip o Interprocessor communications o Branch prediction o Speculative loading o Register stack o JAVA virtual machine o Stack machine principles

High-Level Language Computer Architecture - Yaohan Chu 2014-05-10 High-Level Language Computer Architecture offers a tutorial on high-level language computer architecture, including von Neumann architecture and syntax-oriented architecture as well as direct and indirect execution architecture. Design concepts of Japanese-language data processing systems are discussed, along with the architecture of stack machines and the SYMBOL computer system. The conceptual design of a direct high-level language processor is also described. Comprised of seven chapters, this book first presents a classification of high-level language computer architecture according to the proximity of the machine

language and the programming language. This classification gives four types: von Neumann architecture, syntax-oriented architecture, indirect execution architecture, and direct execution architecture. In order to illustrate the possible evolution of computer architecture, design concepts of Japanese-language data processing systems are chosen as an example. Subsequent chapters focus on the syntax-oriented architecture; the historical SYMBOL computer system which makes use of an indirect execution architecture; and design concepts of direct-execution architecture for the ALGOL 60 language. The final chapter describes the architecture for the processor for an APL subset. This monograph will be of interest to specialists in electronics and computer science.

The Elements of Computing Systems - Noam Nisan 2008
This title gives students an integrated and rigorous picture of applied computer science, as it comes to play in the construction of a simple yet powerful computer system.

The Datacenter as a Computer - Luiz André Barroso 2013
ABSTRACT As computation continues to move into the cloud, the computing platform of interest no longer resembles a pizza box or a refrigerator, but a warehouse full of computers. These new large datacenters are quite different from traditional hosting facilities of earlier times and cannot be viewed simply as a collection of co-located servers. Large portions of the hardware and software resources in these facilities must work in concert to efficiently deliver good levels of Internet service performance, something that can only be achieved by a holistic approach to their design and deployment. In other words, we must treat the datacenter itself as one massive warehouse-scale computer (WSC). We describe the architecture of WSCs, the main factors influencing their design, operation, and cost structure, and the characteristics of their

software base. We hope it will be useful to architects and programmers of today's WSCs, as well as those of future many-core platforms which may one day implement the equivalent of today's WSCs on a single board. NOTES FOR THE SECOND EDITION After nearly four years of substantial academic and industrial developments in warehouse-scale computing, we are delighted to present our first major update to this lecture. The increased popularity of public clouds has made WSC software techniques relevant to a larger pool of programmers since our first edition. Therefore, we expanded Chapter 2 to reflect our better understanding of WSC software systems and the toolbox of software techniques for WSC programming. In Chapter 3, we added to our coverage of the evolving landscape of wimpy vs. brawny server trade-offs, and we now present an overview of WSC interconnects and storage systems that was promised but lacking in the original edition. Thanks largely to the help of our new co-author, Google Distinguished Engineer Jimmy Clidaras, the material on facility mechanical and power distribution design has been updated and greatly extended (see Chapters 4 and 5). Chapters 6 and 7 have also been revamped significantly. We hope this revised edition continues to meet the needs of educators and professionals in this area.

Inside the Machine - Jon Stokes 2007
Om hvordan mikroprocessorer fungerer, med undersøgelse af de nyeste mikroprocessorer fra Intel, IBM og Motorola.

A Programmer's View of the Intel 432 System - Elliott Irving Organick 1983

Stack Computers - Phil Koopman 1989
Computer Systems Organization -- Processor Architectures.

Parallel Computers 2 - R.W Hockney 1988-01-01
Since the publication of the first edition, parallel computing technology has gained considerable momentum. A large proportion of this has come

from the improvement in VLSI techniques, offering one to two orders of magnitude more devices than previously possible. A second contributing factor in the fast development of the subject is commercialization. The supercomputer is no longer restricted to a few well-established research institutions and large companies. A new computer breed combining the architectural advantages of the supercomputer with the advance of VLSI technology is now available at very attractive prices. A pioneering device in this development is the transputer, a VLSI processor specifically designed to operate in large concurrent systems. Parallel Computers 2: Architecture, Programming and Algorithms reflects the shift in emphasis of parallel computing and tracks the development of supercomputers in the years since the first edition was published. It looks at large-scale parallelism as found in transputer ensembles. This extensively rewritten second edition includes major new sections on the transputer and the OCCAM language. The book contains specific information on the various types of machines available, details of computer architecture and technologies, and descriptions of programming languages and algorithms. Aimed at an advanced undergraduate and postgraduate level, this handbook is also useful for research workers, machine designers, and programmers concerned with parallel computers. In addition, it will serve as a guide for potential parallel computer users, especially in disciplines where large amounts of computer time are regularly used.

Computer Programming and Architecture - Henry Levy 2014-06-28
Takes a unique systems approach to programming and architecture of the VAX Using the VAX as a detailed example, the first half of this book offers a complete course in assembly language programming. The second describes higher-level systems issues in computer architecture. Highlights include the VAX

assembler and debugger, other modern architectures such as RISCs, multiprocessing and parallel computing, microprogramming, caches and translation buffers, and an appendix on the Berkeley UNIX assembler.

A Programmer's View of Computer Architecture - James Goodman 1993
This introductory text offers a contemporary treatment of computer architecture using assembly and machine language with a focus on software. Students learn how computers work through a clear, generic presentation of a computer architecture, a departure from the traditional focus on a specific architecture. A computer's capabilities are introduced within the context of software, reinforcing the software focus of the text. Designed for computer science majors in an assembly language course, this text uses a top-down approach to the material that enables students to begin programming immediately and to understand the assembly language, the interface between hardware and software. The text includes examples from the MIPS RISC (reduced instruction set computer) architecture, and an accompanying software simulator package simulates a MIPS RISC processor (the software does not require a MIPS processor to run).

Computer Systems Design And Architecture, 2/E - Heuring 2008-09

The MIPS Programmer's Handbook - Erin Farquhar 1994-02
This book gives a "hands-on" approach to programming the MIPS chip (which is the world's most popular chip). This will be of interest to the same audience as other important MK books on architecture and to the same audience as Kane's book on MIPS RISC Architecture.

Essentials of Computer Architecture, Second Edition - Douglas Comer 2017-01-06
This easy to read textbook provides an introduction to computer architecture, while

focusing on the essential aspects of hardware that programmers need to know. The topics are explained from a programmer's point of view, and the text emphasizes consequences for programmers. Divided in five parts, the book covers the basics of digital logic, gates, and data paths, as well as the three primary aspects of architecture: processors, memories, and I/O systems. The book also covers advanced topics of parallelism, pipelining, power and energy, and performance. A hands-on lab is also included. The second edition contains three new chapters as well as changes and updates throughout.
Computer Organization and Design - David A. Patterson 2011-10-26
"Presents the fundamentals of hardware technologies, assembly language, computer arithmetic, pipelining, memory hierarchies and I/O"--
Memory as a Programming Concept in C and C++ - Frantisek Franek 2004
The overwhelming majority of bugs and crashes in computer programming stem from problems of memory access, allocation, or deallocation. Such memory related errors are also notoriously difficult to debug. Yet the role that memory plays in C and C++ programming is a subject often overlooked in courses and in books because it requires specialised knowledge of operating systems, compilers, computer architecture in addition to a familiarity with the languages themselves. Most professional programmers learn entirely through experience of the trouble it causes. This 2004 book provides students and professional programmers with a concise yet comprehensive view of the role memory plays in all aspects of programming and program behaviour. Assuming only a basic familiarity with C or C++, the author describes the techniques, methods, and tools available to deal with the problems related to memory and its effective use.
Occupational Outlook Handbook - United States. Bureau of Labor Statistics 1976

The Architecture of Computer Hardware, Systems Software, and Networking - Irv Englander 2021-04-06
The Architecture of Computer Hardware, Systems Software and Networking is designed help students majoring in information technology (IT) and information systems (IS) understand the structure and operation of computers and computer-based devices. Requiring only basic computer skills, this accessible textbook introduces the basic principles of system architecture and explores current technological practices and trends using clear, easy-to-understand language. Throughout the text, numerous relatable examples, subject-specific illustrations, and in-depth case studies reinforce key learning points and show students how important concepts are applied in the real world. This fully-updated sixth edition features a wealth of new and revised content that reflects today's technological landscape. Organized into five parts, the book first explains the role of the computer in information systems and provides an overview of its components. Subsequent sections discuss the representation of data in the computer, hardware architecture and operational concepts, the basics of computer networking, system software and operating systems, and various interconnected systems and components. Students are introduced to the material using ideas already familiar to them, allowing them to gradually build upon what they have learned without being overwhelmed and develop a deeper knowledge of computer architecture.
Computer Organization & Architecture 7e - Stallings 2008-02

The Essentials of Computer Organization and Architecture - Linda Null 2014-02-14 Updated and revised, The Essentials of Computer Organization and Architecture, Third Edition is a comprehensive resource that addresses all of the necessary organization and

architecture topics, yet is appropriate for the one-term course.

Introduction to 80 X 86 Assembly Language and Computer Architecture - Richard C. Detmer 2006-07-30

Rust in Action - Tim McNamara 2021-09-07 "This well-written book will help you make the most of what Rust has to offer." - Ramnivas Laddad, author of AspectJ in Action Rust in Action is a hands-on guide to systems programming with Rust. Written for inquisitive programmers, it presents real-world use cases that go far beyond syntax and structure. Summary Rust in Action introduces the Rust programming language by exploring numerous systems programming concepts and techniques. You'll be learning Rust by delving into how computers work under the hood. You'll find yourself playing with persistent storage, memory, networking and even tinkering with CPU instructions. The book takes you through

using Rust to extend other applications and teaches you tricks to write blindingly fast code. You'll also discover parallel and concurrent programming. Filled to the brim with real-life use cases and scenarios, you'll go beyond the Rust syntax and see what Rust has to offer in real-world use cases. Purchase of the print book includes a free eBook in PDF, Kindle, and ePub formats from Manning Publications. About the technology Rust is the perfect language for systems programming. It delivers the low-level power of C along with rock-solid safety features that let you code fearlessly. Ideal for applications requiring concurrency, Rust programs are compact, readable, and blazingly fast. Best of all, Rust's famously smart compiler helps you avoid even subtle coding errors. About the book Rust in Action is a hands-on guide to systems programming with Rust. Written for inquisitive programmers, it presents real-world use cases that go far beyond syntax and structure. You'll explore Rust implementations

for file manipulation, networking, and kernel-level programming and discover awesome techniques for parallelism and concurrency. Along the way, you'll master Rust's unique borrow checker model for memory management without a garbage collector. What's inside Elementary to advanced Rust programming Practical examples from systems programming Command-line, graphical and networked applications About the reader For intermediate programmers. No previous experience with Rust required. About the author Tim McNamara uses Rust to build data processing pipelines and generative art. He is an expert in natural language processing and data engineering. Table of Contents 1 Introducing Rust PART 1 RUST LANGUAGE DISTINCTIVES 2 Language foundations 3 Compound data types 4 Lifetimes, ownership, and borrowing PART 2 DEMYSTIFYING SYSTEMS PROGRAMMING 5 Data in depth 6 Memory 7 Files and storage 8 Networking 9 Time and timekeeping 10

Processes, threads, and containers 11 Kernel 12 Signals, interrupts, and exceptions
Embedded Systems Architecture - Tammy Noergaard 2012-12-31
Embedded Systems Architecture is a practical and technical guide to understanding the components that make up an embedded system's architecture. This book is perfect for those starting out as technical professionals such as engineers, programmers and designers of embedded systems; and also for students of computer science, computer engineering and electrical engineering. It gives a much-needed 'big picture' for recently graduated engineers grappling with understanding the design of real-world systems for the first time, and provides professionals with a systems-level picture of the key elements that can go into an embedded design, providing a firm foundation on which to build their skills. Real-world approach to the fundamentals, as well as the design and architecture process, makes this book a popular

reference for the daunted or the inexperienced: if in doubt, the answer is in here! Fully updated with new coverage of FPGAs, testing, middleware and the latest programming techniques in C, plus complete source code and sample code, reference designs and tools online make this the complete package Visit the companion web site at http://booksite.elsevier.com/9780123821966/ for source code, design examples, data sheets and more A true introductory book, provides a comprehensive get up and running reference for those new to the field, and updating skills: assumes no prior knowledge beyond undergrad level electrical engineering Addresses the needs of practicing engineers, enabling it to get to the point more directly, and cover more ground. Covers hardware, software and middleware in a single volume Includes a library of design examples and design tools, plus a complete set of source code and embedded systems design tutorial materials from companion website

Assembly Programming and Computer Architecture - Brian Hall 2020-10

Computer Organization and Design - John L. Hennessy 1998
The performance of software systems is dramatically affected by how well software designers understand the basic hardware technologies at work in a system. Similarly, hardware designers must understand the far-reaching effects their design decisions have on software applications. For readers in either category, this classic introduction to the field provides a look deep into the computer. It demonstrates the relationships between the software and hardware and focuses on the foundational concepts that are the basis for current computer design.
Computer Systems - Randal E.. Bryant 2013-07-23
For Computer Systems, Computer Organization and Architecture courses in CS, EE, and ECE

departments. Few students studying computer science or computer engineering will ever have the opportunity to build a computer system. On the other hand, most students will be required to use and program computers on a near daily basis. Computer Systems: A Programmer's Perspective introduces the important and enduring concepts that underlie computer systems by showing how these ideas affect the correctness, performance, and utility of application programs. The text's hands-on approach (including a comprehensive set of labs) helps students understand the under-the-hood operation of a modern computer system and prepares them for future courses in systems topics such as compilers, computer architecture, operating systems, and networking.

Parallel Programming - Thomas Rauber 2013-06-13
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.

Heterogeneous Computing Architectures - Olivier Terzo 2019-09-10
Heterogeneous Computing Architectures:

Challenges and Vision provides an updated vision of the state-of-the-art of heterogeneous computing systems, covering all the aspects related to their design: from the architecture and programming models to hardware/software integration and orchestration to real-time and security requirements. The transitions from multicore processors, GPU computing, and Cloud computing are not separate trends, but aspects of a single trend-mainstream; computers from desktop to smartphones are being permanently transformed into heterogeneous supercomputer clusters. The reader will get an organic perspective of modern heterogeneous systems and their future evolution.
Programming Embedded Systems - Michael Barr 2006-10-11
Authored by two of the leading authorities in the field, this guide offers readers the knowledge and skills needed to achieve proficiency with embedded software.
Low-Level Programming - Igor Zhirkov

2017-06-27
Learn Intel 64 assembly language and architecture, become proficient in C, and understand how the programs are compiled and executed down to machine instructions, enabling you to write robust, high-performance code. Low-Level Programming explains Intel 64 architecture as the result of von Neumann architecture evolution. The book teaches the latest version of the C language (C11) and assembly language from scratch. It covers the entire path from source code to program execution, including generation of ELF object files, and static and dynamic linking. Code examples and exercises are included along with the best code practices. Optimization capabilities and limits of modern compilers are examined, enabling you to balance between program readability and performance. The use of various performance-gain techniques is demonstrated, such as SSE instructions and pre-fetching. Relevant Computer Science topics such as models of computation and formal grammars are addressed, and their practical value explained. What You'll Learn Low-Level Programming teaches programmers to: Freely write in assembly language Understand the programming model of Intel 64 Write maintainable and robust code in C11 Follow the compilation process and decipher assembly listings Debug errors in compiled assembly code Use appropriate models of computation to greatly reduce program complexity Write performance-critical code Comprehend the impact of a weak memory model in multi-threaded applications Who This Book Is For Intermediate to advanced programmers and programming students

The Future of Computing Performance - National Research Council 2011-04-21 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.

Computer Organization and Design MIPS Edition - David A. Patterson 2013-09-30 Computer Organization and Design, Fifth Edition, is the latest update to the classic

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

inspire software optimizations that improve performance by 200 times Discusses and highlights the "Eight Great Ideas" of computer architecture: Performance via Parallelism; Performance via Pipelining; Performance via Prediction; Design for Moore's Law; Hierarchy of Memories; Abstraction to Simplify Design; Make the Common Case Fast; and Dependability via Redundancy Includes a full set of updated and improved exercises

The Apollo Guidance Computer - Frank O'Brien 2010-06-25
The technological marvel that facilitated the Apollo missions to the Moon was the on-board computer. In the 1960s most computers filled an entire room, but the spacecraft's computer was required to be compact and low power. Although people today find it difficult to accept that it was possible to control a spacecraft using such a 'primitive' computer, it nevertheless had capabilities that are advanced even by today's standards. This is the first book to fully describe the Apollo guidance computer's architecture, instruction format and programs used by the astronauts. As a comprehensive account, it will span the disciplines of computer science, electrical and aerospace engineering. However, it will also be accessible to the 'space enthusiast'. In short, the intention is for this to be the definitive account of the Apollo guidance computer. Frank O'Brien's interest in the Apollo program began as a serious amateur historian. About 12 years ago, he began performing research and writing essays for the Apollo Lunar Surface Journal, and the Apollo Flight Journal. Much of this work centered on his primary interests, the Apollo Guidance Computer (AGC) and the Lunar Module. These Journals are generally considered the canonical online reference on the flights to the Moon. He was then asked to assist the curatorial staff in the creation of the Cradle of Aviation Museum, on Long Island, New York, where he helped prepare the Lunar Module simulator, a LM procedure

trainer and an Apollo space suit for display. He regularly lectures on the Apollo computer and related topics to diverse groups, from NASA's computer engineering conferences, the IEEE/ACM, computer festivals and university student groups.