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Computer Organization and Design RISC-V Edition

The Hardware Software Interface

Morgan Kaufmann

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 Organization and Design RISC-V Edition

The Hardware Software Interface
Morgan Kaufmann

Modern computer technology requires professionals of every computing specialty to understand both hardware and

software. The interaction between hardware and software at a variety of levels offers a framework for understanding the concepts that are the basis for current computers. Computer Organization and Design, the leading, award-winning textbook from Patterson and Hennessy, used by more than 40,000 students per year, continues to present the most comprehensive and readable introduction to this core computer science topic. This version 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. An online Companion Web site provides advanced content for further study, appendices, glossary, references, links to software tools such as RISC-V simulators, a link to a test case module, and recommended reading. As with all versions of COD, this edition covers parallelism in depth with examples and content highlighting parallel hardware and software topics. The focus of the new edition has changed from 64-bit address and ISA to 32-bit address and ISA for RISC-V because the 32-bit RISC-V ISA is simpler to explain, and 32-bit address

computers are still best for applications like embedded computing and IoT. Includes new sections in each chapter on Domain Specific Architectures (DSA). Includes updates of all the real-world examples in the book.

Computer Organization and Design

The Hardware/software Interface *Morgan Kaufmann*

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 Organization and Design ARM Edition

The Hardware Software Interface

Morgan Kaufmann

The new ARM Edition of Computer Organization and Design features a subset of the ARMv8-A architecture, which is used to present the fundamentals of hardware technologies, assembly language, computer arithmetic,

pipelining, memory hierarchies, and I/O. 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 ARM (mobile computing devices) and x86 (cloud computing) architectures is included. An online companion Web site provides links to a free version of the DS-5 Community Edition (a free professional quality tool chain developed by ARM), as well as additional advanced content for

further study, appendices, glossary, references, and recommended reading. Covers parallelism in depth with examples and content highlighting parallel hardware and software topics Features the Intel Core i7, ARM Cortex-A53, 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 200X 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 exercises

Digital Design and Computer Architecture, RISC-V Edition *Morgan Kaufmann*

The newest addition to the Harris and Harris family of Digital Design and Computer Architecture books, this RISC-V Edition covers the fundamentals of digital logic design and reinforces logic concepts through the design of a RISC-V microprocessor. Combining an engaging and

humorous writing style with an updated and hands-on approach to digital design, this book takes the reader from the fundamentals of digital logic to the actual design of a processor. By the end of this book, readers will be able to build their own RISC-V microprocessor and will have a top-to-bottom understanding of how it works. Beginning with digital logic gates and progressing to the design of combinational and sequential circuits, this book uses these fundamental building blocks as the basis for designing a RISC-V processor. SystemVerilog and VHDL are integrated throughout the text in examples illustrating the methods and techniques for CAD-

based circuit design. The companion website includes a chapter on I/O systems with practical examples that show how to use SparkFun's RED-V RedBoard to communicate with peripheral devices such as LCDs, Bluetooth radios, and motors. This book will be a valuable resource for students taking a course that combines digital logic and computer architecture or students taking a two-quarter sequence in digital logic and computer organization/architecture. Covers the fundamentals of digital logic design and reinforces logic concepts through the design of a RISC-V microprocessor. Gives students a full understanding of the

RISC-V instruction set architecture, enabling them to build a RISC-V processor and program the RISC-V processor in hardware simulation, software simulation, and in hardware. Includes both SystemVerilog and VHDL designs of fundamental building blocks as well as of single-cycle, multicycle, and pipelined versions of the RISC-V architecture. Features a companion website with a bonus chapter on I/O systems with practical examples that show how to use SparkFun's RED-V RedBoard to communicate with peripheral devices such as LCDs, Bluetooth radios, and motors. The companion website also includes appendices covering practical digital design

issues and C programming as well as links to CAD tools, lecture slides, laboratory projects, and solutions to exercises. See the companion EdX MOOCs ENGR85A and ENGR85B with video lectures and interactive problems.

Computer Organization and Design

The Hardware/Software Interface *Elsevier*

"Presents the fundamentals of hardware technologies, assembly language, computer arithmetic, pipelining, memory hierarchies and I/O"--

Computer Organization and Design MIPS Edition

The Hardware/Software Interface *Newnes*

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 RISC-V Reader

An Open Architecture Atlas

Designing Embedded Hardware "O'Reilly Media, Inc."

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.

Computer Organization and

Design

The Hardware Software Interface: RISC-V Edition

Morgan Kaufmann Series in Comp

Computer Organization and Design: The Hardware Software Interface: RISC-V Edition features the RISC-V open source instruction set architecture, the first such 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, the book includes relevant examples, exercises, and material highlighting the emergence of mobile computing and the cloud. Updated content features tablet

computers, cloud infrastructure, and the ARM (mobile computing devices) and x86 (cloud computing) architectures. An online companion website provides advanced content for further study, appendices, a 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

Fundamentals of Computer

Organization and Design *Springer Science & Business Media*

A new advanced textbook/reference providing a comprehensive survey of hardware and software architectural principles and methods of computer systems organization and design. The book is suitable for a first course in computer organization. The style is similar to that of the author's book on assembly language in that it strongly supports self-study by students. This organization facilitates compressed presentation of material. Emphasis is also placed on related concepts to practical designs/chips. Topics: material presentation suitable for self-study;

concepts related to practical designs and implementations; extensive examples and figures; details provided on several digital logic simulation packages; free MASM download instructions provided; and end-of-chapter exercises.

Computer Architecture

A Quantitative Approach *Morgan Kaufmann*

Computer Architecture: A Quantitative Approach, Sixth Edition has been considered essential reading by instructors, students and practitioners of computer design for over 20 years. The sixth edition of this classic textbook from Hennessy and Patterson, winners of the 2017 ACM A.M.

Turing Award recognizing contributions of lasting and major technical importance to the computing field, is fully revised with the latest developments in processor and system architecture. The text now features examples from the RISC-V (RISC Five) instruction set architecture, a modern RISC instruction set developed and designed to be a free and openly adoptable standard. It also includes a new chapter on domain-specific architectures and an updated chapter on warehouse-scale computing that features the first public information on Google's newest WSC. True to its original mission of demystifying computer architecture, this

edition continues the longstanding tradition of focusing on areas where the most exciting computing innovation is happening, while always keeping an emphasis on good engineering design. Winner of a 2019 Textbook Excellence Award (Texty) from the Textbook and Academic Authors Association Includes a new chapter on domain-specific architectures, explaining how they are the only path forward for improved performance and energy efficiency given the end of Moore's Law and Dennard scaling Features the first publication of several DSAs from industry Features extensive updates to the chapter on warehouse-scale

computing, with the first public information on the newest Google WSC Offers updates to other chapters including new material dealing with the use of stacked DRAM; data on the performance of new NVIDIA Pascal GPU vs. new AVX-512 Intel Skylake CPU; and extensive additions to content covering multicore architecture and organization Includes "Putting It All Together" sections near the end of every chapter, providing real-world technology examples that demonstrate the principles covered in each chapter Includes review appendices in the printed text and additional reference appendices available online Includes updated and improved case studies and

exercises ACM named John L. Hennessy and David A. Patterson, recipients of the 2017 ACM A.M. Turing Award for pioneering a systematic, quantitative approach to the design and evaluation of computer architectures with enduring impact on the microprocessor industry

**Computer
Organization and
Design RISC-V
Edition**

**The Hardware
Software Interface**

Morgan Kaufmann

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 Organization & Architecture 7e
Pearson Education India

Computer Organisation & Architecture *McGraw-Hill Education*

This textbook provides a perfect amalgam of the basics of computer architecture, intricacies

of modern assembly languages and advanced concepts such as multiprocessor memory systems and I/O technologies. It shows the design of a processor from first principles including its instruction set, assembly-language specification, functional units, microprogrammed implementation and 5-stage pipeline. Computer Organisation and Architecture can serve as a textbook in both basic as well as advanced courses on computer architecture, systems programming, and microprocessor design. Additionally, it can also serve as a reference book for courses on digital electronics and communication. Salient Features: ? Balanced presentation of

theoretical, qualitative and quantitative aspects of computer architecture ? Extensive coverage of the ARM and x86 assembly languages ? Extensive software support: Instruction set emulators, assembler, Logisim and VHDL design of the SimpleRisc processor

RISC-V Assembly Language

Presents RISC-V assembly language with emphasis on system concepts. You will learn not only assembly language programming but also the system concepts necessary to fully understand at the machine level a RISC-V computer that supports RV32I and RV32M. The software package for the book includes a RISC-V

assembler/linker/debugger/ interpreter that runs on Windows, Mac OS X, Linux, and Raspbian. It is easy to install (simply unzip the distribution file) and easy to use.

The Essentials of Computer Organization and Architecture Jones & Bartlett Learning

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.

Computer Organization, Design, and Architecture, Fifth

Edition *CRC Press*

Suitable for a one- or two-semester undergraduate or beginning graduate course in computer science and computer engineering, *Computer Organization, Design, and Architecture*, Fifth Edition presents the operating principles, capabilities, and limitations of digital computers to enable the development of complex yet efficient systems. With 11 new sections and four revised sections, this edition takes students through a solid, up-to-date exploration of single- and multiple-processor systems, embedded architectures, and performance evaluation. See What's New in the Fifth Edition Expanded coverage of embedded systems,

mobile processors, and cloud computing Material for the "Architecture and Organization" part of the 2013 IEEE/ACM Draft Curricula for Computer Science and Engineering Updated commercial machine architecture examples The backbone of the book is a description of the complete design of a simple but complete hypothetical computer. The author then details the architectural features of contemporary computer systems (selected from Intel, MIPS, ARM, Motorola, Cray and various microcontrollers, etc.) as enhancements to the structure of the simple computer. He also introduces performance enhancements and advanced architectures

including networks, distributed systems, GRIDs, and cloud computing. Computer organization deals with providing just enough details on the operation of the computer system for sophisticated users and programmers. Often, books on digital systems' architecture fall into four categories: logic design, computer organization, hardware design, and system architecture. This book captures the important attributes of these four categories to present a comprehensive text that includes pertinent hardware, software, and system aspects.

Beginning Software Engineering *John Wiley & Sons*

A complete introduction to building

robust and reliable software. Beginning Software Engineering demystifies the software engineering methodologies and techniques that professional developers use to design and build robust, efficient, and consistently reliable software. Free of jargon and assuming no previous programming, development, or management experience, this accessible guide explains important concepts and techniques that can be applied to any programming language. Each chapter ends with exercises that let you test your understanding and help you elaborate on the chapter's main concepts. Everything

you need to understand waterfall, Sashimi, agile, RAD, Scrum, Kanban, Extreme Programming, and many other development models is inside! Describes in plain English what software engineering is Explains the roles and responsibilities of team members working on a software engineering project Outlines key phases that any software engineering effort must handle to produce applications that are powerful and dependable Details the most popular software development methodologies and explains the different ways they handle critical development tasks Incorporates exercises that expand upon each chapter's main ideas Includes an extensive glossary of

software engineering terms

The Architecture of Computer Hardware, Systems Software, and Networking

An Information Technology

Approach *John Wiley & Sons*

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.

A Guide to the Project Management Body of Knowledge (PMBOK® Guide) - Seventh Edition and The Standard for Project Management (RUSSIAN) *Project Management Institute* PMBOK® Guide is the go-to resource for project management

practitioners. The project management profession has significantly evolved due to emerging technology, new approaches and rapid market changes. Reflecting this evolution, The Standard for Project Management enumerates 12 principles of project management and the PMBOK® Guide & Seventh Edition is structured around eight project performance domains. This edition is designed to address practitioners' current and future needs and to help them be more proactive, innovative and nimble in enabling desired project outcomes. This edition of the PMBOK® Guide:

- Reflects the full range of development

- approaches (predictive, adaptive, hybrid, etc.);
- Provides an entire section devoted to tailoring the development approach and processes;
- Includes an expanded list of models, methods, and artifacts;
- Focuses on not just delivering project outputs but also enabling outcomes; and
- Integrates with PM standards™ for information and standards application content based on project type, development approach, and industry sector.

Computer Systems

Digital Design, Fundamentals of Computer Architecture and Assembly Language

Springer

This textbook covers digital design, fundamentals of computer architecture, and assembly language. The book starts by introducing basic number systems, character coding, basic knowledge in digital design, and components of a computer. The book goes on to discuss information representation in computing; Boolean algebra and logic gates; sequential logic; input/output; and CPU performance. The author also covers ARM architecture, ARM instructions and ARM assembly language which is used in a variety of devices such as cell phones, digital TV, automobiles, routers, and switches. The book contains a

set of laboratory experiments related to digital design using Logisim software; in addition, each chapter features objectives, summaries, key terms, review questions and problems. The book is targeted to students majoring Computer Science, Information System and IT and follows the ACM/IEEE 2013 guidelines. • Comprehensive textbook covering digital design, computer architecture, and ARM architecture and assembly • Covers basic number system and coding, basic knowledge in digital design, and components of a computer • Features laboratory exercises in addition to objectives, summaries, key terms, review questions, and problems in each

chapter

ARM Assembly Language

Fundamentals and Techniques, Second Edition *CRC Press*

Delivering a solid introduction to assembly language and embedded systems, *ARM Assembly Language: Fundamentals and Techniques, Second Edition* continues to support the popular ARM7TDMI, but also addresses the latest architectures from ARM, including CortexTM-A, Cortex-R, and Cortex-M processors—all of which have slightly different instruction sets, programmer's models, and exception handling. Featuring three brand-new chapters, a new

appendix, and expanded coverage of the ARM7TM, this edition: Discusses IEEE 754 floating-point arithmetic and explains how to program with the IEEE standard notation Contains step-by-step directions for the use of KeilTM MDK-ARM and Texas Instruments (TI) Code Composer StudioTM Provides a resource to be used alongside a variety of hardware evaluation modules, such as TI's Tiva Launchpad, STMicroelectronics' iNemo and Discovery, and NXP Semiconductors' Xplorer boards Written by experienced ARM processor designers, *ARM Assembly Language: Fundamentals and Techniques, Second Edition* covers the

topics essential to writing meaningful assembly programs, making it an ideal textbook and professional reference.

STRUCTURED COMPUTER ORGANIZATION

Computer Organization and Design, Enhanced

The Hardware/Software Interface *Morgan Kaufmann*

Computer Organization and Design, Fifth Edition, moves into the post-PC era with new examples and material highlighting the emergence of mobile computing and the cloud. The book explores this generational change with updated content featuring tablet

computers, cloud infrastructure, and the ARM (mobile computing devices) and x86 (cloud computing)

architectures. This new edition provides in-depth coverage of parallelism with examples and content highlighting parallel hardware and software topics. It features the Intel Core i7, ARM Cortex-A8 and NVIDIA Fermi GPU as real-world examples throughout the book. It also adds a new concrete example, Going Faster, to demonstrate how understanding hardware can inspire software optimizations that improve performance by 200 times. Other topics covered include: the Eight Great Ideas of computer architecture;

performance via a 2014 Texty Award
 parallelism; from the Text and
 performance via Academic Authors
 pipelining; Association Includes
 performance via new examples,
 prediction; design for exercises, and material
 Moore's Law; hierarchy highlighting the
 of memories; emergence of mobile
 abstraction to simplify computing and the
 design; and cloud Covers
 dependability via parallelism in depth
 redundancy. The book with examples and
 includes a full set of content highlighting
 updated and improved parallel hardware and
 exercises as well as software topics
 pop-up definitions for Features the Intel Core
 technical terms and i7, ARM Cortex-A8 and
 concepts. Furthermore, NVIDIA Fermi GPU as
 it features interactive real-world examples
 learning assessments throughout the book
 that provide instant Adds a new concrete
 feedback in the form of example, "Going
 true/false, multiple Faster," to
 choice, and short essay demonstrate how
 questions. This book understanding
 will appeal to hardware can inspire
 professionals in software optimizations
 computer organization that improve
 and design as well as performance by 200
 students with interest times Discusses and
 or are taking courses in highlights the "Eight
 this subject. Winner of Great Ideas" of

computer architecture: *Morgan Kaufmann*
 Performance via The newest addition to
 Parallelism; the Harris and Harris
 Performance via family of Digital Design
 Pipelining; and Computer
 Performance via Architecture books,
 Prediction; Design for this RISC-V Edition
 Moore's Law; Hierarchy covers the
 of Memories; fundamentals of digital
 Abstraction to Simplify logic design and
 Design; Make the reinforces logic
 Common Case Fast; concepts through the
 and Dependability via design of a RISC-V
 Redundancy Includes a microprocessor.
 full set of updated and Combining an
 improved exercises engaging and
 Features interactive humorous writing style
 learning assessments with an updated and
 that provide instant hands-on approach to
 feedback in the form of digital design, this
 true/false, multiple book takes the reader
 choice, and short essay from the fundamentals
 questions. Includes of digital logic to the
 pop-up definitions for actual design of a
 technical terms and processor. By the end
 and concepts. of this book, readers
 will be able to build
 their own RISC-V
 microprocessor and will
 have a top-to-bottom
 understanding of how
 it works. Beginning

**Digital Design and
Computer
Architecture**

RISC-V Edition

with digital logic gates and progressing to the design of combinational and sequential circuits, this book uses these fundamental building blocks as the basis for designing a RISC-V processor.

SystemVerilog and VHDL are integrated throughout the text in examples illustrating the methods and techniques for CAD-based circuit design. The companion website includes a chapter on I/O systems with practical examples that show how to use SparkFun's RED-V RedBoard to communicate with peripheral devices such as LCDs, Bluetooth radios, and motors. This book will be a valuable resource for students taking a course that combines

digital logic and computer architecture or students taking a two-quarter sequence in digital logic and computer organization/architecture. Covers the fundamentals of digital logic design and reinforces logic concepts through the design of a RISC-V microprocessor. Gives students a full understanding of the RISC-V instruction set architecture, enabling them to build a RISC-V processor and program the RISC-V processor in hardware simulation, software simulation, and in hardware. Includes both SystemVerilog and VHDL designs of fundamental building blocks as well as of single-cycle, multicycle, and pipelined versions of

the RISC-V architecture Features a companion website with a bonus chapter on I/O systems with practical examples that show how to use SparkFun's RED-V RedBoard to communicate with peripheral devices such as LCDs, Bluetooth radios, and motors The companion website also includes appendices covering practical digital design issues and C programming as well as links to CAD tools, lecture slides, laboratory projects, and solutions to exercises See the companion EdX MOOCs ENGR85A and ENGR85B with video lectures and interactive problems

Computer Architecture

A Quantitative Approach *Elsevier*

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.

Parallel Computer Organization and Design *Cambridge University Press*

Teaching fundamental design concepts and the challenges of emerging technology,

this textbook prepares students for a career designing the computer systems of the future. In-depth coverage of complexity, power, reliability and performance, coupled with treatment of parallelism at all levels, including ILP and TLP, provides the state-of-the-art training that students need. The whole gamut of parallel architecture design options is explained, from core microarchitecture to chip multiprocessors to large-scale multiprocessor systems. All the chapters are self-contained, yet concise enough that the material can be taught in a single semester, making it perfect for use in senior undergraduate and

graduate computer architecture courses. The book is also teeming with practical examples to aid the learning process, showing concrete applications of definitions. With simple models and codes used throughout, all material is made open to a broad range of computer engineering/science students with only a basic knowledge of hardware and software.

Exploring Raspberry Pi

Interfacing to the Real World with Embedded Linux *John Wiley & Sons*

Expand Raspberry Pi capabilities with fundamental engineering principles Exploring Raspberry Pi

is the innovators guide to bringing Raspberry Pi to life. This book favors engineering principles over a 'recipe' approach to give you the skills you need to design and build your own projects. You'll understand the fundamental principles in a way that transfers to any type of electronics, electronic modules, or external peripherals, using a "learning by doing" approach that caters to both beginners and experts. The book begins with basic Linux and programming skills, and helps you stock your inventory with common parts and supplies. Next, you'll learn how to make parts work together to achieve the goals of your project, no matter what type of

components you use. The companion website provides a full repository that structures all of the code and scripts, along with links to video tutorials and supplementary content that takes you deeper into your project. The Raspberry Pi's most famous feature is its adaptability. It can be used for thousands of electronic applications, and using the Linux OS expands the functionality even more. This book helps you get the most from your Raspberry Pi, but it also gives you the fundamental engineering skills you need to incorporate any electronics into any project. Develop the Linux and programming skills you need to build basic applications Build your

inventory of parts so you can always "make it work" Understand interfacing, controlling, and communicating with almost any component Explore advanced applications with video, audio, real-world interactions, and more Be free to adapt and create with Exploring Raspberry Pi.

Fundamentals of Computer Organization and Architecture *John Wiley & Sons*

This is the first book in the two-volume set offering comprehensive coverage of the field of computer organization and architecture. This book provides complete coverage of the subjects pertaining to introductory courses in computer organization and

architecture, including:

- * Instruction set architecture and design
- * Assembly language programming
- * Computer arithmetic
- * Processing unit design
- * Memory system design
- * Input-output design and organization
- * Pipelining design techniques
- * Reduced Instruction Set Computers (RISCs)

The authors, who share over 15 years of undergraduate and graduate level instruction in computer architecture, provide real world applications, examples of machines, case studies and practical experiences in each chapter.

See MIPS Run *Elsevier*

See MIPS Run, Second Edition, is not only a thorough update of the

first edition, it is also a marriage of the best-known RISC architecture--MIPS--with the best-known open-source OS--Linux. The first part of the book begins with MIPS design principles and then describes the MIPS instruction set and programmers' resources. It uses the MIPS32 standard as a baseline (the 1st edition used the R3000) from which to compare all other versions of the architecture and assumes that MIPS64 is the main option. The second part is a significant change from the first edition. It provides concrete examples of operating system low level code, by using Linux as the example operating system. It describes how Linux is built on

the foundations the MIPS hardware provides and summarizes the Linux application environment, describing the libraries, kernel device-drivers and CPU-specific code. It then digs deep into application code and library support, protection and memory management, interrupts in the Linux kernel and multiprocessor Linux. Sweetman has revised his best-selling MIPS bible for MIPS programmers, embedded systems designers, developers and programmers, who need an in-depth understanding of the MIPS architecture and specific guidance for writing software for MIPS-based systems, which are increasingly Linux-based.

Completely new material offers the best explanation available on how Linux runs on real hardware. Provides a complete, updated and easy-to-use guide to the MIPS instruction set using the MIPS32 standard as the baseline architecture with the MIPS64 as the main option. Retains the same engaging writing style that made the first edition so readable, reflecting the authors 20+ years experience in designing systems based on the MIPS architecture.

Computers as Components

Principles of Embedded Computing System Design *Morgan Kaufmann*

Computers as

Components, Second Edition, updates the first book to bring essential knowledge on embedded systems technology and techniques under a single cover. This edition has been updated to the state-of-the-art by reworking and expanding performance analysis with more examples and exercises, and coverage of electronic systems now focuses on the latest applications. It gives a more comprehensive view of multiprocessors including VLIW and superscalar architectures as well as more detail about power consumption. There is also more advanced treatment of all the components of the system as well as in-depth coverage of networks, reconfigurable systems, hardware-software co-design, security, and program analysis. It presents an updated discussion of current industry development software including Linux and Windows CE. The new edition's case studies cover SHARC DSP with the TI C5000 and C6000 series, and real-world applications such as DVD players and cell phones. Researchers, students, and savvy professionals schooled in hardware or software design, will value Wayne Wolf's integrated engineering design approach. * Uses real processors (ARM processor and TI C55x DSP) to demonstrate both technology and techniques...Shows readers how to apply

principles to actual design practice. * Covers all necessary topics with emphasis on actual design practice...Realistic introduction to the state-of-the-art for both students and practitioners. * Stresses necessary fundamentals which can be applied to evolving technologies...helps readers gain facility to design large, complex embedded systems that actually work.

Modern Processor Design

Fundamentals of Superscalar Processors *Waveland Press*

Conceptual and precise, Modern Processor Design brings together numerous

microarchitectural techniques in a clear, understandable framework that is easily accessible to both graduate and undergraduate students. Complex practices are distilled into foundational principles to reveal the authors insights and hands-on experience in the effective design of contemporary high-performance micro-processors for mobile, desktop, and server markets. Key theoretical and foundational principles are presented in a systematic way to ensure comprehension of important implementation issues. The text presents fundamental concepts and foundational techniques such as processor design, pipelined processors,

memory and I/O systems, and especially superscalar organization and implementations. Two case studies and an extensive survey of actual commercial superscalar processors reveal real-world developments in processor design and performance. A thorough overview of advanced instruction flow techniques, including developments in advanced branch predictors, is incorporated. Each chapter concludes with homework problems that will institute the groundwork for emerging techniques in the field and an introduction to multiprocessor systems.

Architecture of

Network Systems
Elsevier

Architecture of Network Systems explains the practice and methodologies that will allow you to solve a broad range of problems in system design, including problems related to security, quality of service, performance, manageability, and more. Leading researchers Dimitrios Serpanos and Tilman Wolf develop architectures for all network sub-systems, bridging the gap between operation and VLSI. This book provides comprehensive coverage of the technical aspects of network systems, including system-on-chip technologies, embedded protocol processing and high-

performance, and low-power design. It develops a functional approach to network system architecture based on the OSI reference model, which is useful for practitioners at every level. It also covers both fundamentals and the latest developments in network systems architecture, including network-on-chip, network processors, algorithms for lookup and classification, and network systems for the next-generation Internet. The book is recommended for practicing engineers designing the architecture of network systems and graduate students in computer engineering and computer science studying network system design. This is

the first book to provide comprehensive coverage of the technical aspects of network systems, including processing systems, hardware technologies, memory managers, software routers, and more. Develops a systematic approach to network architectures, based on the OSI reference model, that is useful for practitioners at every level. Covers both the important basics and cutting-edge topics in network systems architecture, including Quality of Service and Security for mobile, real-time P2P services, Low-Power Requirements for Mobile Systems, and next generation Internet systems.

**ARM System
Developer's Guide**

Designing and Optimizing System Software *Elsevier*

Over the last ten years, the ARM architecture has become one of the most pervasive architectures in the world, with more than 2 billion ARM-based processors embedded in products ranging from cell phones to automotive braking systems. A world-wide community of ARM developers in semiconductor and product design companies includes software developers, system designers and hardware engineers. To date no book has directly addressed their need to develop the system and software for an ARM-based system. This text fills that gap. This book provides a comprehensive

description of the operation of the ARM core from a developer's perspective with a clear emphasis on software. It demonstrates not only how to write efficient ARM software in C and assembly but also how to optimize code. Example code throughout the book can be integrated into commercial products or used as templates to enable quick creation of productive software. The book covers both the ARM and Thumb instruction sets, covers Intel's XScale Processors, outlines distinctions among the versions of the ARM architecture, demonstrates how to implement DSP algorithms, explains exception and interrupt handling, describes the

cache technologies that surround the ARM cores as well as the most efficient memory management techniques. A final chapter looks forward to the future of the ARM architecture considering ARMv6, the latest change to the instruction set, which has been designed to improve the DSP and media processing capabilities of the architecture. * No other book describes the ARM core from a system and software perspective. * Author team combines extensive ARM software engineering experience with an in-depth knowledge of ARM developer needs. * Practical, executable code is fully explained in the book and available on the publisher's Website. *

Includes a simple embedded operating system.

Introduction to Microcontrollers

Architecture, Programming, and Interfacing for the Freescale 68HC12

Elsevier

Introduction to Microcontrollers is a comprehensive, introductory text/reference for electrical and computer engineers and students with little experience with a high-level programming language. It systematically teaches the programming of a microcontroller in assembly language, as well as C and C++. This book also covers the principles of good programming practice through top-down

design and the use of data structures. It is suitable as an introductory text for a first course on microcomputers that demonstrates what a small computer can do. Shows how a computer executes instructions; Shows how a high-level programming language converts to assembler language; Shows how a microcontroller is interfaced to the outside world; Hundreds of examples, experiments, "brain-teasers" and motivators; More than 20 exercises at the end of each chapter

Microprocessors and Microcomputers

Hardware and Software *Prentice Hall*

The Cache Memory Book *Morgan*

Kaufmann

The Second Edition of The Cache Memory Book introduces systems designers to the concepts behind cache design. The book teaches the basic cache concepts and more exotic techniques. It leads readers through some of the most intricate protocols used in complex multiprocessor caches. Written in an accessible, informal style, this text demystifies cache memory design by translating cache concepts and jargon into practical methodologies and real-life examples. It also provides adequate detail to serve as a reference book for ongoing work in cache memory design. The Second Edition

includes an updated and expanded glossary of cache memory terms and buzzwords. The book provides new real world applications of cache memory design and a new chapter on cache "tricks". Illustrates detailed example designs of caches Provides numerous examples in the form of block diagrams, timing waveforms, state tables, and code traces Defines and discusses more than 240 cache specific buzzwords, comparing in detail the relative merits of different design methodologies Includes an extensive glossary, complete with clear definitions, synonyms, and references to the appropriate text discussions

Computer Organization *New York ; Toronto : McGraw-Hill*

Fast and Effective Embedded Systems Design

Applying the ARM mbed *Elsevier*

Fast and Effective Embedded Systems Design is a fast-moving introduction to embedded system design, applying the innovative ARM mbed and its web-based development environment. Each chapter introduces a major topic in embedded systems, and proceeds as a series of practical experiments, adopting a "learning through doing" strategy. Minimal background knowledge is needed. C/C++ programming is

applied, with a step-by-step approach which allows the novice to get coding quickly. Once the basics are covered, the book progresses to some "hot" embedded issues - intelligent instrumentation, networked systems, closed loop control, and digital signal processing. Written by two experts in the field, this book reflects on the experimental results, develops and matches theory to practice, evaluates the strengths and weaknesses of the technology or technique introduced, and considers applications and the wider context. Numerous exercises and end of chapter questions are included. A hands-on introduction to the field of embedded systems, with a focus on fast prototyping. Key embedded system concepts covered through simple and effective experimentation. Amazing breadth of coverage, from simple digital i/o, to advanced networking and control. Applies the most accessible tools available in the embedded world. Supported by mbed and book web sites, containing FAQs and all code examples. Deep insights into ARM technology, and aspects of microcontroller architecture. Instructor support available, including power point slides, and solutions to questions and exercises.