

Digital Design With Rtl Design Vhdl And Verilog

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Digital Logic Design Using Verilog - Vaibbhav Taraate 2021-12-02

This second edition focuses on the thought process of digital design and implementation in the context of VLSI and system design. It covers the Verilog 2001 and Verilog 2005 RTL design styles, constructs and the optimization at the RTL and synthesis level. The book also covers the logic synthesis, low power, multiple clock domain design concepts and design performance improvement techniques. The book includes 250 design examples/illustrations and 100 exercise questions. This volume can be used as a core or supplementary text in undergraduate courses on logic design and as a text for professional and vocational coursework. In addition, it will be a hands-on professional reference and a self-study aid for hobbyists.

Digital Design Using VHDL - William J. Dally 2016

Provides students with a system-level perspective and the tools they need to understand, analyze and design complete digital systems using VHDL. It goes beyond the design of simple combinational and sequential modules to show how such modules are used to build complete systems, reflecting digital design in the real world.

Engineering Digital Design - Richard F. Tinder 2000-01-18

Engineering Digital Design, Second Edition provides the most extensive coverage of any available textbook in digital logic and design. The new REVISED Second Edition published in

September of 2002 provides 5 productivity tools free on the accompanying CD ROM. This software is also included on the Instructor's Manual CD ROM and complete instructions accompany each software program. In the REVISED Second Edition modern notation combines with state-of-the-art treatment of the most important subjects in digital design to provide the student with the background needed to enter industry or graduate study at a competitive level. Combinatorial logic design and synchronous and asynchronous sequential machine design methods are given equal weight, and new ideas and design approaches are explored. The productivity tools provided on the accompanying CD are outlined below: [1] EXL-Sim2002 logic simulator: EXL-Sim2002 is a full-featured, interactive, schematic-capture and simulation program that is ideally suited for use with the text at either the entry or advanced-level of logic design. Its many features include drag-and-drop capability, rubber banding, mixed logic and positive logic simulations, macro generation, individual and global (or randomized) delay assignments, connection features that eliminate the need for wire connections, schematic page sizing and zooming, waveform zooming and scrolling, a variety of printout capabilities, and a host of other useful features. [2] BOOZER logic minimizer: BOOZER is a software minimization tool that is recommended for use with the text. It accepts entered variable (EV) or canonical (1's and 0's) data from K-maps or truth tables, with or

without don't cares, and returns an optimal or near optimal single or multi-output solution. It can handle up to 12 functions Boolean functions and as many inputs when used on modern computers. [3] ESPRESSO II logic minimizer: ESPRESSO II is another software minimization tool widely used in schools and industry. It supports advanced heuristic algorithms for minimization of two-level, multi-output Boolean functions but does not accept entered variables. It is also readily available from the University of California, Berkeley, 1986 VLSI Tools Distribution. [4] ADAM design software: ADAM (for Automated Design of Asynchronous Machines) is a very powerful productivity tool that permits the automated design of very complex asynchronous state machines, all free of timing defects. The input files are state tables for the desired state machines. The output files are given in the Berkeley format appropriate for directly programming PLAs. ADAM also allows the designer to design synchronous state machines, timing-defect-free. The options include the lumped path delay (LPD) model or NESTED CELL model for asynchronous FSM designs, and the use of D FLIP-FLOPs for synchronous FSM designs. The background for the use of ADAM is covered in Chapters 11, 14 and 16 of the REVISED 2nd Edition. [5] A-OPS design software: A-OPS (for Asynchronous One-hot Programmable Sequencers) is another very powerful productivity tool that permits the design of asynchronous and synchronous state machines by using a programmable sequencer kernel. This software generates a PLA or PAL output file (in Berkeley format) or the VHDL code for the automated timing-defect-free designs of the following: (a) Any 1-Hot programmable sequencer up to 10 states. (b) The 1-Hot design of multiple asynchronous or synchronous state machines driven by either PLDs or RAM. The input file is that of a state table for the desired state machine. This software can be used to design systems with the capability of instantly switching between several radically different controllers on a time-shared basis. The background for the use of A-OPS is covered in Chapters 13, 14 and 16 of the REVISED 2nd Edition.

Digital Design and Verilog HDL

Fundamentals - Joseph Cavanagh 2017-12-19

Comprehensive and self contained, this tutorial covers the design of a plethora of combinational and sequential logic circuits using conventional logic design and Verilog HDL. Number systems and number representations are presented along with various binary codes. Several advanced topics are covered, including functional decomposition and iterative networks. A variety of examples are provided for combinational and sequential logic, computer arithmetic, and advanced topics such as Hamming code error correction. Constructs supported by Verilog are described in detail. All designs are continued to completion. Each chapter includes numerous design issues of varying complexity to be resolved by the reader.

High-level Synthesis - Michael Fingeroff 2010

Are you an RTL or system designer that is currently using, moving, or planning to move to an HLS design environment? Finally, a comprehensive guide for designing hardware using C++ is here. Michael Fingeroff's High-Level Synthesis Blue Book presents the most effective C++ synthesis coding style for achieving high quality RTL. Master a totally new design methodology for coding increasingly complex designs! This book provides a step-by-step approach to using C++ as a hardware design language, including an introduction to the basics of HLS using concepts familiar to RTL designers. Each chapter provides easy-to-understand C++ examples, along with hardware and timing diagrams where appropriate. The book progresses from simple concepts such as sequential logic design to more complicated topics such as memory architecture and hierarchical sub-system design. Later chapters bring together many of the earlier HLS design concepts through their application in simplified design examples. These examples illustrate the fundamental principles behind C++ hardware design, which will translate to much larger designs. Although this book focuses primarily on C and C++ to present the basics of C++ synthesis, all of the concepts are equally applicable to SystemC when describing the core algorithmic part of a design. On completion of this book, readers should be well on their way to becoming experts in high-level synthesis.

RTL Hardware Design Using VHDL - Pong P.

Chu 2006-04-20

The skills and guidance needed to master RTL hardware design. This book teaches readers how to systematically design efficient, portable, and scalable Register Transfer Level (RTL) digital circuits using the VHDL hardware description language and synthesis software. Focusing on the module-level design, which is composed of functional units, routing circuit, and storage, the book illustrates the relationship between the VHDL constructs and the underlying hardware components, and shows how to develop codes that faithfully reflect the module-level design and can be synthesized into efficient gate-level implementation. Several unique features distinguish the book:

- * Coding style that shows a clear relationship between VHDL constructs and hardware components
- * Conceptual diagrams that illustrate the realization of VHDL codes
- * Emphasis on the code reuse
- * Practical examples that demonstrate and reinforce design concepts, procedures, and techniques
- * Two chapters on realizing sequential algorithms in hardware
- * Two chapters on scalable and parameterized designs and coding
- * One chapter covering the synchronization and interface between multiple clock domains

Although the focus of the book is RTL synthesis, it also examines the synthesis task from the perspective of the overall development process. Readers learn good design practices and guidelines to ensure that an RTL design can accommodate future simulation, verification, and testing needs, and can be easily incorporated into a larger system or reused. Discussion is independent of technology and can be applied to both ASIC and FPGA devices. With a balanced presentation of fundamentals and practical examples, this is an excellent textbook for upper-level undergraduate or graduate courses in advanced digital logic. Engineers who need to make effective use of today's synthesis software and FPGA devices should also refer to this book.

Digital System Design with FPGA: Implementation Using Verilog and VHDL - Cem Unsalan 2017-07-14

Master FPGA digital system design and implementation with Verilog and VHDL. This practical guide explores the development and deployment of FPGA-based digital systems using the two most popular hardware description

languages, Verilog and VHDL. Written by a pair of digital circuit design experts, the book offers a solid grounding in FPGA principles, practices, and applications and provides an overview of more complex topics. Important concepts are demonstrated through real-world examples, ready-to-run code, and inexpensive start-to-finish projects for both the Basys and Arty boards.

Digital System Design with FPGA:

Implementation Using Verilog and VHDL covers:

- Field programmable gate array fundamentals
- Basys and Arty FPGA boards
- The Vivado design suite
- Verilog and VHDL
- Data types and operators
- Combinational circuits and circuit blocks
- Data storage elements and sequential circuits
- Soft-core microcontroller and digital interfacing
- Advanced FPGA applications
- The future of FPGA

VHDL Modeling for Digital Design Synthesis

- Yu-Chin Hsu 2012-12-06

The purpose of this book is to introduce VHSIC Hardware Description Language (VHDL) and its use for synthesis. VHDL is a hardware description language which provides a means of specifying a digital system over different levels of abstraction. It supports behavior specification during the early stages of a design process and structural specification during the later implementation stages. VHDL was originally introduced as a hardware description language that permitted the simulation of digital designs. It is now increasingly used for design specifications that are given as the input to synthesis tools which translate the specifications into netlists from which the physical systems can be built. One problem with this use of VHDL is that not all of its constructs are useful in synthesis. The specification of delay in signal assignments does not have a clear meaning in synthesis, where delays have already been determined by the implementation technology. VHDL has data-structures such as files and pointers, useful for simulation purposes but not for actual synthesis. As a result synthesis tools accept only subsets of VHDL. This book tries to cover the synthesis aspect of VHDL, while keeping the simulation-specifics to a minimum. This book is suitable for working professionals as well as for graduate or undergraduate study. Readers can view this book as a way to get acquainted with VHDL and how it can be used in

modeling of digital designs.

Verilog for Digital Design Set - Frank Vahid
2006-12

Application-Specific Hardware Architecture Design with VHDL - Bogdan Belean 2017-10-17

This book guides readers through the design of hardware architectures using VHDL for digital communication and image processing applications that require performance computing. Further it includes the description of all the VHDL-related notions, such as language, levels of abstraction, combinational vs. sequential logic, structural and behavioral description, digital circuit design, and finite state machines. It also includes numerous examples to make the concepts presented in text more easily understandable.

Digital Design and Computer Architecture - Sarah Harris 2015-04-09

Digital Design and Computer Architecture: ARM Edition covers the fundamentals of digital logic design and reinforces logic concepts through the design of an ARM 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 an ARM processor. By the end of this book, readers will be able to build their own 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 an ARM 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 the Raspberry Pi computer 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

an ARM microprocessor. Features side-by-side examples of the two most prominent Hardware Description Languages (HDLs)—SystemVerilog and VHDL—which illustrate and compare the ways each can be used in the design of digital systems. Includes examples throughout the text that enhance the reader’s understanding and retention of key concepts and techniques. The Companion website includes a chapter on I/O systems with practical examples that show how to use the Raspberry Pi computer 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.

SystemVerilog for Hardware Description - Vaibhav Taraate 2020-06-10

This book introduces the reader to FPGA based design for RTL synthesis. It describes simple to complex RTL design scenarios using SystemVerilog. The book builds the story from basic fundamentals of FPGA based designs to advance RTL design and verification concepts using SystemVerilog. It provides practical information on the issues in the RTL design and verification and how to overcome these. It focuses on writing efficient RTL codes using SystemVerilog, covers design for the Xilinx FPGAs and also includes implementable code examples. The contents of this book cover improvement of design performance, assertion based verification, verification planning, and architecture and system testing using FPGAs. The book can be used for classroom teaching or as a supplement in lab work for undergraduate and graduate coursework as well as for professional development and training programs. It will also be of interest to researchers and professionals interested in the RTL design for FPGA and ASIC.

Digital Design, Preview Ed. - Frank Vahid
2009-11-17

Digital Design provides a modern approach to learning the increasingly important topic of digital systems design. The text's focus on register-transfer-level design and present-day applications not only leads to a better appreciation of computers and of today's

ubiquitous digital devices, but also provides for a better understanding of careers involving digital design and embedded system design.1.

Introduction2. Combinational Logic Design3. Sequential Logic Design-Controllers4. Datapath Components5. Register-Transfer Level (RTL) Design6. Optimizations and Tradeoffs7. Physical Implementation8. Programmable Processors9. Hardware Description Languages

Introduction to Logic Circuits & Logic Design with Verilog - Brock J. LaMeres 2017-04-17

This textbook for courses in Digital Systems Design introduces students to the fundamental hardware used in modern computers. Coverage includes both the classical approach to digital system design (i.e., pen and paper) in addition to the modern hardware description language (HDL) design approach (computer-based). Using this textbook enables readers to design digital systems using the modern HDL approach, but they have a broad foundation of knowledge of the underlying hardware and theory of their designs. This book is designed to match the way the material is actually taught in the classroom. Topics are presented in a manner which builds foundational knowledge before moving onto advanced topics. The author has designed the presentation with learning Goals and assessment at its core. Each section addresses a specific learning outcome that the student should be able to “do” after its completion. The concept checks and exercise problems provide a rich set of assessment tools to measure student performance on each outcome.

Digital Design - M. Morris Mano 2013

For courses on digital design in an Electrical Engineering, Computer Engineering, or Computer Science department. Digital Design, fifth edition is a modern update of the classic authoritative text on digital design. This book teaches the basic concepts of digital design in a clear, accessible manner. The book presents the basic tools for the design of digital circuits and provides procedures suitable for a variety of digital applications.

Advanced Digital Logic Design - Sunggu Lee 2006

This textbook is intended to serve as a practical guide for the design of complex digital logic circuits such as digital control circuits, network interface circuits, pipelined arithmetic units, and

RISC microprocessors. It is an advanced digital logic design textbook that emphasizes the use of synthesizable Verilog code and provides numerous fully worked-out practical design examples including a Universal Serial Bus interface, a pipelined multiply-accumulate unit, and a pipelined microprocessor for the ARM THUMB architecture.

Digital Systems Design Using VHDL -

Charles H. Roth, Jr. 2016-12-05

Written for advanced study in digital systems design, Roth/John’s DIGITAL SYSTEMS DESIGN USING VHDL, 3E integrates the use of the industry-standard hardware description language, VHDL, into the digital design process. The book begins with a valuable review of basic logic design concepts before introducing the fundamentals of VHDL. The book concludes with detailed coverage of advanced VHDL topics. Important Notice: Media content referenced within the product description or the product text may not be available in the ebook version.

Digital Electronics and Design with VHDL - Volnei A. Pedroni 2008-01-25

Digital Electronics and Design with VHDL offers a friendly presentation of the fundamental principles and practices of modern digital design. Unlike any other book in this field, transistor-level implementations are also included, which allow the readers to gain a solid understanding of a circuit's real potential and limitations, and to develop a realistic perspective on the practical design of actual integrated circuits. Coverage includes the largest selection available of digital circuits in all categories (combinational, sequential, logical, or arithmetic); and detailed digital design techniques, with a thorough discussion on state-machine modeling for the analysis and design of complex sequential systems. Key technologies used in modern circuits are also described, including Bipolar, MOS, ROM/RAM, and CPLD/FPGA chips, as well as codes and techniques used in data storage and transmission. Designs are illustrated by means of complete, realistic applications using VHDL, where the complete code, comments, and simulation results are included. This text is ideal for courses in Digital Design, Digital Logic, Digital Electronics, VLSI, and VHDL; and industry practitioners in digital electronics.

Comprehensive coverage of fundamental digital concepts and principles, as well as complete, realistic, industry-standard designs. Many circuits shown with internal details at the transistor-level, as in real integrated circuits. Actual technologies used in state-of-the-art digital circuits presented in conjunction with fundamental concepts and principles. Six chapters dedicated to VHDL-based techniques, with all VHDL-based designs synthesized onto CPLD/FPGA chips.

Modern Digital Designs with EDA, VHDL and FPGA - Lo Jien-Chung 2015

Digital Design with CPLD Applications and VHDL - Robert K. Dueck 2001

A guide that uses programmable logic as the vehicle for instructing readers in the principles of digital design. Following discussion of digital fundamentals, the book introduces readers to Complex Programmable Logic Devices. Graphic design files, VHDL files and simulation files are on the CD-ROM, so readers can run simulations or program CPLDs with error-free design files and use these files as templates for their own modifications.

Digital Design with RTL Design, VHDL, and Verilog - Frank Vahid 2010-03-09

An eagerly anticipated, up-to-date guide to essential digital design fundamentals. Offering a modern, updated approach to digital design, this much-needed book reviews basic design fundamentals before diving into specific details of design optimization. You begin with an examination of the low-levels of design, noting a clear distinction between design and gate-level minimization. The author then progresses to the key uses of digital design today, and how it is used to build high-performance alternatives to software. Offers a fresh, up-to-date approach to digital design, whereas most literature available is sorely outdated. Progresses through low levels of design, making a clear distinction between design and gate-level minimization. Addresses the various uses of digital design today. Enables you to gain a clearer understanding of applying digital design to your life. With this book by your side, you'll gain a better understanding of how to apply the material in the book to real-world scenarios.

ASIC Design and Synthesis - Vaibhav Taraate

2021-01-06

This book describes simple to complex ASIC design practical scenarios using Verilog. It builds a story from the basic fundamentals of ASIC designs to advanced RTL design concepts using Verilog. Looking at current trends of miniaturization, the contents provide practical information on the issues in ASIC design and synthesis using Synopsys DC and their solution. The book explains how to write efficient RTL using Verilog and how to improve design performance. It also covers architecture design strategies, multiple clock domain designs, low-power design techniques, DFT, pre-layout STA and the overall ASIC design flow with case studies. The contents of this book will be useful to practicing hardware engineers, students, and hobbyists looking to learn about ASIC design and synthesis.

Digital Logic Design - Brian Holdsworth
2002-11-01

New, updated and expanded topics in the fourth edition include: EBCDIC, Grey code, practical applications of flip-flops, linear and shaft encoders, memory elements and FPGAs. The section on fault-finding has been expanded. A new chapter is dedicated to the interface between digital components and analog voltages. *A highly accessible, comprehensive and fully up to date digital systems text *A well known and respected text now revamped for current courses *Part of the Newnes suite of texts for HND/1st year modules

Design Recipes for FPGAs: Using Verilog and VHDL - Peter Wilson 2011-02-24

Design Recipes for FPGAs: Using Verilog and VHDL provides a rich toolbox of design techniques and templates to solve practical, every-day problems using FPGAs. Using a modular structure, the book gives 'easy-to-find' design techniques and templates at all levels, together with functional code. Written in an informal and 'easy-to-grasp' style, it goes beyond the principles of FPGA s and hardware description languages to actually demonstrate how specific designs can be synthesized, simulated and downloaded onto an FPGA. This book's 'easy-to-find' structure begins with a design application to demonstrate the key building blocks of FPGA design and how to connect them, enabling the experienced FPGA

designer to quickly select the right design for their application, while providing the less experienced a 'road map' to solving their specific design problem. The book also provides advanced techniques to create 'real world' designs that fit the device required and which are fast and reliable to implement. This text will appeal to FPGA designers of all levels of experience. It is also an ideal resource for embedded system development engineers, hardware and software engineers, and undergraduates and postgraduates studying an embedded system which focuses on FPGA design. A rich toolbox of practical FGPA design techniques at an engineer's finger tips Easy-to-find structure that allows the engineer to quickly locate the information to solve their FGPA design problem, and obtain the level of detail and understanding needed

Circuit Design with VHDL, third edition -
Volnei A. Pedroni 2020-04-14

A completely updated and expanded comprehensive treatment of VHDL and its applications to the design and simulation of real, industry-standard circuits. This comprehensive treatment of VHDL and its applications to the design and simulation of real, industry-standard circuits has been completely updated and expanded for the third edition. New features include all VHDL-2008 constructs, an extensive review of digital circuits, RTL analysis, and an unequalled collection of VHDL examples and exercises. The book focuses on the use of VHDL rather than solely on the language, with an emphasis on design examples and laboratory exercises. The third edition begins with a detailed review of digital circuits (combinatorial, sequential, state machines, and FPGAs), thus providing a self-contained single reference for the teaching of digital circuit design with VHDL. In its coverage of VHDL-2008, it makes a clear distinction between VHDL for synthesis and VHDL for simulation. The text offers complete VHDL codes in examples as well as simulation results and comments. The significantly expanded examples and exercises include many not previously published, with multiple physical demonstrations meant to inspire and motivate students. The book is suitable for undergraduate and graduate students in VHDL and digital circuit design, and can be used as a professional

reference for VHDL practitioners. It can also serve as a text for digital VLSI in-house or academic courses.

Verilog HDL - Samir Palnitkar 2003
VERILOG HDL, Second Edition by Samir Palnitkar With a Foreword by Prabhu Goel Written for both experienced and new users, this book gives you broad coverage of Verilog HDL. The book stresses the practical design and verification perspective of Verilog rather than emphasizing only the language aspects. The information presented is fully compliant with the IEEE 1364-2001 Verilog HDL standard. Among its many features, this edition-
• Describes state-of-the-art verification methodologies
• Provides full coverage of gate, dataflow (RTL), behavioral and switch modeling
• Introduces you to the Programming Language Interface (PLI)
• Describes logic synthesis methodologies
• Explains timing and delay simulation
• Discusses user-defined primitives
• Offers many practical modeling tips
Includes over 300 illustrations, examples, and exercises, and a Verilog resource list. Learning objectives and summaries are provided for each chapter. About the CD-ROM The CD-ROM contains a Verilog simulator with a graphical user interface and the source code for the examples in the book.
What people are saying about Verilog HDL-
"Mr. Palnitkar illustrates how and why Verilog HDL is used to develop today's most complex digital designs. This book is valuable to both the novice and the experienced Verilog user. I highly recommend it to anyone exploring Verilog based design." -Rajeev Madhavan, Chairman and CEO, Magma Design Automation
"This book is unique in its breadth of information on Verilog and Verilog-related topics. It is fully compliant with the IEEE 1364-2001 standard, contains all the information that you need on the basics, and devotes several chapters to advanced topics such as verification, PLI, synthesis and modeling techniques." -Michael McNamara, Chair, IEEE 1364-2001 Verilog Standards Organization
This has been my favorite Verilog book since I picked it up in college. It is the only book that covers practical Verilog. A must have for beginners and experts." -Berend Ozceri, Design Engineer, Cisco Systems, Inc.
"Simple, logical and well-organized material with

plenty of illustrations, makes this an ideal textbook." -Arun K. Somani, Jerry R. Junkins
Chair Professor, Department of Electrical and
Computer Engineering, Iowa State University,
Ames PRENTICE HALL Professional Technical
Reference Upper Saddle River, NJ 07458
www.phptr.com ISBN: 0-13-044911-3

Embedded System Design - Frank Vahid
2001-10-17

This book introduces a modern approach to embedded system design, presenting software design and hardware design in a unified manner. It covers trends and challenges, introduces the design and use of single-purpose processors ("hardware") and general-purpose processors ("software"), describes memories and buses, illustrates hardware/software tradeoffs using a digital camera example, and discusses advanced computation models, controls systems, chip technologies, and modern design tools. For courses found in EE, CS and other engineering departments.

Digital Logic Design Using Verilog - Vaibbhav Taraate 2016-05-17

This book is designed to serve as a hands-on professional reference with additional utility as a textbook for upper undergraduate and some graduate courses in digital logic design. This book is organized in such a way that it can describe a number of RTL design scenarios, from simple to complex. The book constructs the logic design story from the fundamentals of logic design to advanced RTL design concepts.

Keeping in view the importance of miniaturization today, the book gives practical information on the issues with ASIC RTL design and how to overcome these concerns. It clearly explains how to write an efficient RTL code and how to improve design performance. The book also describes advanced RTL design concepts such as low-power design, multiple clock-domain design, and SOC-based design. The practical orientation of the book makes it ideal for training programs for practicing design engineers and for short-term vocational programs. The contents of the book will also make it a useful read for students and hobbyists.

High-Level Synthesis - Philippe Coussy
2008-08-01

This book presents an excellent collection of contributions addressing different aspects of

high-level synthesis from both industry and academia. It includes an overview of available EDA tool solutions and their applicability to design problems.

Complete Digital Design: A Comprehensive Guide to Digital Electronics and Computer System Architecture - Mark Balch 2003-06-22
YOUR ONE-STOP RESOURCE FOR DIGITAL

SYSTEM DESIGN! The explosion in communications and embedded computing technologies has brought with it a host of new skill requirements for electrical and electronics engineers, students, and hobbyists. With engineers expected to have such diverse expertise, they need comprehensive, easy-to-understand guidance on the fundamentals of digital design. Enter McGraw-Hill's Complete Digital Design. Written by an experienced electrical engineer and networking hardware designer, this book helps you understand and navigate the interlocking components, architectures, and practices necessary to design and implement digital systems. It includes: * Real world implementation of microprocessor-based digital systems * Broad presentation of supporting analog circuit principles * Building complete systems with basic design elements and the latest technologies Complete Digital Design will teach you how to develop a customized set of requirements for any design problem—and then research and evaluate available components and technologies to solve it. Perfect for the professional, the student, and the hobbyist alike, this is one volume you need handy at all times! What you'll find inside: * Digital logic and timing analysis * Integrated circuits * Microprocessor and computer architecture * Memory technologies * Networking and serial communications * Finite state machine design * Programmable logic: CPLD and FPGA * Analog circuit basics * Diodes, transistors, and operational amplifiers * Analog-to-digital conversion * Voltage regulation * Signal integrity and PCB design * And more!

Digital Design - Mohammad A. Karim
2017-12-19

In today's digital design environment, engineers must achieve quick turn-around time with ready accesses to circuit synthesis and simulation applications. This type of productivity relies on the principles and practices of computer aided

design (CAD). Digital Design: Basic Concepts and Principles addresses the many challenging issues critical to today's digital design practices such as hazards and logic minimization, finite-state-machine synthesis, cycles and races, and testability theories while providing hands-on experience using one of the industry's most popular design application, Xilinx Web PACKTM. The authors begin by discussing conventional and unconventional number systems, binary coding theories, and arithmetic as well as logic functions and Boolean algebra. Building upon classic theories of digital systems, the book illustrates the importance of logic minimization using the Karnaugh map technique. It continues by discussing implementation options and examining the pros and cons of each method in addition to an assessment of tradeoffs that often accompany design practices. The book also covers testability, emphasizing that a good digital design must be easy to verify and test with the lowest cost possible. Throughout the text, the authors analyze combinational and sequential logic elements and illustrate the designs of these components in structural, hierarchical, and behavior VHDL descriptions. Covering fundamentals and best practices, Digital Design: Basic Concepts and Principles provides you with critical knowledge of how each digital component ties together to form a system and develops the skills you need to design and simulate these digital components using modern CAD software.

Digital Design of Signal Processing Systems - Shoab Ahmed Khan 2011-02-02

Digital Design of Signal Processing Systems discusses a spectrum of architectures and methods for effective implementation of algorithms in hardware (HW). Encompassing all facets of the subject this book includes conversion of algorithms from floating-point to fixed-point format, parallel architectures for basic computational blocks, Verilog Hardware Description Language (HDL), SystemVerilog and coding guidelines for synthesis. The book also covers system level design of Multi Processor System on Chip (MPSoC); a consideration of different design methodologies including Network on Chip (NoC) and Kahn Process Network (KPN) based connectivity among processing elements. A special emphasis is

placed on implementing streaming applications like a digital communication system in HW. Several novel architectures for implementing commonly used algorithms in signal processing are also revealed. With a comprehensive coverage of topics the book provides an appropriate mix of examples to illustrate the design methodology. Key Features: A practical guide to designing efficient digital systems, covering the complete spectrum of digital design from a digital signal processing perspective Provides a full account of HW building blocks and their architectures, while also elaborating effective use of embedded computational resources such as multipliers, adders and memories in FPGAs Covers a system level architecture using NoC and KPN for streaming applications, giving examples of structuring MATLAB code and its easy mapping in HW for these applications Explains state machine based and Micro-Program architectures with comprehensive case studies for mapping complex applications The techniques and examples discussed in this book are used in the award winning products from the Center for Advanced Research in Engineering (CARE). Software Defined Radio, 10 Gigabit VoIP monitoring system and Digital Surveillance equipment has respectively won APICTA (Asia Pacific Information and Communication Alliance) awards in 2010 for their unique and effective designs.

Digital System Design with VHDL - Zwolinski 2004-09

Digital System Design with SystemVerilog - Mark Zwolinski 2009-10-23

The Definitive, Up-to-Date Guide to Digital Design with SystemVerilog: Concepts, Techniques, and Code To design state-of-the-art digital hardware, engineers first specify functionality in a high-level Hardware Description Language (HDL)—and today's most powerful, useful HDL is SystemVerilog, now an IEEE standard. Digital System Design with SystemVerilog is the first comprehensive introduction to both SystemVerilog and the contemporary digital hardware design techniques used with it. Building on the proven approach of his bestselling Digital System Design with VHDL, Mark Zwolinski covers

everything engineers need to know to automate the entire design process with SystemVerilog—from modeling through functional simulation, synthesis, timing simulation, and verification. Zwolinski teaches through about a hundred and fifty practical examples, each with carefully detailed syntax and enough in-depth information to enable rapid hardware design and verification. All examples are available for download from the book's companion Web site, zwolinski.org. Coverage includes Using electronic design automation tools with programmable logic and ASIC technologies Essential principles of Boolean algebra and combinational logic design, with discussions of timing and hazards Core modeling techniques: combinational building blocks, buffers, decoders, encoders, multiplexers, adders, and parity checkers Sequential building blocks: latches, flip-flops, registers, counters, memory, and sequential multipliers Designing finite state machines: from ASM chart to D flip-flops, next state, and output logic Modeling interfaces and packages with SystemVerilog Designing testbenches: architecture, constrained random test generation, and assertion-based verification Describing RTL and FPGA synthesis models Understanding and implementing Design-for-Test Exploring anomalous behavior in asynchronous sequential circuits Performing Verilog-AMS and mixed-signal modeling Whatever your experience with digital design, older versions of Verilog, or VHDL, this book will help you discover SystemVerilog's full power and use it to the fullest.

Advanced HDL Synthesis and SOC

Prototyping - Vaibbhav Taraate 2018-12-15

This book describes RTL design using Verilog, synthesis and timing closure for System On Chip (SOC) design blocks. It covers the complex RTL design scenarios and challenges for SOC designs and provides practical information on performance improvements in SOC, as well as Application Specific Integrated Circuit (ASIC) designs. Prototyping using modern high density Field Programmable Gate Arrays (FPGAs) is discussed in this book with the practical examples and case studies. The book discusses SOC design, performance improvement techniques, testing and system level verification,

while also describing the modern Intel FPGA/XILINX FPGA architectures and their use in SOC prototyping. Further, the book covers the Synopsys Design Compiler (DC) and Prime Time (PT) commands, and how they can be used to optimize complex ASIC/SOC designs. The contents of this book will be useful to students and professionals alike.

Digital VLSI Systems Design - Seetharaman Ramachandran 2007-06-14

This book provides step-by-step guidance on how to design VLSI systems using Verilog. It shows the way to design systems that are device, vendor and technology independent. Coverage presents new material and theory as well as synthesis of recent work with complete Project Designs using industry standard CAD tools and FPGA boards. The reader is taken step by step through different designs, from implementing a single digital gate to a massive design consuming well over 100,000 gates. All the design codes developed in this book are Register Transfer Level (RTL) compliant and can be readily used or amended to suit new projects.

Digital Design (Verilog) - Peter J. Ashenden 2007-10-24

Digital Design: An Embedded Systems Approach Using Verilog provides a foundation in digital design for students in computer engineering, electrical engineering and computer science courses. It takes an up-to-date and modern approach of presenting digital logic design as an activity in a larger systems design context. Rather than focus on aspects of digital design that have little relevance in a realistic design context, this book concentrates on modern and evolving knowledge and design skills. Hardware description language (HDL)-based design and verification is emphasized--Verilog examples are used extensively throughout. By treating digital logic as part of embedded systems design, this book provides an understanding of the hardware needed in the analysis and design of systems comprising both hardware and software components. Includes a Web site with links to vendor tools, labs and tutorials. Presents digital logic design as an activity in a larger systems design context Features extensive use of Verilog examples to demonstrate HDL (hardware description language) usage at the abstract behavioural level and register transfer level, as

well as for low-level verification and verification environments Includes worked examples throughout to enhance the reader's understanding and retention of the material Companion Web site includes links to tools for FPGA design from Synplicity, Mentor Graphics, and Xilinx, Verilog source code for all the examples in the book, lecture slides, laboratory projects, and solutions to exercises

Digital Signal Processing with Field Programmable Gate Arrays - Uwe Meyer-Baese 2013-03-09

Starts with an overview of today's FPGA technology, devices, and tools for designing state-of-the-art DSP systems. A case study in the first chapter is the basis for more than 30 design examples throughout. The following chapters deal with computer arithmetic concepts, theory and the implementation of FIR and IIR filters, multirate digital signal processing systems, DFT and FFT algorithms, and advanced algorithms with high future potential. Each chapter contains exercises. The VERILOG source code and a glossary are given in the appendices, while the accompanying CD-ROM contains the examples in VHDL and Verilog code as well as the newest Altera "Baseline" software. This edition has a new chapter on adaptive filters, new sections on division and floating point arithmetics, an up-date to the current Altera software, and some new exercises.

Principles of Verifiable RTL Design - Lionel Bening 2007-05-08

System designers, computer scientists and engineers have continuously invented and employed notations for modeling, specifying, simulating, documenting, communicating, teaching, verifying and controlling the designs of digital systems. Initially these systems were represented via electronic and fabrication details. Following C. E. Shannon's revelation of 1948, logic diagrams and Boolean equations were used to represent digital systems in a fashion that de-emphasized electronic and fabrication detail while revealing logical behavior. A small number of circuits were made available to remove the abstraction of these

representations when it was desirable to do so. As system complexity grew, block diagrams, timing charts, sequence charts, and other graphic and symbolic notations were found to be useful in summarizing the gross features of a system and describing how it operated. In addition, it always seemed necessary or appropriate to augment these documents with lengthy verbal descriptions in a natural language. While each notation was, and still is, a perfectly valid means of expressing a design, lack of standardization, conciseness, and formal definitions interfered with communication and the understanding between groups of people using different notations. This problem was recognized early and formal languages began to evolve in the 1950s when I. S. Reed discovered that flip-flop input equations were equivalent to a register transfer equation, and that xvi tor-like notation. Expanding these concepts Reed developed a notation that became known as a Register Transfer Language (RTL).

Digital Design Techniques and Exercises - Vaibbhav Taraate 2021-12-10

This book describes digital design techniques with exercises. The concepts and exercises discussed are useful to design digital logic from a set of given specifications. Looking at current trends of miniaturization, the contents provide practical information on the issues in digital design and various design optimization and performance improvement techniques at logic level. The book explains how to design using digital logic elements and how to improve design performance. The book also covers data and control path design strategies, architecture design strategies, multiple clock domain design and exercises, low-power design strategies and solutions at the architecture and logic-design level. The book covers 60 exercises with solutions and will be useful to engineers during the architecture and logic design phase. The contents of this book prove useful to hardware engineers, logic design engineers, students, professionals and hobbyists looking to learn and use the digital design techniques during various phases of design.