

Effective Coding With VHDL Principles And Best Practice

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VHDL: A Logic Synthesis Approach - D. Naylor

1997-07-31

This book is structured in a practical, example-driven, manner. The use of VHDL for constructing logic synthesisers is one of the aims of the book; the second is the application of the tools to the design process. Worked examples, questions and answers are provided together with do and don'ts of good practice. An appendix on logic design the source code

are available free of charge over the Internet.

Writing Testbenches: Functional Verification of HDL Models - Janick Bergeron
2012-12-06

mental improvements during the same period. What is clearly needed in verification techniques and technology is the equivalent of a synthesis productivity breakthrough. In the second edition of Writing Testbenches, Bergeron raises the verification level of

abstraction by introducing coverage-driven constrained-random transaction-level self-checking testbenches all made possible through the introduction of hardware verification languages (HVLs), such as e from Verisity and OpenVera from Synopsys. The state-of-art methodologies described in Writing Test benches will contribute greatly to the much-needed equivalent of a synthesis breakthrough in verification productivity. I not only highly recommend this book, but also I think it should be required reading by anyone involved in design and verification of today's ASIC, SoCs and systems. Harry Foster Chief Architect Verplex Systems, Inc. xviii Writing Testbenches: Functional Verification of HDL Models PREFACE If you survey hardware design groups, you will learn that between 60% and 80% of their effort is now dedicated to verification.

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

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

Digital System Design with VHDL - Zwolinski 2004-09

Software-Defined Radio for Engineers - Alexander M. Wyglinski 2018-04-30

Based on the popular Artech House classic, Digital Communication Systems Engineering with Software-

Defined Radio, this book provides a practical approach to quickly learning the software-defined radio (SDR) concepts needed for work in the field. This up-to-date volume guides readers on how to quickly prototype wireless designs using SDR for real-world testing and experimentation. This book explores advanced wireless communication techniques such as OFDM, LTE, WLA, and hardware targeting. Readers will gain an understanding of the core concepts behind wireless hardware, such as the radio frequency front-end, analog-to-digital and digital-to-analog converters, as well as various processing technologies. Moreover, this volume includes chapters on timing estimation, matched filtering, frame synchronization message decoding, and source coding. The orthogonal frequency division multiplexing is explained and details about HDL code generation and deployment are provided. The book concludes with coverage of the WLAN toolbox with

OFDM beacon reception and the LTE toolbox with downlink reception. Multiple case studies are provided throughout the book. Both MATLAB and Simulink source code are included to assist readers with their projects in the field.

Synthesis of Arithmetic Circuits - Jean-Pierre

Deschamps 2006-03-24

A new approach to the study of arithmetic circuits In *Synthesis of Arithmetic Circuits: FPGA, ASIC and Embedded Systems*, the authors take a novel approach of presenting methods and examples for the synthesis of arithmetic circuits that better reflects the needs of today's computer system designers and engineers. Unlike other publications that limit discussion to arithmetic units for general-purpose computers, this text features a practical focus on embedded systems. Following an introductory chapter, the publication is divided into two parts. The first part, *Mathematical Aspects and Algorithms*, includes mathematical background,

number representation, addition and subtraction, multiplication, division, other arithmetic operations, and operations in finite fields. The second part, *Synthesis of Arithmetic Circuits*, includes hardware platforms, general principles of synthesis, adders and subtractors, multipliers, dividers, and other arithmetic primitives. In addition, the publication distinguishes itself with: * A separate treatment of algorithms and circuits—a more useful presentation for both software and hardware implementations * Complete executable and synthesizable VHDL models available on the book's companion Web site, allowing readers to generate synthesizable descriptions * Proposed FPGA implementation examples, namely synthesizable low-level VHDL models for the Spartan II and Virtex families * Two chapters dedicated to finite field operations This publication is a must-have resource for students in computer science and embedded system designers,

engineers, and researchers in the field of hardware and software computer system design and development. An Instructor Support FTP site is available from the Wiley editorial department.

Finite State Machines in Hardware - Volnei A. Pedroni
2013-12-20

A comprehensive guide to the theory and design of hardware-implemented finite state machines, with design examples developed in both VHDL and SystemVerilog languages. Modern, complex digital systems invariably include hardware-implemented finite state machines. The correct design of such parts is crucial for attaining proper system performance. This book offers detailed, comprehensive coverage of the theory and design for any category of hardware-implemented finite state machines. It describes crucial design problems that lead to incorrect or far from optimal implementation and provides examples of finite state machines developed in both VHDL and SystemVerilog

(the successor of Verilog) hardware description languages. Important features include: extensive review of design practices for sequential digital circuits; a new division of all state machines into three hardware-based categories, encompassing all possible situations, with numerous practical examples provided in all three categories; the presentation of complete designs, with detailed VHDL and SystemVerilog codes, comments, and simulation results, all tested in FPGA devices; and exercise examples, all of which can be synthesized, simulated, and physically implemented in FPGA boards. Additional material is available on the book's Website. Designing a state machine in hardware is more complex than designing it in software. Although interest in hardware for finite state machines has grown dramatically in recent years, there is no comprehensive treatment of the subject. This book offers the most detailed coverage of finite state

machines available. It will be essential for industrial designers of digital systems and for students of electrical engineering and computer science.

State Machines using VHDL

- Orhan Gazi 2021-01-07

This textbook teaches students techniques for the design of advanced digital systems using Field Programmable Gate Arrays (FPGAs). The authors focus on communication between FPGAs and peripheral devices (such as EEPROM, analog-to-digital converters, sensors, digital-to-analog converters, displays etc.) and in particular state machines and timed state machines for the implementation of serial communication protocols, such as UART, SPI, I2C, and display protocols, such as VGA, HDMI. VHDL is used as the programming language and all topics are covered in a structured, step-by-step manner.

Embedded Systems Design with Platform FPGAs -

Ronald Sass 2010-09-10

Embedded Systems Design

with Platform FPGAs introduces professional engineers and students alike to system development using Platform FPGAs. The focus is on embedded systems but it also serves as a general guide to building custom computing systems. The text describes the fundamental technology in terms of hardware, software, and a set of principles to guide the development of Platform FPGA systems. The goal is to show how to systematically and creatively apply these principles to the construction of application-specific embedded system architectures. There is a strong focus on using free and open source software to increase productivity. Each chapter is organized into two parts. The white pages describe concepts, principles, and general knowledge. The gray pages provide a technical rendition of the main issues of the chapter and show the concepts applied in practice. This includes step-by-step details for a specific development board and tool chain so that the reader can

carry out the same steps on their own. Rather than try to demonstrate the concepts on a broad set of tools and boards, the text uses a single set of tools (Xilinx Platform Studio, Linux, and GNU) throughout and uses a single developer board (Xilinx ML-510) for the examples. Explains how to use the Platform FPGA to meet complex design requirements and improve product performance Presents both fundamental concepts together with pragmatic, step-by-step instructions for building a system on a Platform FPGA Includes detailed case studies, extended real-world examples, and lab exercises

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

FPGA Prototyping by VHDL Examples -

Pong P. Chu
2018-01-25

A hands-on introduction to FPGA prototyping and SoC design This Second Edition of

the popular book follows the same “learning-by-doing” approach to teach the fundamentals and practices of VHDL synthesis and FPGA prototyping. It uses a coherent series of examples to demonstrate the process to develop sophisticated digital circuits and IP (intellectual property) cores, integrate them into an SoC (system on a chip) framework, realize the system on an FPGA prototyping board, and verify the hardware and software operation. The examples start with simple gate-level circuits, progress gradually through the RT (register transfer) level modules, and lead to a functional embedded system with custom I/O peripherals and hardware accelerators. Although it is an introductory text, the examples are developed in a rigorous manner, and the derivations follow strict design guidelines and coding practices used for large, complex digital systems. The new edition is completely updated. It presents the hardware design in the SoC

context and introduces the hardware-software co-design concept. Instead of treating examples as isolated entities, the book integrates them into a single coherent SoC platform that allows readers to explore both hardware and software “programmability” and develop complex and interesting embedded system projects. The revised edition: Adds four general-purpose IP cores, which are multi-channel PWM (pulse width modulation) controller, I2C controller, SPI controller, and XADC (Xilinx analog-to-digital converter) controller. Introduces a music synthesizer constructed with a DDFS (direct digital frequency synthesis) module and an ADSR (attack-decay-sustain-release) envelop generator. Expands the original video controller into a complete stream-based video subsystem that incorporates a video synchronization circuit, a test pattern generator, an OSD (on-screen display) controller, a sprite generator, and a frame buffer. Introduces basic concepts of software-hardware

co-design with Xilinx MicroBlaze MCS soft-core processor. Provides an overview of bus interconnect and interface circuit. Introduces basic embedded system software development. Suggests additional modules and peripherals for interesting and challenging projects. The FPGA Prototyping by VHDL Examples, Second Edition makes a natural companion text for introductory and advanced digital design courses and embedded system course. It also serves as an ideal self-teaching guide for practicing engineers who wish to learn more about this emerging area of interest.

MSP430 Microcontroller

Basics - John H. Davies
2008-08-21

The MSP430 microcontroller family offers ultra-low power mixed signal, 16-bit architecture that is perfect for wireless low-power industrial and portable medical applications. This book begins with an overview of embedded systems and microcontrollers followed by a comprehensive

in-depth look at the MSP430. The coverage included a tour of the microcontroller's architecture and functionality along with a review of the development environment. Start using the MSP430 armed with a complete understanding of the microcontroller and what you need to get the microcontroller up and running! Details C and assembly language for the MSP430 Companion Web site contains a development kit Full coverage is given to the MSP430 instruction set, and sigma-delta analog-digital converters and timers
VHDL-2008 - Peter J. Ashenden
2007-11-26

VHDL-2008: Just the New Stuff, as its title says, introduces the new features added to the latest revision of the IEEE standard for the VHDL hardware description language. Written by the Chair and Technical Editor of the IEEE working group, the book is an authoritative guide to how the new features work and how to use them to improve design productivity. It will be

invaluable for early adopters of the new language version, for tool implementers, and for those just curious about where VHDL is headed. * First in the market describing the new features of VHDL 2008; * Just the new features, so existing users and implementers can focus on what's new; * Helps readers to learn the new features soon, rather than waiting for new editions of complete VHDL reference books. * Authoritative, written by experts in the area; * Tutorial style, making it more accessible than the VHDL Standard Language Reference Manual.

Constraining Designs for Synthesis and Timing

Analysis - Sridhar

Gangadharan 2014-07-08

This book serves as a hands-on guide to timing constraints in integrated circuit design.

Readers will learn to maximize performance of their IC designs, by specifying timing requirements correctly.

Coverage includes key aspects of the design flow impacted by timing constraints, including

synthesis, static timing analysis and placement and routing.

Concepts needed for specifying timing requirements are explained in detail and then applied to specific stages in the design flow, all within the context of Synopsys Design Constraints (SDC), the industry-leading format for specifying constraints.

Designing Embedded

Hardware - John Catsoulis
2002

Intelligent readers who want to build their own embedded computer systems-- installed in everything from cell phones to cars to handheld organizers to refrigerators-- will find this book to be the most in-depth, practical, and up-to-date guide on the market. Designing Embedded Hardware carefully steers between the practical and philosophical aspects, so developers can both create their own devices and gadgets and customize and extend off-the-shelf systems. There are hundreds of books to choose from if you need to learn programming, but only a few are available if you want to

learn to create hardware. Designing Embedded Hardware provides software and hardware engineers with no prior experience in embedded systems with the necessary conceptual and design building blocks to understand the architectures of embedded systems. Written to provide the depth of coverage and real-world examples developers need, Designing Embedded Hardware also provides a road-map to the pitfalls and traps to avoid in designing embedded systems. Designing Embedded Hardware covers such essential topics as: The principles of developing computer hardware Core hardware designs Assembly language concepts Parallel I/O Analog-digital conversion Timers (internal and external) UART Serial Peripheral Interface Inter-Integrated Circuit Bus Controller Area Network (CAN) Data Converter Interface (DCI) Low-power operation This invaluable and eminently useful book gives you the practical tools and

skills to develop, build, and program your own application-specific computers.

The Elements of Computing Systems - Noam Nisan 2008

This title gives students an integrated and rigorous picture of applied computer science, as it comes to play in the construction of a simple yet powerful computer system.

Principles of Model Checking - Christel Baier 2008-04-25

A comprehensive introduction to the foundations of model checking, a fully automated technique for finding flaws in hardware and software; with extensive examples and both practical and theoretical exercises. Our growing dependence on increasingly complex computer and software systems necessitates the development of formalisms, techniques, and tools for assessing functional properties of these systems. One such technique that has emerged in the last twenty years is model checking, which systematically (and automatically) checks whether a model of a given

system satisfies a desired property such as deadlock freedom, invariants, and request-response properties. This automated technique for verification and debugging has developed into a mature and widely used approach with many applications. Principles of Model Checking offers a comprehensive introduction to model checking that is not only a text suitable for classroom use but also a valuable reference for researchers and practitioners in the field. The book begins with the basic principles for modeling concurrent and communicating systems, introduces different classes of properties (including safety and liveness), presents the notion of fairness, and provides automata-based algorithms for these properties. It introduces the temporal logics LTL and CTL, compares them, and covers algorithms for verifying these logics, discussing real-time systems as well as systems subject to random phenomena. Separate chapters treat such efficiency-improving techniques as

abstraction and symbolic manipulation. The book includes an extensive set of examples (most of which run through several chapters) and a complete set of basic results accompanied by detailed proofs. Each chapter concludes with a summary, bibliographic notes, and an extensive list of exercises of both practical and theoretical nature.

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.

VHDL: Programming by Example - Douglas Perry
2002-06-02

* Teaches VHDL by example *
Includes tools for simulation and synthesis * CD-ROM containing Code/Design examples and a working demo of ModelSIM

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 notion that became known as a Register Transfer Language (RTL).

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.

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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

100 Power Tips for FPGA Designers -

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.

The Designer's Guide to VHDL
- Peter J. Ashenden 2002

"The second edition of The Designer's Guide to VHDL sets a new standard in VHDL texts. I am certain that you will find it a very valuable addition to your library." --From the foreword by Paul Menchini, Menchini & Associates Since the publication of the first edition of The Designer's Guide to VHDL in 1996, digital electronic systems have increased exponentially in their complexity, product lifetimes have dramatically shrunk, and reliability requirements have shot through the roof. As a result more and more designers have turned to VHDL to help them dramatically improve productivity as well as the quality of their designs. VHDL, the IEEE standard hardware description language for

describing digital electronic systems, allows engineers to describe the structure and specify the function of a digital system as well as simulate and test it before manufacturing. In addition, designers use VHDL to synthesize a more detailed structure of the design, freeing them to concentrate on more strategic design decisions and reduce time to market.

Adopted by designers around the world, the VHDL family of standards have recently been revised to address a range of issues, including portability across synthesis tools. This best-selling comprehensive tutorial for the language and authoritative reference on its use in hardware design at all levels--from system to gates--has been revised to reflect the new IEEE standard, VHDL-2001. Peter Ashenden, a member of the IEEE VHDL standards committee, presents the entire description language and builds a modeling methodology based on successful software engineering techniques. Reviewers on Amazon.com

have consistently rated the first edition with five stars. This second edition updates the first, retaining the authors unique ability to teach this complex subject to a broad audience of students and practicing

professionals. Features: Details how the new standard allows for increased portability across tools. Covers related standards, including the Numeric Synthesis Package and the Synthesis Operability Package, demonstrating how they can be used for digital systems design. Presents four extensive case studies to demonstrate and combine features of the language taught across multiple chapters. Requires only a minimal background in programming, making it an excellent tutorial for anyone in computer architecture, digital systems engineering, or CAD.

Computer Organization and Design - John L. Hennessy 1998

The performance of software systems is dramatically affected by how well software designers understand the basic

hardware technologies at work in a system. Similarly, hardware designers must understand the far-reaching effects their design decisions have on software applications. For readers in either category, this classic introduction to the field provides a look deep into the computer. It demonstrates the relationships between the software and hardware and focuses on the foundational concepts that are the basis for current computer design.

Advanced FPGA Design -

Steve Kilts 2007-06-18

This book provides the advanced issues of FPGA design as the underlying theme of the work. In practice, an engineer typically needs to be mentored for several years before these principles are appropriately utilized. The topics that will be discussed in this book are essential to designing FPGA's beyond moderate complexity. The goal of the book is to present practical design techniques that are otherwise only available through mentorship and real-world experience.

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.

HDL Chip Design - Douglas J. Smith 1996

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.

The Designer's Guide to VHDL - Peter J. Ashenden 2010-10-07

VHDL, the IEEE standard hardware description language for describing digital electronic

systems, has recently been revised. The Designer's Guide to VHDL has become a standard in the industry for learning the features of VHDL and using it to verify hardware designs. This third edition is the first comprehensive book on the market to address the new features of VHDL-2008. First comprehensive book on VHDL to incorporate all new features of VHDL-2008, the latest release of the VHDL standard Helps readers get up to speed quickly with new features of the new standard Presents a structured guide to the modeling facilities offered by VHDL Shows how VHDL functions to help design digital systems Includes extensive case studies and source code used to develop testbenches and case study examples Helps readers gain maximum facility with VHDL for design of digital systems

Introduction to Logic Circuits & Logic Design with Verilog -

Brock J. LaMeris 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.

FPGA Prototyping by VHDL

Examples - Pong P. Chu

2011-09-20

This book uses a "learn by doing" approach to introduce the concepts and techniques of VHDL and FPGA to designers through a series of hands-on experiments. *FPGA Prototyping by VHDL Examples* provides a collection of clear, easy-to-follow templates for quick code development; a large number of practical examples to illustrate and reinforce the concepts and design techniques; realistic projects that can be implemented and tested on a Xilinx prototyping board; and a thorough exploration of the Xilinx PicoBlaze soft-core microcontroller.

Digital Design - John F.

Wakerly 2001

CD-ROM contains: Xilinx student edition foundation series software.

[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.

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.

Effective Coding with VHDL -

Ricardo Jasinski 2016-05-27

A guide to applying software design principles and coding practices to VHDL to improve the readability, maintainability, and quality of VHDL code. This book addresses an often-neglected aspect of the creation of VHDL designs. A VHDL description is also source code, and VHDL designers can use the best practices of software development to write high-quality code and to organize it in a design. This book presents this unique set of skills, teaching VHDL designers of all experience levels how to apply the best design principles and coding practices from the software world to the world of hardware. The concepts introduced here will help readers write code that is easier to understand and more likely to be correct, with improved readability, maintainability, and overall quality. After a brief review of VHDL, the book presents fundamental design principles for writing code, discussing

such topics as design, quality, architecture, modularity, abstraction, and hierarchy. Building on these concepts, the book then introduces and provides recommendations for each basic element of VHDL code, including statements, design units, types, data objects, and subprograms. The book covers naming data objects and functions, commenting the source code, and visually presenting the code on the screen. All recommendations are supported by detailed rationales. Finally, the book explores two uses of VHDL: synthesis and testbenches. It examines the key characteristics of code intended for synthesis (distinguishing it from code meant for simulation) and then demonstrates the design and implementation of testbenches with a series of examples that verify different kinds of models, including combinational, sequential, and FSM code. Examples from the book are also available on a companion website, enabling

the reader to experiment with the complete source code.

VHDL 101 - William Kafig

2011-01-28

VHDL 101 is written for Electrical Engineers and others wishing to break into FPGA design and assumes a basic knowledge of digital design and some experience with engineering 'process'. Bill Kafig, industry expert, swiftly brings the reader up to speed on techniques and functions commonly used in VHDL (VHSIC Hardware Description Language) as well as commands and data types. Extensive simple, complete designs accompany the content for maximum comprehension. The book concludes with a section on design re-use, which is of utmost importance to today's engineer who needs to meet a deadline and lower costs per unit. *Gets you up to speed with VHDL fast, reducing time to market and driving down costs *Covers the basics including language concepts and includes complete design examples for ease of learning * Covers

widely accepted industry nomenclature * Learn from "best design practices" Gets you up to speed with VHDL fast, reducing time to market and driving down costs Covers the basics including language concepts and includes complete design examples for ease of learning Covers widely accepted industry nomenclature Learn from "best design practices"

Vhdl by Example - Blaine C. Readler 2014-05-28

A practical primer for the student and practicing engineer already familiar with the basics of digital design, the reference develops a working grasp of the VHDL hardware description language step-by-

step using easy-to-understand examples. Starting with a simple but workable design sample, increasingly more complex fundamentals of the language are introduced until all core features of VHDL are brought to light. Included in the coverage are state machines, modular design, FPGA-based memories, clock management, specialized I/O, and an introduction to techniques of simulation. The goal is to prepare the reader to design real-world FPGA solutions. All the sample code used in the book is available online. What Strunk and White did for the English language with "The Elements of Style," VHDL BY EXAMPLE does for FPGA design.