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VAUGHAN FOLEY

Digital Design and Computer Architecture John Wiley & Sons

The book is divided into four major parts. Part I covers HDL constructs and synthesis of basic digital circuits. Part II provides an overview of embedded software development with the emphasis on low-level I/O access and drivers. Part III demonstrates the design and development of hardware and software for several complex I/O peripherals, including PS2 keyboard and mouse, a graphic video controller, an audio codec, and an SD (secure digital) card. Part IV provides three case studies of the integration of hardware accelerators, including a custom GCD (greatest common divisor) circuit, a Mandelbrot set fractal circuit, and an audio synthesizer based on DDFS (direct digital frequency synthesis) methodology. The book utilizes FPGA devices, Nios II soft-core processor, and development platform from Altera Co., which is one of the two main FPGA manufactures. Altera has a generous university program that provides free software and discounted prototyping boards for educational institutions (details at

<http://www.altera.com/university>). The two main educational prototyping boards are known as DE1 (\$99) and DE2 (\$269). All experiments can be implemented and tested with these boards. A board combined with this book becomes a “turn-key” solution for the SoPC design experiments and projects. Most HDL and C codes in the book are device independent and can be adapted by other prototyping boards as long as a board has similar I/O configuration.

SystemVerilog Assertions Handbook CreateSpace

With the advance of semiconductor and communication technologies, the use of system-on-a-chip (SoC) has become an essential technique to decrease product costs. To design and implement an SoC-based product, it proves necessary to totally or partly rely on the hardware description language (HDL) synthesis flow and field programmable gate array (FPGA) devices or cell libraries. As a consequence, it has become an important attainment for electrical engineers to develop a good understanding of the key issues of HDL design flows based on FPGA devices or cell libraries. To achieve this, this book addresses the need for teaching such a topic based on Verilog HDL and FPGAs. This book, Digital System Designs and Practices: Using Verilog HDL and FPGAs, aim to be used as a text for students and as a reference book for professionals or a self-study book for

readers. For classroom use, each chapter includes many worked examples and review questions for helping readers test their understanding of the contents. In addition, throughout the book, an abundance of worked examples are provided for helping readers realize the basic features of Verilog HDL and grasp the essentials of digital system designs as well. The contents of this book largely stem from the course FPGA System Designs and Practices, offered at our campus over the past decade. This course is an undergraduate elective and the first-year graduate course. This book is so structured that it can be used as a sequence of courses, including Hardware Description Language, FPGA System Designs and Practices, Digital System Designs, Advanced Digital System Designs, and others. HDL-based design has become an essential technique for modern digital systems. This book focuses on developing, verifying, and synthesizing designs of practical digital systems using the most widely used hardware description Language: Verilog HDL and FPGAs. The main features of this book are: -- Explains how to perform synthesis and verification to achieve optimized synthesis results and compiler times -- Offers complete coverage of Verilog HDL syntax - - Illustrates the entire design and verification flow using an FPGA case study -- Presents many real-world worked design examples -- Gives readers deeper understanding with review questions in

each section and end-of-chapter problems -- Emphasizes design/implementation tradeoff options, with coverage of ASICs and FPGAs

Coding and RTL Synthesis John Wiley & Sons

DIGITAL SYSTEMS DESIGN USING VERILOG integrates coverage of logic design principles, Verilog as a hardware design language, and FPGA implementation to help electrical and computer engineering students master the process of designing and testing new hardware configurations. A Verilog equivalent of authors Roth and John's previous successful text using VHDL, this practical book presents Verilog constructs side-by-side with hardware, encouraging students to think in terms of desired hardware while writing synthesizable Verilog. Following a review of the basic concepts of logic design, the authors introduce the basics of Verilog using simple combinational circuit examples, followed by models for simple sequential circuits. Subsequent chapters ask readers to tackle more and more complex designs. Important Notice: Media content referenced within the product description or the product text may not be available in the ebook version.

Practical FPGA Programming in C Springer Nature

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.

FPGA Prototyping by SystemVerilog Examples Elsevier

This book provides a rich toolbox of design techniques and templates to solve practical, every-day problems using FPGAs. Using a modular structure, it provides design techniques and templates at all levels, together with functional code, which you can easily match and apply to your application. Written in an informal and easy to grasp style, this invaluable resource goes beyond the principles of FPGAs and hardware description languages to demonstrate how specific designs can be synthesized, simulated and downloaded onto an FPGA. In addition, the book provides advanced techniques to create 'real world' designs that fit the device required and which are fast and reliable to implement. Examples are rewritten and tested in Verilog and VHDL. Describes high-level applications as examples and provides the building blocks to implement them, enabling the student to start practical work straight away. Singles out the most important parts of the language that are needed for design, giving the student the information needed to get up and running quickly.

Verilog Designer's Library Morgan Kaufmann

SystemVerilog provides abundant features that could overwhelm a SystemVerilog beginner. Fortunately, for a decent RTL design, only a small subset of SystemVerilog is needed. The purpose of this book is to carefully choose the right subset of SystemVerilog so that the digital designer can comfortably start their SystemVerilog design project. In this book, FPGA application is chosen not only for its easy and quick practice but also for its wider adoption. SystemVerilog examples will be deployed broadly throughout this book for reference. For those who want to learn HDL design, this book will help them ramp up their HDL design skill quickly while avoiding the pitfalls. For those who have experience in Verilog but want to advance their knowledge to SystemVerilog, this book can be a good reference. For the VHDL designers who want to explore the features in SystemVerilog, this book can serve as a bridge since it is written in a way that the common and different concepts between VHDL and SystemVerilog are emphasized. The following are the specialties of this book: 1. It provides a carefully chosen subset of SystemVerilog language for FPGA design. 2. It provides a great number of examples for easier learning and practice. 3. It shows using SystemVerilog as an efficient way for a productive verification. 4. It emphasizes on the FPGA application but the presented RTL design is also applicable to ASIC. This book is organized as follows: Chapter 1 first briefly describes the HDL digital design methodology. Then it describes SystemVerilog language and its syntax. The basic topics include lexical convention, data type, operators, and expressions. It also explains various programming statements such as assignment statements, if-else statements, case statements and loop statements. Chapter 2 shows how to use SystemVerilog to describe the basic digital gates and digital hardware circuits as well as to model their behavior. It explains SystemVerilog modelling constructs. The constructs are modules, procedures, interfaces,

functions and packages. This chapter also covers advanced topics such as compiler directives, digital arithmetic operation and design optimization. Chapter 3 introduces the synchronous sequential digital design. It gives some example designs such as flip-flop registers, shift registers, counters and adders. The design of finite-state machine (FSM) is discussed in depth for control circuit in digital systems. The algorithmic state machine (ASM) with data path is described for data-processing digital system. It also addresses other advanced topics of timing analysis, design performance and clock-domain crossing. Chapter 4 focuses on the functional simulation of digital design. It describes the general construction of test bench using SystemVerilog. It introduces the initial procedure for pre-simulation initialization, the final procedure for post-simulation processing and the task procedure for repetitive operations. It explains how to control the simulation proceeding with procedure timing control. It presents some useful system functions and tasks for math functions, file I/O and etc.. Chapter 5 addresses the FPGA design methodology. The topics covers design flow, design environment, intellectual property (IP) core usage, simulation and constraints. The FPGA design for system-on-chip (SOC) is emphasized as this type of FPGA becomes popular. The FPGA configuration options are discussed. Last but not least, it introduces helpful FPGA design practices for a successful design.

FPGA Prototyping by Verilog Examples vhdcohen publishing

Introduction to Logic Synthesis Using Verilog HDL explains how to write accurate Verilog descriptions of digital systems that can be synthesized into digital system netlists with desirable characteristics. The book contains numerous Verilog examples that begin with simple combinational networks and progress to synchronous sequential logic systems. Common pitfalls in the development of synthesizable Verilog HDL are also discussed along with methods for avoiding them. The target audience is anyone with a basic understanding of digital logic principles who wishes to learn how to model digital systems in the Verilog HDL in a manner that also allows for automatic synthesis. A wide range of readers, from hobbyists and undergraduate students to seasoned professionals, will find this a compelling and approachable work. The book provides concise coverage of the material and includes many examples, enabling readers to quickly generate high-quality synthesizable Verilog models.

Xilinx MicroBlaze MCS SoC Edition John Wiley & Sons

FPGA brings high performance applications to market quickly - this book covers the many emerging platforms in a proven, effective manner.

Principles and Practices Prentice Hall

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 FPGA design techniques at an engineer's finger tips. Easy-to-find structure that allows the engineer to quickly locate the information to solve their FPGA design problem, and obtain the level of detail and understanding needed.

The Verilog® Hardware Description Language Pearson Education

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.

RTL Design and Verification vhdcohen publishing

Advanced Chip Design Practical Examples in Verilog Createspace Independent Pub

Digital Logic Design Using Verilog Advanced Chip Design Practical Examples in Verilog

This title builds on the student's background from a first course in logic design and focuses on developing, verifying, and synthesizing designs of digital circuits. The Verilog language is introduced in an integrated, but selective manner, only as needed to support design examples.

Design Through Verilog HDL CI-Engineering

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.

A Guide to Digital Design and Synthesis Prentice Hall Professional

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.

HDL Chip Design Pearson Education

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.

Advanced Digital Logic Design Elsevier

This book was written for new designers looking for a solid foundation in PCB design although designers with more experience will find the reference material, software, and explanations of the

values that manufacturers use invaluable as well.

Practical Examples in Verilog John Wiley & Sons

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 verilog 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 major features of verilog 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," VERILOG BY EXAMPLE does for FPGA design.

Introduction to Logic Synthesis using Verilog HDL Springer Science & Business Media

FPGA Prototyping Using Verilog Examples will provide you with a hands-on introduction to Verilog synthesis and FPGA programming through a "learn by doing" approach. By following the clear, easy-to-understand templates for code development and the numerous practical examples, you can quickly develop and simulate a sophisticated digital circuit, realize it on a prototyping device, and verify the operation of its physical implementation. This introductory text that will provide you

with a solid foundation, instill confidence with rigorous examples for complex systems and prepare you for future development tasks.

An Embedded Systems Approach Using Verilog Laxmi Publications

This book concentrates on common classes of hardware architectures and design problems, and focuses on the process of transitioning design requirements into synthesizable HDL code. Using his extensive, wide-ranging experience in computer architecture and hardware design, as well as in his training and consulting work, Ben provides numerous examples of real-life designs illustrated with VHDL and Verilog code. This code is shown in a way that makes it easy for the reader to gain a greater understanding of the languages and how they compare. All code presented in the book is included on the companion CD, along with other information, such as application notes.

Embedded Systems Design with Platform FPGAs Prentice Hall Professional

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.