Digital VLSI Systems Design A Design Manual For Implementation Of Projects On Fpgas And Asics Using Verilog

Handbook of VLSI Chip Design and Expert Systems

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.

Low Power Digital VLSI Design Circuits and Systems

This book is structured as a step-by-step course of study along the lines of a VLSI integrated circuit design project. The entire Verilog language is presented, from the basics to everything necessary for synthesis of an entire 70,000 transistor, full-duplex serialiser-deserialiser, including synthesisable PLLs. The author includes everything that one needs for in-depth understanding of the Verilog language. Complete solutions for the 27 labs are provided in the downloadable file that accompanies the book. For readers with access to appropriate electronic design tools, all solutions can be developed, simulated, and synthesized as described in the book. A partial list of design topics includes design partitioning, hierarchy decomposition, safe coding styles, back annotation, wrapper modules, concurrency, assertion-based verification, clock synchronization, and design for test. A concluding presentation of special topics includes System Verilog and Verilog-AMS.

Digital VLSI Systems

Verilog and its usage has come a long way since its original invention in the mid-80s by Phil Moorby. At the time the average design size was around ten thousand gates everywhere. But today, design sizes have grown exponentially in size, and automatic logic synthesis from RTL has become the standard design flow for most design. Indeed, the language has evolved and been re-standardized too. Over the years, many books have been written about Verilog. My own, coauthored with Phil Moorby, had the goal of defining the language and its usage, providing - amply along the way - with new editions as the language and its usage evolved. However this new book takes a very different and unique view, that of the designer. John Michael Williams has a long history of working and teaching in the field of IC and ASIC design. He brings an in-depth presentation of Verilog and how to use it with logic synthesis tools; no other Verilog book has dealt with this topic as deeply as he has. If you need to learn Verilog and get up to speed quickly to use it for synthesis, this book is for you. It is sectioned around a set of lessons including presentation and explanation of new concepts and approaches to design, along with lab sessions.

Digital VLSI Design with Verilog

This book provides a new paradigm for teaching digital systems design. It puts forth the view that modern digital logic consists of several interacting areas that combine in a cohesive fashion. This includes traditional subjects such as Boolean algebra, logic formalisms, Karnaugh maps, and other classical topics. However, it goes beyond these subject areas by including VHDL, CMOS, VLSI and RISC architectures to show what the field looks like to a modern logic designer. Modern digital design is no longer practiced as a stand-alone art. The integrated approach used in this book is designed to ensure that graduating engineers are prepared to meet the challenges of the new century.

Digital VLSI Design with Verilog

This book provides insight into the practical design of VLSI circuits. It is aimed at novice VLSI designers and other enthusiasts who would like to understand VLSI design flows. Coverage includes key concepts in CMOS digital design, design of DSP and communication blocks on FPGAs, ASIC front end and physical design, and analog and mixed signal design. The approach is designed to focus on practical implementation of key elements of the VLSI design process, in order to make the topic accessible to novices. The design concepts are demonstrated using software from Mathworks, Xilinx, Mentor Graphics, Synopsys and Cadence.

Clocking in Modern VLSI Systems

Top-Down Digital VLSI Design

Digital audio, speech recognition, code modems, radar, high-definition television—these are but a few of the modern computer and communications applications relying on digital signal processing (DSP) and the attendant application-specific integrated circuits (ASICs). As information-age industries constantly reinvent ASIC chips for lower power consumption and digital efficiency, there is a growing need for designers who are current and fluent in VLSI design methodologies for DSP. Enter Top-Down Digital VLSI Design, a comprehensive resource for performance optimization techniques in VLSI signal processing. Based on Keshab Parhi's highly respected and popular graduate-level courses, this book is destined to become the standard text and reference in the field. This text integrates VLSI architecture theory and algorithms, architectures various architectural concepts at the implementation level, and presents several approaches to analysis, estimation, and reduction of power consumption. Throughout this book, Dr. Parhi explains how to design high-speed, low-area, and low-power VLSI systems for a broad range of DSP applications. He covers pipelining extensively as well as numerous other techniques, from parallel processing to scaling and roundoff noise computation. Readers are shown how to apply all these techniques to improve implementation of several DSP algorithms, using both ASICs and off-the-shelf programmable digital signal processors (DSPs). The book features hundreds of graphics illustrating various DSP algorithms, examples based on digital filters and transforms clarifying key concepts, and interesting end-of-chapter exercises that help match techniques with applications. In addition, the abundance of readily available design tools makes this an extremely useful resource for designers of DSP systems in wired, wireless, or multimedia communications. The material can also be adopted in new courses in architecture theory and algorithms, as well as in introductory courses for designers of DSP applications in wired, wireless, or multimedia communications. Topics include: * Transformations for high speed using pipelining, retiming, and parallel processing techniques * Power reduction transformations for supply voltage reduction as well as for strength or capacitance reduction * Area reduction using folding techniques * Strategies for arithmetic implementation * Synchronous, and asynchronous pipelining * Design of programmable DSPs. An Instructor's Manual presenting detailed solutions to all the problems in the book is available from the Wiley editorial department.

Performance Optimization Methodologies For Design of Digital VLSI Systems

Market_Desc: - Students in graduate level courses - Electrical Engineers - Computer Scientists - Circuit Designers - Algorithm Designers - System Designers - Computer Programmers in the Multimedia and Wireless Communications Industries - VLSI System Designers Special Features: This example-packed resource provides invaluable professional training for a rapidly-expanding industry. - Presents a variety of approaches to analysis, estimation, and reduction of power consumption in order to help designers extend battery life. - Includes application-driven problems at the end of each chapter - Features six appendices covering shortest path algorithms used in retiming, scheduling, and allocation techniques, as well as determining the iteration bound - The Author is a recognized expert in the field, having written several books, taught several graduate-level classes, and served on several IEEE boards About The Book: This book
complements the other Digital Signaling Processing books in our list, which include an introductory treatment (Marven), a comprehensive handbook (Mitra), a professional reference (Kaloupsidis), and others which pertain to a specific topic such as noise control. This graduate level textbook will fill an important niche in a rapidly expanding market.

A Practical Approach to VLSI System on Chip (SoC) Design

This book conveys an understanding of CMOS technology, circuit design, layout, and system design sufficient to the designer. The book deals with the technology down to the layout level of detail, thereby providing a bridge from a circuit to a form that may be fabricated. The early chapters provide a circuit view of the CMOS IC design, the middle chapters cover a sub-system view of CMOS VLSI, and the final section illustrates these techniques using a real-world case study.

Digital VLSI Systems Design

VLSI Digital Signal Processing Systems

Mixed Analog-digital VLSI Devices and Technology

This book aims to highlight the research activities in the domain of thermal-aware testing. Thermal-aware testing can be employed both at circuit level and at system level Describes range of algorithms for addressing thermal-aware test issue, presents comparison of temperature reduction with power-aware techniques and include results on benchmark circuits and systems for different techniques This book will be suitable for researchers working on power- and thermal-aware design and the testing of digital VLSI chips

Modern VLSI Design

High-Performance Digital VLSI Circuit Design

Adaptive Design Verification of Digital VLSI Systems

This is the only book that offers a thorough treatment of the following: design and application of programmable digital signal processors, formal specification and optimization of signal processing architectures and circuits; high-level synthesis of DSP architectures and datapaths; detailed treatment of application-specific integrated circuits (ASICs); scheduling, allocation and assignment algorithms for multiprocessor DSP systems; and hardware/software co-design issues in DSP.

VLSI Digital Signal Processors: An Introduction to Rapid Prototyping and Design Synthesis provides a cohesive, quantitative and clear exposition of the implementation and prototyping of digital signal processing algorithms on programmable signal processors, parallel processing systems and application-specific ICs. Included are both programmable and dedicated digital signal processors, and discussions of the latest optimization methods and the use of computer-aided design techniques.

Practical Low Power Digital VLSI Design

KEY BENEFIT: This hands-on book leads readers through the complete process of building a ready-to-fabricate CMOS integrated circuit using popular commercial design software tools. The VLSI CAD flow described in this book uses tools from two vendors: Cadence Design Systems, Inc. and Synopsys Inc. Detailed tutorials include step-by-step instructions and screen shots of tool windows and dialog boxes. MARKET: A useful reference for chip designers.

Digital Integrated Circuit Design

Low-Power Digital VLSI Design: Circuits and Systems addresses both process technologies and device modeling, Power dissipation in CMOS circuits, several practical circuit examples, and low-power techniques are discussed. Low-voltage issues for digital CMOS and BiCMOS circuits are emphasized. The book also provides an advanced view of digital circuit design and the current status of low-voltage VLSI technology. A low-power design methodology is presented with various power minimization techniques at the circuit, logic, architecture and algorithm levels. Features: Low-voltage CMOS device modeling, technology files, design rules Switching activity concept, low-power guidelines to engineer low-power VLSI design, circuit design rules for low-power circuits, and low-power techniques for low-power circuits in CMOS SRAMS and DRAMS Low-power on-chip voltage down converter design Numerous advanced CMOS subsystems (e.g. multipliers, address, memories, regular structures, phase-locked loops) with several design options trading power, delay and area Low-power design methodology, power estimation techniques Power reduction techniques at the logic, architecture and algorithm levels More than 190 circuits explained at the transistor level.

Design of VLSI Systems - A Practical Introduction

A Design Methodology and Computer Aids for Digital VLSI Systems

System-on-a-chip (SoC) has become an essential technique to lower product costs and maximize power efficiency, particularly as the mobility and size requirements of electronics continues to grow. It has therefore become increasingly important for electrical engineers to develop a strong understanding of the key stages of hardware description language (HDL) design flow based on cell-based libraries or field-programmable gate array (FPGA) devices. Honed and revised through years of classroom use, this book focuses on development, verifying, and synthesizing designs of practical digital systems using the most widely used hardware description Language: Verilog HDL. Explains how to perform synthesis and verification to achieve optimized synthesis results and compiler times Offers complete coverage of Verilog syntax illustrates the entire design and verification flow using an FPGA case study Provides real-world design examples such as LED and LCD displays, and includes step-by-step instructions and screen shots of tool windows and dialog boxes. MARKET: A useful reference for chip designers.

CMOS VLSI Design: A Circuits and Systems Perspective

Very Large Scale Integration (VLSI) Systems refer to the latest development in computer microchips which are created by integrating hundreds of thousands of transistors into one chip. Emerging research in this area has the potential to uncover further applications for VLSI technologies in addition to system advancements. Design and Modeling of Low Power VLSI Systems analyzes various traditional and modern low power techniques for integrated circuit design in addition to the
limiting factors of existing techniques and methods for optimization. Through a research-based discussion of the technicalities involved in the VLSI hardware development process cycle, this book is a useful resource for researchers, engineers, and graduate-level students in computer science and engineering.

The digital design language VHDL
High-Performance Digital VLSI Circuit Design is the first book devoted entirely to the design of digital high-performance VLSI circuits. CMOS, BiCMOS and bipolar circuits are covered in depth, including state-of-the-art circuit structures. Recent advances in both the computer and telecommunications industries demand high-performance VLSI digital circuits. Digital processing of signals demands high-speed circuit techniques for the GHz range. The design of such circuits represents a great challenge; one that is amplified when the power supply is scaled down to 3.3 V. Moreover, the requirements of low-power/high-performance circuits add an extra dimension to the design of such circuits. High-Performance Digital VLSI Circuit Design is a self-contained text, introducing the subject of high-performance VLSI circuit design and explaining the speed/power tradeoffs. The first few chapters of the book discuss the necessary background material in the area of device design and device modeling, respectively. High-performance CMOS circuits are then covered, especially the new all-N-logic dynamic circuits. Propagation delay times of high-speed bipolar CML and ECL are developed analytically to give a thorough understanding of various interacting process, device and circuit parameters. High-current phenomena of bipolar devices are also addressed as these devices typically operate at maximum currents for limited device area. Different, new, high-performance BiCMOS circuits are presented and compared to their conventional counterparts. These new circuits find direct applications in the areas of high-speed adders, frequency dividers, sense amplifiers, level-shifters, input/output clock buffers and PLLs. The book concludes with a few system application examples of digital high-performance VLSI circuits. Audience: A vital reference for practicing IC designers. Can be used as a text for graduate and senior undergraduate students in the area.

VLSI Digital Signal Processors
Design and optimization of integrated circuits is essential to the creation of new semiconductor chips, and physical optimizations are becoming more prominent as a result of semiconductor scaling. Modern chip design has become so complex that it is largely performed by specialized software, which is frequently updated to address the new design challenges. The rise of the software environment brings with it new design constraints such as timing, power consumption and increased problem complexities. A user of such software needs a high-level understanding of the underlying mathematical models and algorithms. On the other hand, a developer of such software must have a keen understanding of computer science aspects, including algorithmic performance bottlenecks and how various algorithms operate and interact. "VLSI Physical Design: From Graph Partitioning to Timing Closure" introduces and compares algorithms that are used during the physical design phase of integrated-circuit design, wherein a geometric chip layout is produced starting from an abstract circuit design. The emphasis is on essential and fundamental techniques, ranging from hypergraph partitioning and circuit placement to timing closure.

Introduction to NMOS and CMOS VLSI Systems Design
VLSI DIGITAL SIGNAL PROCESSING SYSTEMS: DESIGN AND IMPLEMENTATION
For Electrical Engineering and Computer Engineering courses that cover the design and technology of very large scale integrated (VLSI) circuits and systems. May also be used as a VLSI reference for professional VLSI design engineers, VLSI design managers, and VLSI CAD engineers. Modern VLSI Design provides a comprehensive “bottom-up” guide to the design of VLSI systems, from the physical design of circuits through system architecture with focus on the latest solution for system-on-chip (SOC) design. Because VLSI system designers face a variety of challenges that include high performance, interconnect delays, low power, low cost, fast design turnaround time, successful designers must understand the entire design process. The Third Edition also provides a much more thorough discussion of hardware description languages, with introduction to both Verilog and VHDL. For that reason, this book presents the entire VLSI design process in a single volume.

Low-Power Digital VLSI Design
The Design and Analysis of VLSI Circuits
Thermal-Aware Testing of Digital VLSI Circuits and Systems
Top-Down VLSI Design: From Architectures to Gate-Level Circuits and FPGAs
VLSI Systems Design for Digital Signal Processing
Introduction to VLSI Systems
VLSI Physical Design: From Graph Partitioning to Timing Closure
Design and Modeling of Low Power VLSI Systems
Digital VLSI Chip Design with Cadence and Synopsys CAD Tools

VLSI Design
The book aims to guide future and current VLSI design engineers a robust understanding of the underlying principles of basic VLSI design technology. It not only
focuses on circuit design processes obeying VLSI rules but also on technological aspects of fabrication. The Hardware Description Language (HDL) Verilog is explained along with its modelling style. The book also covers CMOS design from the digital systems level to the circuit level. The book clearly explains fundamental principles and is a guide to good design practices.

A First Course in Digital Systems Design

Virtual Manufacturing presents a novel concept of combining human computer interfaces with virtual reality for discrete and continuous manufacturing systems. The authors address the relevant concepts of manufacturing engineering, virtual reality, and computer science and engineering, before embarking on a description of the methodology for building augmented reality for manufacturing processes and manufacturing systems. Virtual Manufacturing is centered on the description of the development of augmented reality models for a range of processes based on CNC, PLC, SCADA, mechatronics and on embedded systems. Further discussions address the use of augmented reality for developing augmented reality models to control contemporary manufacturing systems and to acquire micro- and macro-level decision parameters for managers to boost profitability of their manufacturing systems. Guiding readers through the building of their own virtual factory software, Virtual Manufacturing comes with access to online files and software that will enable readers to create a virtual factory, operate it and experiment with it. This is a valuable source of information with a useful toolkit for anyone interested in virtual manufacturing, including advanced undergraduate students, postgraduate students and researchers.

Introduction to VLSI Systems

With the advance of semiconductors and ubiquitous computing, the use of system-on-a-chip (SoC) has become an essential technique to reduce product cost. With this progress and continuous reduction of feature sizes, and the development of very large-scale integration (VLSI) circuits, addressing the harder problems requires fundamental understanding of circuit and layout design issues. Furthermore, engineers can often develop their physical intuition to estimate the behavior of circuits rapidly without relying predominantly on computer-aided design (CAD) tools. Introduction to VLSI Systems: A Logic, Circuit, and System Perspective addresses the need for teaching such a topic in terms of a logic, circuit, and system design perspective. To achieve the above-mentioned goals, this classroom-tested book focuses on: Implementing a digital system as a full-custom integrated circuit Switch logic design and useful paradigms that may apply to various static and dynamic logic families The fabrication and layout designs of complementary metal-oxide-semiconductor (CMOS) VLSI Important issues of modern CMOS processes, including deep submicron devices, circuit optimization, interconnect modeling and optimization, signal integrity, power integrity, clocking and timing, power dissipation, and electrostatic discharge (ESD) Introduction to VLSI Systems builds an understanding of integrated circuits from the bottom up, paying much attention to logic circuit, layout, and system designs. Armed with these tools, readers can not only comprehensively understand the features and limitations of modern VLSI technologies, but also have enough background to adapt to this ever-changing field.

Digital System Designs and Practices

VLSI Systems Design for Digital Signal Processing: Signal processing and signal processors

Practical Low Power Digital VLSI Design emphasizes the optimization and trade-off techniques that involve power dissipation, in the hope that the readers are better prepared the next time they are presented with a low power design problem. The book highlights the basic principles, methodologies and techniques that are common to most CMOS digital designs. The advantages and disadvantages of a particular low power technique are discussed. Besides the classical area-performance trade-off, the impact to design cycle time, complexity, risk, testability and reusability are discussed. The wide impacts to all aspects of design are what make low power problems challenging and interesting. Heavy emphasis is given to top-down structured design style, with occasional coverage in the semicustom design methodology. The examples and design techniques cited have been known to be applied to production scale designs or laboratory settings. The goal of Practical Low Power Digital VLSI Design is to permit the readers to practice the low power techniques using current generation design style and process technology. Practical Low Power Digital VLSI Design considers a wide range of design abstraction levels spanning circuit, logic, architecture and system. Substantial basic knowledge is provided for qualitative and quantitative analysis at the different design abstraction levels. Low power techniques are presented at the circuit, logic, architecture and system levels. Special techniques that are specific to some key areas of digital chip design are discussed as well as some of the low power techniques that are just appearing on the horizon. Practical Low Power Digital VLSI Design will be of benefit to VLSI design engineers and students who have a fundamental knowledge of CMOS digital design.

Basic VLSI Design Technology

Design of Analog-digital VLSI Circuits for Telecommunications and Signal Processing

Top-down approach to practical, tool-independent, digital circuit design, reflecting how circuits are designed.