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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...

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FPGA Prototyping by VHDL Examples: Xilinx MicroBlaze MCS SoC. 4.6 stars | 5-9 Days; Get it to Oman by 03-November to 07-November. OMR 66.550

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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.

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

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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.

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.

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.

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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.

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

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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.

A hands-on introduction to FPGA prototyping and SoC design This is the successor edition of the popular FPGA Prototyping by Verilog Examples text. It follows the same “learning-by-doing” approach to teach the fundamentals and practices of HDL synthesis and FPGA prototyping. The new edition 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

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hardware accelerators. Although it is an introductory text, the examples are developed in a rigorous manner, and the derivations follow the strict design guidelines and coding practices used for large, complex digital systems. The book is completely updated and uses the SystemVerilog language, which “absorbs” the Verilog language. 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 new 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.

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Design Recipes for FPGAs: Using Verilog and VHDL provides a

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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 FPGAs 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

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.

The push to move products to market as quickly and cheaply as

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possible is fiercer than ever, and accordingly, engineers are always looking for new ways to provide their companies with the edge over the competition. Field-Programmable Gate Arrays (FPGAs), which are faster, denser, and more cost-effective than traditional programmable logic devices (PLDs), are quickly becoming one of the most widespread tools that embedded engineers can utilize in order to gain that needed edge. FPGAs are especially popular for prototyping designs, due to their superior speed and efficiency. This book hones in on that rapid prototyping aspect of FPGA use, showing designers exactly how they can cut time off production cycles and save their companies money drained by costly mistakes, via prototyping designs with FPGAs first. Reading it will take a designer with a basic knowledge of implementing FPGAs to the “next-level of FPGA use because unlike broad beginner books on FPGAs, this book presents the required design skills in a focused, practical, example-oriented manner. In-the-trenches expert authors assure the most applicable advice to practicing engineers Dual focus on successfully making critical decisions and avoiding common pitfalls appeals to engineers pressured for speed and perfection Hardware and software are both covered, in order to address the growing trend toward "cross-pollination" of engineering expertise

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