Digital Electronics with PLD Integration

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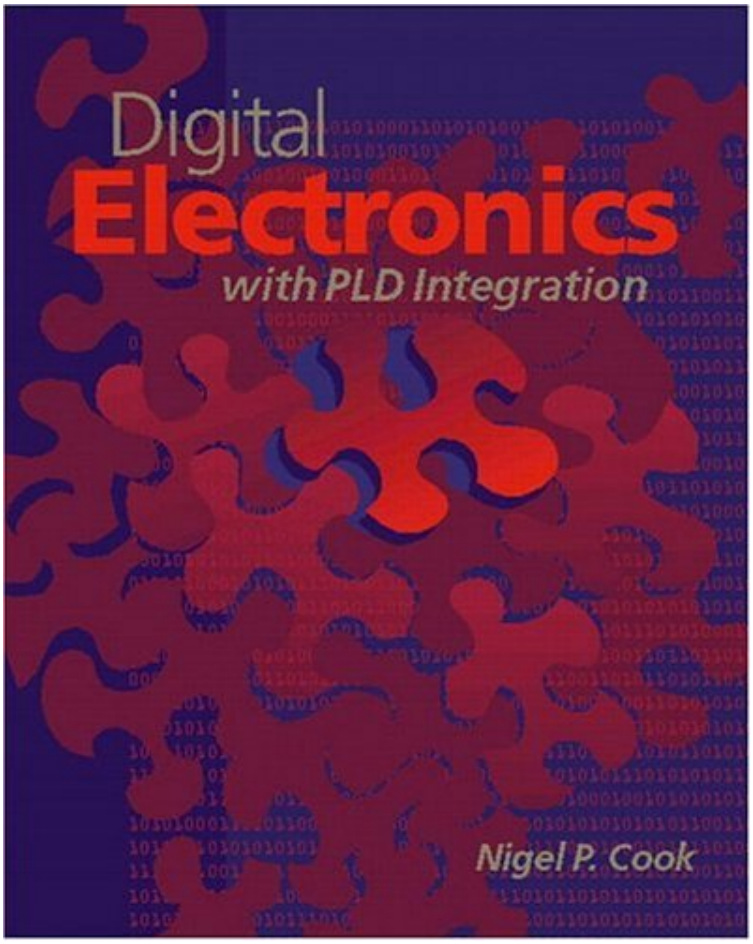

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Nigel P. Cook : Digital Electronics with PLD Integration before purchasing it in order to gage whether or not it would be worth my time, and all praised Digital Electronics with PLD Integration:

This book introduces readers to both the fundamentals of digital logic and the advanced, modern method of utilizing the fundamentals with PLD Technology. An application first approachand over 80 PLD alternative circuit applications for both Altera and Xilinx integrated and referenced throughout the bookshows learners how to immediately begin using PLD software and allow them to experiment The book emphasizes strong testing, test equipment, and troubleshooting, to help prepare the technician student for the working world. Other key topics include number systems and codes, standard logic versus programmable logic, digital IC types, troubleshooting logic gates, logic circuit simplification, decoders and encoders, other combinational logic circuits, set-reset and data-type flip-flops, JK flip-flop and timer circuits, registers, counters, semiconductor memories, digital systems, and an introduction to

microprocessors. For technicians specializing in digital electronics.

From the Back CoverWith the industry's rising use of Programmable Logic Devices (PLDs), it has become increasingly important for electronics students to learn to understand how PLDs work. Nigel P. Cook's Digital Electronics with PLD Integration is intended to do just that. Students will find a combination of fundamental digital logic theory with a presentation and explanation of PLDs. The features of this text include: An integration of the Programmable Logic Device concepts and applications with standard logic fundamentals, allowing students to understand the how and why behind this new technology. Coverage of both Xilinx and Altera software at the end of most chapters to show students how to apply the concepts of PLDs. End-of-chapter questions and exercises geared to reinforce both standard logic and PLD concepts . Excerpt. Reprinted by permission. All rights reserved. Preface Analog to Digital Since World War II, no branch of science has contributed more to the development of the modern world than electronics. It has stimulated dramatic advances in the fields of communication, computing, consumer products, industrial automation, tests and measurement, and health care. It has now become the largest single industry in the world, exceeding the automobile and oil industries, with annual sales of electronic systems greater than $2 trillion. One of the most important trends in this huge industry has been a gradual shift from analog electronics to digital electronics. This movement began in the 1960s and is almost complete today. In fact, a recent statistic stated that, on average, 90% of the circuitry within electronic systems is now digital and only 10% is analog. This digitalization of the electronics industry is merging sectors that were once separate. For example, two of the largest sectors or branches of electronics are computing and communications. Being able to communicate with each other using a common digital language has enabled computers and communications to interlink, so that computers can now function within communication-based networks, and communications networks can now function through computer-based systems. Industry experts call this merging convergence, and predict that digital electronics will continue to unite the industry and stimulate progress in practically every field of human endeavor. Needless to say, this course you are about to undertake in digital electronic concepts, terminology, components, circuits, applications, and testing and troubleshooting is an essential element in your study of electronics. WHY USE PROGRAMMABLE LOGIC DEVICES? There has been, and continues to be, an almost meteoric advancement in digital technology every year. This is evidently clear when we see the performance of personal computers, or PCs, advance in leaps and bounds. To quote a recently posted statistic, microprocessor ICs are improving at a rate of 60% per year, while memory ICs are quadrupling their capacity every three years. These, and other rapid changes in all the key building blocks of digital electronic systems, mean that consumer products are generally obsolete in less than three years. To keep up with this fast pace, electronic companies have to design and manufacture new products in a cycle of typically less than six months. To meet this accelerated schedule, engineers and technicians have looked for shortcuts that enable them to construct a digital prototype circuit and evaluate its performance in a much more timely manner. Constructing a Prototype Using Standard Logic Devices To construct a circuit using standard logic devices, you would first need to insert all of the devices into a protoboard, and then connect them with a spaghetti-like maze of hookup wire. This standard logic prototyping method has the following disadvantages: Hookup wire cutting and stripping is time consuming. Wires can easily be inserted incorrectly, causing possible device damage and lengthy delays while the errors are isolated. A large and costly inventory of all standard logic ICs must be maintained. If the desired standard logic IC is not available, further delays will result. To modify or add to a working circuit, the wires and ICs have to be removed from the protoboard, and the new design rebuilt from scratch. Constructing a Circuit Using Programmable Logic Devices By using an inexpensive personal computer (PC), a Computer Aided Design (CAD) software program, and a single Programmable Logic Device (PLD), you can easily prototype a digital circuit. The five-step process for creating a prototype using a PLD is: (1) create the circuit using the PC, (2) then compile it, (3) simulate it on the PC to see if it works as it should, (4) download it into the PLD, and finally (5) test it by applying inputs and monitoring outputs. This PLD prototyping method has the following advantages: With manual wiring reduced to a minimum, prototypes can be constructed, tested, and modified at a much faster rate. Wiring errors can be avoided. You can experiment with many digital IC types without having to stock them in your supply cabinet. Circuit designs can be saved as electronic files within the PC and used again when needed. Since the PLD can be used over and over again, modifications can easily be made by altering the circuit in the PC, and then downloading the new design into the PLD. Larger and more complex projects can be undertaken now that the tedious manual procedures are automated. In this text we will be examining this PLD prototyping method in detail to prepare you for industry. Referring to the following chapter outline, you can see that you are first introduced to the PLD method of prototyping in Chapter 4 (Standard Logic versus Programmable Logic). From that point on, the PLD alternative is integrated into the traditional standard logic device topics.