Practical Problems In Vlsi Physical Design

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

Practical Problems in VLSI Physical Design Automation contains problems and solutions related to various well-known algorithms used in VLSI physical design automation. Dr. Lim believes that the best way to learn new algorithms is to walk through a small example by hand. This knowledge will greatly help understand, analyze, and improve some of the well-known algorithms. The author has designed and taught a graduate-level course on physical CAD for VLSI at Georgia Tech. Over the years he has written his homework with such a focus and has maintained typeset version of the solutions.

The brief primarily focuses on the performance analysis of CNT based interconnects in current research scenario. Different CNT structures are modeled on the basis of transmission line theory. Performance comparison for different CNT structures illustrates that CNTs are more promising than Cu or other materials used in global VLSI interconnects. The brief is organized into five chapters which mainly discuss: (1) an overview of current research scenario and basics of interconnects; (2) unique crystal structures and the basics of physical properties of CNTs, and the production, purification and applications of CNTs; (3) a brief technical review, the geometry and equivalent RLC parameters for different single and bundled CNT structures; (4) a comparative analysis of crosstalk and delay for different single and bundled CNT structures; and (5) various unique mixed CNT bundle structures and their equivalent electrical models.

New and classical results in computational complexity, including interactive proofs, PCP, derandomization, and quantum computation. Ideal for graduate students.

Encyclopedia of Microcomputers

Proceedings of the 6th Computer Science On-line Conference 2017 (CSOC 2017), Vol 1

VLSI Design Methodology Development

Algorithm Engineering

From VLSI Chips to MCMs

This book describes the life cycle process of IP cores, from specification to production, including IP modeling, verification, optimization, and protection. Various trade-offs in the des including those associated with many of the most common memory cores, controller IPs and system-on-chip (SoC) buses. Readers will also benefit from the author's practical cove methodologies. such as bug localization, UVM, and scan-chain. A SoC case study is presented to compare traditional verification with the new verification methodologies. Discusses of IP cores, from specification to production, including IP modeling, verification, optimization, and protection; Introduce a deep introduction for Verilog for both implementation and Demonstrates how to use IP in applications such as memory controllers and SoC buses. Describes a new verification methodology called bug localization; Presents a novel scan-cha debugging; Enables readers to employ UVM methodology in straightforward, practical terms.

Very Large Scale Integration (VLSI) has become a necessity rather than a specialization for electrical and computer engineers. This unique text provides Engineering and Computer S comprehensive study of the subject, covering VLSI from basic design techniques to working principles of physical design automation tools to leading edge application-specific array CMOS design, the author describes VLSI design from the viewpoint of a digital circuit engineer. He develops physical pictures for CMOS circuits and demonstrates the top-down de design projects - a microprocessor and a field programmable gate array. The author then discusses VLSI testing and dedicates an entire chapter to the working principles, strength ubiquitous physical design tools. Finally, he unveils the frontiers of VLSI. He emphasizes its use as a tool to develop innovative algorithms and architecture to solve previously intrac answers not only the question of "what is VLSI," but also shows how to use VLSI. It provides graduate and upper level undergraduate students with a complete and congregated vi Based on the authors' expansive collection of notes taken over the years, Nano-CMOS Circuit and Physical Design bridges the gap between physical and circuit design and fabricati manufacturability, and yield. This innovative book covers: process technology, including sub-wavelength optical lithography; impact of process scaling on circuit and physical impleme with leaky transistors; and DFM, yield, and the impact of physical implementation.

VLSI is an important area of electronic and computer engineering. However, there are few textbooks available for undergraduate/postgraduate study of VLSI design automation and Design Automation: Theory and Practice fills the void and is an essential introduction for senior undergraduates, postgraduates and anyone starting work in the field of CAD for VLS physical design, together with such related areas as automatic cell generation, silicon compilation, layout editors and compaction. A problem-solving approach is adopted and each s examples. Each topic is treated in a standard format: Problem Definition, Cost Functions and Constraints, Possible Approaches and Latest Developments. Special features: The book VLSI physical design, from partitioning and floorplanning to layout generation and silicon compilation; provides a comprehensive treatment of most of the popular algorithms; covers and gives a bibliography for further research; offers numerous fully described examples, problems and programming exercises.

Advances in Evolutionary Computing

Physical Design Automation of VLSI Systems

VLSI Physical Design Automation

Practical Problems in VLSI Physical Design Automation

Algorithms and Data Structures in VLSI Design

Volume 13 - Optical Disks to Production Scheduling

This volume is based on the research papers presented in the 4th Computer Science On-line Conference. The volume Artificial Intelligence Perspectives and Applications presents new approaches and methods to real-world problems, and in particular, exploratory research that describes novel approaches in the field of artificial intelligence. Particular emphasis is laid on modern trends in selected fields of interest. New algorithms or methods in a variety of fields are also presented. The Computer Science On-line Conference (CSOC 2015) is intended to provide an international forum for discussions on the latest high-quality research results in all areas related to

Computer Science. The addressed topics are the theoretical aspects and applications of Computer Science, Artificial Intelligences, Cybernetics, Automation Control Theory and Software Engineering.

This book provides a comprehensive overview of the VLSI design process. It covers end-to-end system on chip (SoC) design, including design methodology, the design environment, tools, choice of design components, handoff procedures, and design infrastructure needs. The book also offers critical guidance on the latest UPF-based low power design flow issues for deep submicron SOC designs, which will prepare readers for the challenges of working at the nanotechnology scale. This practical guide will provide engineers who aspire to be VLSI designers with the techniques and tools of the trade, and will also be a valuable professional reference for those already working in VLSI design and verification with a focus on complex SoC designs. A comprehensive practical guide for VLSI designers; Covers end-to-end VLSI SoC design flow; Includes source code, case studies, and application examples.

One of the main problems in chip design is the enormous number of possible combinations of individual chip elements within a system, and the problem of their compatibility. The recent application of data structures, efficient algorithms, and ordered binary decision diagrams (OBDDs) has proven vital in designing the computer chips of tomorrow. This book provides an introduction to the foundations of this interdisciplinary research area, emphasizing its applications in computer aided circuit design.

This key text addresses the complex computer chips of tomorrow which will consist of several layers of metal interconnect, making the interconnect within a chip or a multichip module a three dimensional problem. You'll find an insightful approach to the algorithmic, cell design issues in chip and MCM routing with an emphasis on techniques for eliminating routing area.

VLSI Circuit Design Methodology Demystified

Introduction to VLSI Systems

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

Proceedings of the 4th Computer Science On-line Conference 2015 (CSOC2015), Vol 1: Artificial Intelligence Perspectives and Applications

Particle Swarm Optimization with Applications

A Comprehensive Guide

With vastly increased complexity and functionality in the "nanometer era" (i.e. hundreds of millions of transistors on one chip), increasing the performance of integrated circuits has become a challenging task. Connecting effectively (interconnect design) all of these chip elements has become the greatest determining factor in overall performance. 3-D integrated circuit design may offer the best solutions in the near future. This is the first book on 3-D integrated circuit design, covering all of the technological and design aspects of this emerging design paradigm, while proposing effective solutions to specific challenging problems concerning the design of 3-D integrated circuits. A handy, comprehensive reference or a practical design guide, this book provides a sound foundation for the design of 3-D integrated circuits. * Demonstrates how to overcome "interconnect bottleneck" with 3-D integrated circuit design...leading edge design techniques offer solutions to problems (performance/power consumption/price) faced by all circuit designers * The FIRST book on 3-D integrated circuit design...provides up-to-date information that is otherwise difficult to find * Focuses on design issues key to the product development cycle...good design plays a major role in exploiting the implementation flexibilities offered in the 3-D * Provides broad coverage of 3-D integrated circuit design, including interconnect prediction models, thermal management techniques, and timing optimization...offers practical view of designing 3-D circuits

This book addresses two main problems with interconnections at the chip and package level: crosstalk and simultaneous switching noise. Its orientation is towards giving general information rather than a compilation of practical cases. Each chapter contains a list of references for the topics.

This book provides broad and comprehensive coverage of the entire EDA flow. EDA/VLSI practitioners and researchers in need of fluency in an "adjacent" field will find this an invaluable reference to the basic EDA concepts, principles, data structures, algorithms, and architectures for the design, verification, and test of VLSI circuits. Anyone who needs to learn the concepts, principles, data structures, algorithms, and architectures of the EDA flow will benefit from this book. Covers complete spectrum of the EDA flow, from ESL design modeling to logic/test synthesis, verification, physical design, and test - helps EDA newcomers to get "up-and-running" quickly Includes comprehensive coverage of EDA concepts, principles, data structures, algorithms, and architectures - helps all readers improve their VLSI design competence Contains latest advancements not yet available in other books, including Test compression, ESL design modeling, large-scale floorplanning, placement, routing, synthesis of clock and power/ground networks - helps readers to design/develop testable chips or products Includes industry best-practices wherever appropriate in most chapters - helps readers avoid costly mistakes

Algorithms are essential building blocks of computer applications. However, advancements in computer hardware, which render traditional computer models more and more unrealistic, and an ever increasing demand for efficient solution to actual real world problems have led to a rising gap between classical algorithm theory and algorithmics in practice. The emerging discipline of Algorithm Engineering aims at bridging this gap. Driven by concrete applications, Algorithm Engineering complements theory by the benefits of experimentation and puts equal emphasis on all aspects arising during a cyclic solution process ranging from realistic modeling, design, analysis, robust and efficient implementations to careful experiments. This tutorial - outcome of a GI-Dagstuhl Seminar held in Dagstuhl Castle in September 2006 - covers the essential aspects of this process in ten chapters on basic ideas, modeling and design issues, analysis of algorithms, realistic computer models, implementation aspects and algorithmic software libraries, selected case studies, as well as challenges in Algorithm Engineering. Both researchers and practitioners in the field will find it useful as a state-of-the-art survey.

Bridging the Gap Between Algorithm Theory and Practice

Advanced Logic Synthesis

Nano-CMOS Circuit and Physical Design

Routing in the Third Dimension

VLSI Physical Design: From Graph Partitioning to Timing Closure

Theory and Applications

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.

The Complete, Modern Tutorial on Practical VLSI Chip Design, Validation, and Analysis As microelectronics engineers design complex chips using existing circuit libraries, they must ensure correct logical, physical, and electrical properties, and prepare for reliable foundry fabrication. VLSI Design Methodology Development focuses on the design and analysis steps needed to perform these tasks and successfully complete a modern chip design. Microprocessor design authority Tom Dillinger carefully introduces core concepts, and then guides engineers through modeling, functional design validation, design implementation, electrical analysis, and release to manufacturing. Writing from the engineer's perspective, he covers underlying EDA tool algorithms, flows, criteria for assessing project status, and key tradeoffs and interdependencies. This fresh and accessible tutorial will be valuable to all VLSI system designers, senior undergraduate or graduate students of microelectronics design, and companies offering internal courses for engineers at all levels. Reflect complexity, cost, resources, and schedules in planning a chip design project Perform hierarchical design decomposition, floorplanning, and physical integration, addressing DFT, DFM, and DFY requirements Model functionality and behavior, validate designs, and verify formal equivalency Apply EDA tools for logic synthesis, placement, and routing Analyze timing, noise, power, and electrical issues Prepare for manufacturing release and bring-up, from mastering ECOs to qualification This guide is for all VLSI system designers, senior undergraduate or graduate students of microelectronics design, and companies offering internal courses for engineers at all levels. It is applicable to engineering teams undertaking new projects and migrating existing designs to new technologies.

The last decade has brought explosive growth in the technology for manufac turing integrated circuits. Integrated circuits with several hundred thousand transistors are now commonplace. This manufacturing capability, combined with the economic benefits of large electronic systems, is forcing a revolution in the design of these systems and providing a challenge to those people in terested in integrated system design. Modern circuits are too complex for an individual to comprehend completely. Managing tremendous complexity and automating the design process have become crucial issues. Two groups are interested in dealing with complexity and in developing algorithms to automate the design process. One group is composed of practi tioners in computer-aided design (CAD) who develop computer programs to aid the circuit-design process. The second group is made up of computer scientists and mathemati'::~I\ns who are interested in the design and analysis of efficient combinatorial aJ::,orithms. These two groups have developed separate bodies of literature and, until recently, have had relatively little interaction. An obstacle to bringing these two groups together is the lack of books that discuss issues of importance to both groups in the same context. There are many instances when a familiarity with the literature of the other group would be beneficial. Some practitioners could use known theoretical results to improve their "cut and try" heuristics. In other cases, theoreticians have published impractical or highly abstracted toy formulations, thinking that the latter are important for circuit layout.

This book is intended to gather recent studies on particle swarm optimization (PSO). In this book, readers can find the recent theoretical developments and applications on PSO algorithm. From the theoretical aspect, PSO has preserved its popularity because of the fast convergence rate, and a lot of hybrid algorithms have recently been developed in order to increase the performance of the algorithm. At the same time, PSO has also been used to solve different kinds of engineering optimization problems. In this book, a reader can find engineering applications of PSO, such as environmental economic dispatch and grid computing.

From VLSI Architectures to CMOS Fabrication
A Logic, Circuit, and System Perspective
Interconnection Noise in VLSI Circuits
Quantum Computation and Quantum Information
A Modern Approach
Artificial Intelligence Trends in Intelligent Systems

VLSI Electronics

On Optimal Interconnections for VLSI describes, from a geometric perspective, algorithms for high-performance, high-density interconnections during the global and detailed routing phases of circuit layout. First, the book addresses area minimization, with a focus on near-optimal approximation algorithms for minimum-cost Steiner routing. In addition to practical implementations of recent methods, the implications of recent results on spanning tree degree bounds and the method of Zelikovsky are discussed. Second, the book addresses delay minimization, starting with a discussion of accurate, yet algorithmically tractable, delay models. Recent minimum-delay constructions are highlighted, including provably good cost-radius tradeoffs, critical-sink routing algorithms, Elmore delay-optimal routing, graph Steiner arborescences, non-tree routing, and wiresizing. Third, the book addresses skew minimization for clock routing and prescribed-delay routing formulations. The discussion starts with early matching-based constructions and goes on to treat zero-skew routing with provably minimum wirelength, as well as planar clock routing.

Finally, the book concludes with a discussion of multiple (competing) objectives, i.e., how to optimize area, delay, skew, and other objectives simultaneously. These techniques are useful when the routing instance has heterogeneous resources or is highly congested, as in FPGA routing, multi-chip packaging, and very dense layouts. Throughout the book, the emphasis is on practical algorithms and a complete self-contained development. On Optimal Interconnections for VLSI will be of use to both circuit designers (CAD tool users) as well as researchers and developers in the area of performance-driven physical design.

This book presents new methods and approaches to real-world problems as well as exploratory research that describes novel artificial intelligence applications, including deep learning, neural networks and hybrid algorithms. This book constitutes the refereed proceedings of the Artificial Intelligence Trends in Intelligent Systems Section of the 6th Computer Science On-line Conference 2017 (CSOC 2017), held in April 2017.

"The Encyclopedia of Microcomputers serves as the ideal companion reference to the popular Encyclopedia of Computer Science and Technology. Now in its 10th year of publication, this timely reference work details the broad spectrum of microcomputer technology, including microcomputer history; explains and illustrates the use of microcomputers throughout academe, business, government, and society in general; and assesses the future impact of this rapidly changing technology."

Optimal Layouts for the Shuffle-Exchange Graph and Other Networks

Three-dimensional Integrated Circuit Design

Fundamentals of Modern VLSI Devices

Theory and Practice

Electronic Design Automation

IP Cores Design from Specifications to Production

This overview of the security problems in modern VLSI design provides a detailed treatment of a newly developed constraint-based protection paradigm for the protection of VLSI design IPs – from FPGA design to standard-cell placement, and from advanced CAD tools to physical design algorithms.

This book solves several mathematical problems in the areas of Very Large Scale Integration (VLSI) and parallel computation. In particular, it describes optimal layouts for the shuffle-exchange graph, one of the best known networks for parallel computation. Attempts to design a shuffle-exchange computer have been hampered in part by the fact that, until now, no good layouts for the shuffle-exchange graph were known.The mesh of trees network (which may eventually prove as useful as the shuffle-exchange graph) is introduced and the book shows how it can be used to perform a variety of computations, including sorting and matrix multiplication, in a logarithmic number of steps.Next, the book introduces the tree of meshes, the first planar graph that was discovered not to have a linear-area layout. Most recently, the structure of this graph has been used to develop a general framework for solving VLSI graph layout problems.Finally, the book develops techniques for proving lower bounds on the bisection width, crossing number, and layout area of a graph. These techniques significantly extend the power and range of previous methods.Researchers in the fields of VLSI, parallel computation, and graph theory will find this study of particular value; it is also accessible to anyone with an elementary knowledge of mathematics and computer science. The book is self-contained and presents in a unified and original manner many results scattered in the technical literature, while also covering new and fundamental results for the first time.Tom Leighton is Assistant Professor of Mathematics in the Department of Applied Mathematics and Laboratory for Computer Science at MIT.

First-ever comprehensive introduction to the major new subject of quantum computing and quantum information.

This book was written to arm engineers qualified and knowledgeable in the area of VLSI circuits with the essential knowledge they need to get into this exciting field and to help those already in it achieve a higher level of proficiency. Few people truly understand how a large chip is developed, but an understanding of the whole process is necessary to appreciate the importance of each part of it and to understand the process from concept to silicon. It will teach readers how to become better engineers through a practical approach of diagnosing and attacking real-world problems.

ALGORITHMS VLSI DESIGN AUTOMATION

Modeling, Verification, Optimization, and Protection

OBDD - Foundations and Applications

VLSI Design

Computational Complexity

Synthesis, Verification, and Test

&Quot;VLSI Physical Design Automation: Theory and Practice is an essential introduction for senior undergraduates, postgraduates and anyone starting work in the field of CAD for VLSI. It covers all aspects of physical design, together with such related areas as automatic cell generation, silicon compilation, layout editors and compaction. A problem-solving approach is adopted and each solution is illustrated with examples. Each topic is treated in a standard format: Problem Definition, Cost Functions and Constraints, Possible Approaches and Latest Developments."--BOOK JACKET.

Market_Desc: · Electrical Engineering Students taking courses on VLSI systems, CAD tools for VLSI, Design Automation at Final Year or Graduate Level, Computer Science courses on the same topics, at a similar level· Practicing Engineers wishing to learn the state of the art in VLSI Design Automation· Designers of CAD tools for chip design in software houses or large electronics companies. Special Features: · Probably the first book on Design Automation for VLSI Systems which covers all stages of design from layout synthesis through logic synthesis to high-level synthesis· Clear, precise presentation of examples, well illustrated with over 200 figures· Focus on algorithms for VLSI design tools means it will appeal to some Computer Science as well as Electrical Engineering departments About The Book: Enrollments in VLSI design automation courses are not large but it's a very popular elective, especially for those seeking a career in the microelectronics industry. Already the reviewers seem very enthusiastic about the coverage of the book

being a better match for their courses than available competitors, because it covers all design phases. It has plenty of worked problems and a large no. of illustrations. It's a good 'list-builder' title that matches our strategy of focusing on topics that lie on the interface between Elec Eng and Computer Science.

Algorithms for VLSI Physical Design Automation is a core reference text for graduate students and CAD professionals. It provides a comprehensive treatment of the principles and algorithms of VLSI physical design. Algorithms for VLSI Physical Design Automation presents the concepts and algorithms in an intuitive manner. Each chapter contains 3-4 algorithms that are discussed in detail. Additional algorithms are presented in a somewhat shorter format. References to advanced algorithms are presented at the end of each chapter. Algorithms for VLSI Physical Design Automation covers all aspects of physical design. The first three chapters provide the background material while the subsequent chapters focus on each phase of the physical design cycle. In addition, newer topics like physical design automation of FPGAs and MCMs have been included. The author provides an extensive bibliography which is useful for finding advanced material on a topic. Algorithms for VLSI Physical Design Automation is an invaluable reference for professionals in layout, design automation and physical design.

This book provides a single-source reference to the state-of-the-art in logic synthesis. Readers will benefit from the authors' expert perspectives on new technologies and logic synthesis, new data structures, big data and logic synthesis, and convergent logic synthesis. The authors describe techniques that will enable readers to take advantage of recent advances in big data techniques and frameworks in order to have better logic synthesis algorithms.

Digital Integrated Circuit Design

Intellectual Property Protection in VLSI Designs

Practical Aspects of Declarative Languages

VLSI Electronics

Artificial Intelligence Perspectives and Applications

Principles of VLSI RTL Design

This book provides a collection of fourty articles containing new material on both theoretical aspects of Evolutionary Computing (EC), and demonstrating the usefulness/success of large-scale real world problems. Around 23 articles deal with various theoretical aspects of EC and 17 articles demonstrate the success of EC methodologies. These articles are wr the field from different countries all over the world.

The physical design flow of any project depends upon the size of the design, the technology, the number of designers, the clock frequency, and the time to do the design. As techn styles change, physical design flows are constantly reinvented as traditional phases are removed and new ones are added to accommodate changes in technology. Handbook of Algo Design Automation provides a detailed overview of VLSI physical design automation, emphasizing state-of-the-art techniques, trends and improvements that have emerged during th a brief introduction to the modern physical design problem, basic algorithmic techniques, and partitioning, the book discusses significant advances in floorplanning representations a formulations of the floorplanning problem. The text also addresses issues of placement, net layout and optimization, routing multiple signal nets, manufacturability, physical synthes designing for specialized technologies. It includes a personal perspective from Ralph Otten as he looks back on the major technical milestones in the history of physical design autom books on this topic are currently available, most are either too broad or out of date. Alternatively, proceedings and journal articles are valuable resources for researchers in this are widely dispersed in the literature. This handbook pulls together a broad variety of perspectives on the most challenging problems in the field, and focuses on emerging problems and

Design and optimization of integrated circuits are essential to the creation of new semiconductor chips, and physical optimizations are becoming more prominent as a result of sem Modern chip design has become so complex that it is largely performed by specialized software, which is frequently updated to address advances in semiconductor technologies an 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 mu understanding of computer science aspects, including algorithmic performance bottlenecks and how various algorithms operate and interact. "VLSI Physical Design: From Graph Part 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 design. The emphasis is on essential and fundamental techniques, ranging from hypergraph partitioning and circuit placement to timing closure.

This book constitutes the refereed proceedings of the 5th International Symposium on Practical Aspects of Declarative Languages, PADL 2003, held in New Orleans, LA, USA, in Janu revised full papers presented together with 3 invited contributions were carefully reviewed and selected from 57 submissions. All current aspects of declarative programming are a 5th International Symposium, PADL 2003, New Orleans, LA, USA, January 13-14, 2003, Proceedings

Combinatorial Algorithms for Integrated Circuit Layout

On Optimal Interconnections for VLSI

Handbook of Algorithms for Physical Design Automation

Analysis and Design

A Practical Guide

Algorithms for VLSI Physical Design Automation, Third Edition covers all aspects of physical design. The book is a core reference for graduate students and CAD professionals. For students, concepts and algorithms are presented in an intuitive manner. For CAD professionals, the material presents a balance of theory and practice. An extensive bibliography is provided which is useful for finding advanced material on a topic. At the end of each chapter, exercises are provided, which range in complexity from simple to research level.

Algorithms for VLSI Physical Design Automation, Third Edition provides a comprehensive background in the principles and algorithms of VLSI physical design. The goal of this book is to serve as a basis for the development of introductory-level graduate courses in VLSI physical design automation. It provides self-contained material for teaching and

learning algorithms of physical design. All algorithms which are considered basic have been included, and are presented in an intuitive manner. Yet, at the same time, enough detail is provided so that readers can actually implement the algorithms given in the text and use them. The first three chapters provide the background material, while the focus of each chapter of the rest of the book is on each phase of the physical design cycle. In addition, newer topics such as physical design automation of FPGAs and MCMs have been included. The basic purpose of the third edition is to investigate the new challenges presented by interconnect and process innovations. In 1995 when the second edition of this book was prepared, a six-layer process and 15 million transistor microprocessors were in advanced stages of design. In 1998, six metal process and 20 million transistor designs are in production. Two new chapters have been added and new material has been included in almost allother chapters. A new chapter on process innovation and its impact on physical design has been added. Another focus of the third edition is to promote use of the Internet as a resource, so wherever possible URLs have been provided for further investigation. Algorithms for VLSI Physical Design Automation, Third Edition is an important core reference work for professionals as well as an advanced level textbook for students.

Since register transfer level (RTL) design is less about being a bright engineer, and more about knowing the downstream implications of your work, this book explains the impact of design decisions taken that may give rise later in the product lifecycle to issues related to testability, data synchronization across clock domains, synthesizability, power consumption, routability, etc., all which are a function of the way the RTL was originally written. Readers will benefit from a highly practical approach to the fundamentals of these topics, and will be given clear guidance regarding necessary safeguards to observe during RTL design.

Practical Problems in VLSI Physical Design AutomationSpringer Science & Business Media

Learn the basic properties and designs of modern VLSI devices, as well as the factors affecting performance, with this thoroughly updated second edition. The first edition has been widely adopted as a standard textbook in microelectronics in many major US universities and worldwide. The internationally renowned authors highlight the intricate interdependencies and subtle trade-offs between various practically important device parameters, and provide an in-depth discussion of device scaling and scaling limits of CMOS and bipolar devices. Equations and parameters provided are checked continuously against the reality of silicon data, making the book equally useful in practical transistor design and in the classroom. Every chapter has been updated to include the latest developments, such as MOSFET scale length theory, high-field transport model and SiGe-base bipolar devices.

Algorithms for VLSI Physical Design Automation

A Conceptual Taxonomy

Carbon Nanotube Based VLSI Interconnects

Complexity Issues in VLSI