



Regular Fabrics In Deep Submicron Integratedcircuit Design

Vassilis Paliouras



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EDA for IC Implementation, Circuit Design, and Process Technology Luciano Lavagno,Louis Scheffer,Grant Martin,2018-10-03 Presenting a comprehensive overview of the design automation algorithms tools and methodologies used to design integrated circuits the Electronic Design Automation for Integrated Circuits Handbook is available in two volumes The second volume EDA for IC Implementation Circuit Design and Process Technology thoroughly examines real time logic to GDSII a file format used to transfer data of semiconductor physical layout analog mixed signal design physical verification and technology CAD TCAD Chapters contributed by leading experts authoritatively discuss design for manufacturability at the nanoscale power supply network design and analysis design modeling and much more Save on the complete set

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Electronic Design Automation for IC Implementation, Circuit Design, and Process Technology Luciano Lavagno,Igor L. Markov,Grant Martin,Louis K. Scheffer,2017-02-03 The second of two volumes in the Electronic Design Automation for Integrated Circuits Handbook Second Edition Electronic Design Automation for IC Implementation Circuit Design and Process Technology thoroughly examines real time logic RTL to GDSII a file format used to transfer data of semiconductor physical layout design flow analog mixed signal design physical verification and technology computer aided design TCAD Chapters contributed by leading experts authoritatively discuss design for manufacturability

DFM at the nanoscale power supply network design and analysis design modeling and much more New to This Edition Major updates appearing in the initial phases of the design flow where the level of abstraction keeps rising to support more functionality with lower non recurring engineering NRE costs Significant revisions reflected in the final phases of the design flow where the complexity due to smaller and smaller geometries is compounded by the slow progress of shorter wavelength lithography New coverage of cutting edge applications and approaches realized in the decade since publication of the previous edition these are illustrated by new chapters on 3D circuit integration and clock design Offering improved depth and modernity Electronic Design Automation for IC Implementation Circuit Design and Process Technology provides a valuable state of the art reference for electronic design automation EDA students researchers and professionals

Cross-Talk Noise Immune VLSI Design Using Regular Layout Fabrics Robert K. Brayton,Alberto L.

Sangiovanni-Vincentelli,2012-12-06 This book was motivated by the problems being faced with shrinking IC process feature sizes It is well known that as process feature sizes shrink a host of electrical problems like cross talk electromigration self heat etc are becoming important Cross talk is one of the major problems since it results in unpredictable design behavior In particular it can result in significant delay variation or signal integrity problems in a wire depending on the state of its neighboring wires Typical approaches to tackle the cross talk problem attempt to fix the problem once it is created In our approach we ensure that cross talk is eliminated by design The work described in this book attempts to take an outside the box view and propose a radically different design style This design style first imposes a fixed layout pattern or fabric on the integrated circuit and then embeds the circuit being implemented into this fabric The fabric is chosen carefully in order to eliminate the cross talk problem being faced in modem IC processes With our choice of fabric cross talk between adjacent wires on an IC is reduced by between one and two orders of magnitude In this way the fabric concept eliminates cross talk up front and by design We propose two separate design flows each of which uses the fabric concept to implement logic The first flow uses fabric compliant standard cells as an im plementation vehicle We call these cells fabric cells and they have the same logic functionality as existing standard cells with which they are compared Interconnect-Centric Design for

Advanced SOC and NOC Jari Nurmi,H. Tenhunen,J. Isoaho,Axel Jantsch,2006-03-20 In Interconnect centric Design for Advanced SoC and NoC we have tried to create a comprehensive understanding about on chip interconnect characteristics design methodologies layered views on different abstraction levels and finally about applying the interconnect centric design in system on chip design Traditionally on chip communication design has been done using rather ad hoc and informal approaches that fail to meet some of the challenges posed by next generation SOC designs such as performance and throughput power and energy reliability predictability synchronization and management of concurrency To address these challenges it is critical to take a global view of the communication problem and decompose it along lines that make it more tractable We believe that a layered approach similar to that defined by the communication networks community should also

be used for on chip communication design The design issues are handled on physical and circuit layer logic and architecture layer and from system design methodology and tools point of view Formal communication modeling and refinement is used to bridge the communication layers and network centric modeling of multiprocessor on chip networks and socket based design will serve the development of platforms for SoC and NoC integration Interconnect centric Design for Advanced SoC and NoC is concluded by two application examples interconnect and memory organization in SoCs for advanced set top boxes and TV and a case study in NoC platform design for more generic applications

Electronic Design Automation Laung-Terng Wang, Yao-Wen Chang, Kwang-Ting (Tim) Cheng, 2009-03-11 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

On-Chip Communication Architectures Sudeep Pasricha, Nikil Dutt, 2010-07-28 Over the past decade system on chip SoC designs have evolved to address the ever increasing complexity of applications fueled by the era of digital convergence Improvements in process technology have effectively shrunk board level components so they can be integrated on a single chip New on chip communication architectures have been designed to support all inter component communication in a SoC design These communication architecture fabrics have a critical impact on the power consumption performance cost and design cycle time of modern SoC designs As application complexity strains the communication backbone of SoC designs academic and industrial R D efforts and dollars are increasingly focused on communication architecture design On Chip Communication Architectures is a comprehensive reference on concepts research and trends in on chip communication architecture design It will provide readers with a comprehensive survey not available elsewhere of all current standards for on chip communication architectures A definitive guide to on chip communication architectures explaining key concepts surveying research efforts and predicting future trends Detailed analysis of all popular standards for on chip communication architectures Comprehensive survey of all research on communication architectures covering a wide range of topics relevant to this area spanning the past several years and up to date with the most current research efforts Future trends that will have a significant impact on research and design of communication architectures over the next

several years Regular Nanofabrics in Emerging Technologies M. Haykel Ben Jamaa, 2011-03-24 Regular Nanofabrics in Emerging Technologies gives a deep insight into both fabrication and design aspects of emerging semiconductor technologies that represent potential candidates for the post CMOS era Its approach is unique across different fields and it offers a synergetic view for a public of different communities ranging from technologists to circuit designers and computer scientists The book presents two technologies as potential candidates for future semiconductor devices and systems and it shows how fabrication issues can be addressed at the design level and vice versa The reader either for academic or research purposes will find novel material that is explained carefully for both experts and non initiated readers Regular Nanofabrics in Emerging Technologies is a survey of post CMOS technologies It explains processing circuit and system level design for people with various backgrounds **Minimizing and Exploiting Leakage in VLSI Design** Nikhil Jayakumar, Suganth Paul, Rajesh Garg, 2009-12-02 Power consumption of VLSI Very Large Scale Integrated circuits has been growing at an alarmingly rapid rate This increase in power consumption coupled with the increasing demand for portable hand held electronics has made power consumption a dominant concern in the design of VLSI circuits today Traditionally dynamic switching power has dominated the total power consumption of an IC However due to current scaling trends leakage power has now become a major component of the total power consumption in VLSI circuits Leakage power reduction is especially important in portable hand held electronics such as cell phones and PDAs This book presents two techniques aimed at reducing leakage power in digital VLSI ICs The first technique reduces leakage through the selective use of high threshold voltage sleep transistors The second technique reduces leakage by applying the optimal Reverse Body Bias RBB voltage This book also shows readers how to turn the leakage problem into an opportunity through the use of sub threshold logic

Proceedings, 2007 **Embedded Systems** Krzysztof Iniewski, 2012-10-26 Covers the significant embedded computing technologies highlighting their applications in wireless communication and computing power An embedded system is a computer system designed for specific control functions within a larger system often with real time computing constraints It is embedded as part of a complete device often including hardware and mechanical parts Presented in three parts Embedded Systems Hardware Design and Implementation provides readers with an immersive introduction to this rapidly growing segment of the computer industry Acknowledging the fact that embedded systems control many of today s most common devices such as smart phones PC tablets as well as hardware embedded in cars TVs and even refrigerators and heating systems the book starts with a basic introduction to embedded computing systems It hones in on system on a chip SoC multiprocessor system on chip MPSoC and network on chip NoC It then covers on chip integration of software and custom hardware accelerators as well as fabric flexibility custom architectures and the multiple I O standards that facilitate PCB integration Next it focuses on the technologies associated with embedded computing systems going over the basics of field programmable gate array FPGA digital signal processing DSP and application specific integrated circuit ASIC technology

architectural support for on chip integration of custom accelerators with processors and O S support for these systems Finally it offers full details on architecture testability and computer aided design CAD support for embedded systems soft processors heterogeneous resources and on chip storage before concluding with coverage of software support in particular O S Linux Embedded Systems Hardware Design and Implementation is an ideal book for design engineers looking to optimize and reduce the size and cost of embedded system products and increase their reliability and performance

Interconnect Technology and Design for Gigascale Integration Jeffrey A. Davis, James D. Meindl, 2012-12-06 Interconnect Technology and Design for Gigascale Integration is the cumulative effort from academic researchers at Georgia Tech MIT and Stanford as well as from industry researchers at IBM T J Watson Research Center LSI Logic and SUN microsystems The material found in this book is unique in that it spans IC interconnect topics ranging from IBM s revolutionary copper process to an in depth exploration into interconnect aware computer architectures This broad swath of topics presented by leaders in the research field is intended to provide a comprehensive perspective on interconnect technology and design issues so that the reader will understand the implications of the semiconductor industry s next substantial milestone gigascale integration

Integrated Circuit and System Design. Power and Timing Modeling, Optimization and Simulation Vassilis Paliouras, 2005-09-06 This book constitutes the refereed proceedings of the 15th International Workshop on Power and Timing Optimization and Simulation PATMOS 2005 held in Leuven Belgium in September 2005 The 74 revised full papers presented were carefully reviewed and selected from numerous submissions The papers are organized in topical sections on low power processors code optimization for low power high level design telecommunications and signal processing low power circuits system on chip design busses and interconnections modeling design automation low power techniques memory and register files applications digital circuits and analog and physical design

Integrated Optical Interconnect Architectures for Embedded Systems Ian O'Connor, Gabriela Nicolescu, 2012-11-07 This book provides a broad overview of current research in optical interconnect technologies and architectures Introductory chapters on high performance computing and the associated issues in conventional interconnect architectures and on the fundamental building blocks for integrated optical interconnect provide the foundations for the bulk of the book which brings together leading experts in the field of optical interconnect architectures for data communication Particular emphasis is given to the ways in which the photonic components are assembled into architectures to address the needs of data intensive on chip communication and to the performance evaluation of such architectures for specific applications

Three-dimensional Integrated Circuit Design Vasilis F. Pavlidis, Eby G. Friedman, 2010-07-28 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

Field Programmable Logic and Applications Peter Y.K. Cheung, Georg A. Constantinides, Jose T. de Sousa, 2003-10-02 This book contains the papers presented at the 13th International Workshop on Field Programmable Logic and Applications FPL held on September 1 3 2003 The conference was hosted by the Institute for Systems and Computer Engineering Research and Development of Lisbon INESC ID and the Department of Electrical and Computer Engineering of the IST Technical University of Lisbon Portugal The FPL series of conferences was founded in 1991 at Oxford University UK and has been held annually since in Oxford 3 times Vienna Prague Darmstadt London Tallinn Glasgow Villach Belfast and Montpellier It brings together academic researchers industrial experts users and newcomers in an formal welcoming atmosphere that encourages productive exchange of ideas and knowledge between delegates Exciting advances in field programmable logic show no sign of slowing down New grounds have been broken in architectures design techniques run time configuration and applications of field programmable devices in several different areas Many of these innovations are reported in this volume The size of FPL conferences has grown significantly over the years FPL in 2002 saw 214 papers submitted representing an increase of 83% when compared to the year before The interest and support for FPL in the programmable logic community continued this year with 216 papers submitted The technical program was assembled from 90 selected regular papers and 56 posters resulting in this volume of proceedings The program also included three invited plenary keynote presentations from LSI Logic Xilinx and Cadence and three industrial tutorials from Altera Mentor Graphics and Daffa

American Book Publishing Record, 2004 *Network-on-Chip Architectures* Chrysostomos Nicopoulos, Vijaykrishnan Narayanan, Chita R. Das, 2009-09-18 2 The Cell Processor from Sony Toshiba and IBM STI 3 and the Sun UltraSPARC T1 formerly codenamed Niagara 4 signal the growing popularity of such systems Furthermore Intel's very recently announced 80 core TeraFLOP chip 5 exemplifies the irreversible march toward many core systems with tens or even hundreds of processing elements 1 2 The Dawn of the Communication Centric Revolution The multi core thrust has ushered the gradual displacement of the computation centric design model by a more communication centric approach 6 The large

sophisticated monolithic modules are giving way to several smaller simpler processing elements working in tandem This trend has led to a surge in the popularity of multi core systems which typically manifest themselves in two distinct incarnations heterogeneous Multi Processor Systems on Chip MPSoC and homogeneous Chip Multi Processors CMP The SoC philosophy revolves around the technique of Platform Based Design PBD 7 which advocates the reuse of Intellectual Property IP cores in flexible design templates that can be customized accordingly to satisfy the demands of particular implementations The appeal of such a modular approach lies in the substantially reduced Time To Market TTM incubation period which is a direct outcome of lower circuit complexity and reduced design effort The whole system can now be viewed as a diverse collection of pre existing IP components integrated on a single die

Signal Integrity Effects in Custom IC and ASIC Designs

Raminderpal Singh,2001-12-12 offers a tutorial guide to IC designers who want to move to the next level of chip design by unlocking the secrets of signal integrity Jake Buurma Senior Vice President Worldwide Research Development Cadence Design Systems Inc Covers signal integrity effects in high performance Radio Frequency RF IC Brings together research papers from the past few years that address the broad range of issues faced by IC designers and CAD managers now and in the future A Wiley IEEE Press publication

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