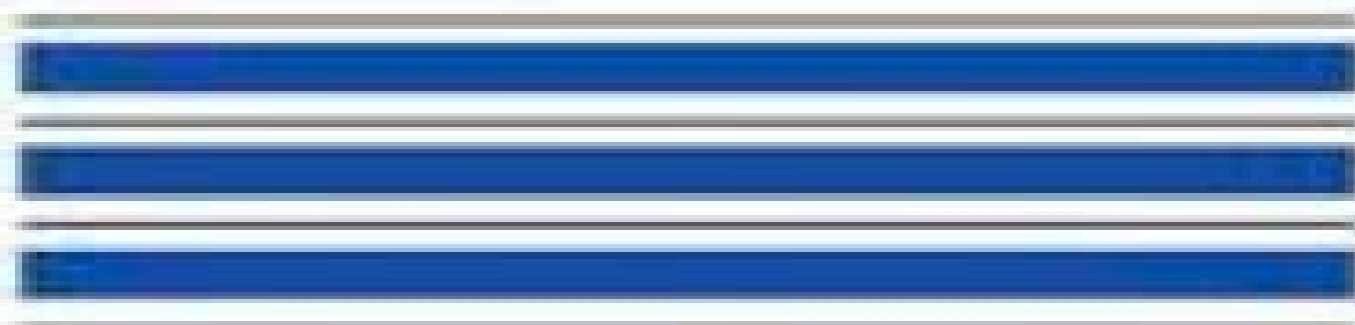

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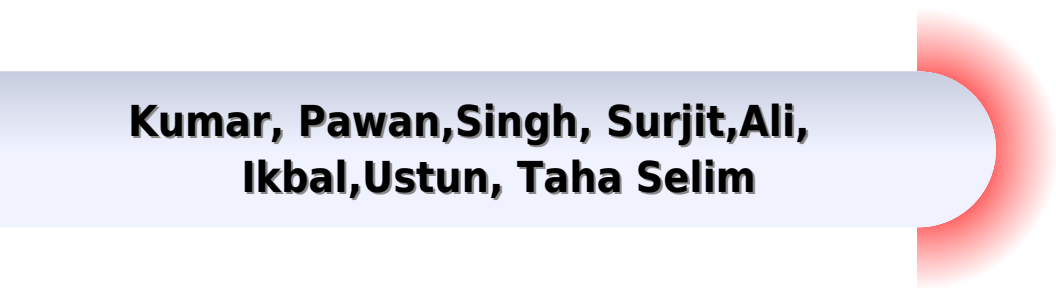
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Algorithmic And Register Transfer Level Synthesis The System Architects Workbench

**Kumar, Pawan, Singh, Surjit, Ali,
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Algorithmic And Register Transfer Level Synthesis The System Architects Workbench:

Algorithmic and Register-Transfer Level Synthesis: The System Architect's Workbench Donald E. Thomas, Elizabeth D. Lagnese, Robert A. Walker, Jayanth V. Rajan, Robert L. Blackburn, John A. Nestor, 1989-10-31 Recently there has been increased interest in the development of computer aided design programs to support the system level designer of integrated circuits more actively Such design tools hold the promise of raising the level of abstraction at which an integrated circuit is designed thus releasing the current designers from many of the details of logic and circuit level design The promise further suggests that a whole new group of designers in neighboring engineering and science disciplines with far less understanding of integrated circuit design will also be able to increase their productivity and the functionality of the systems they design This promise has been made repeatedly as each new higher level of computer aided design tool is introduced and has repeatedly fallen short of fulfillment This book presents the results of research aimed at introducing yet higher levels of design tools that will inch the integrated circuit design community closer to the fulfillment of that promise

1 1 SYNTHESIS OF INTEGRATED CIRCUITS In the integrated circuit design process a behavior that meets certain specifications is conceived for a system the behavior is used to produce a design in terms of a set of structural logic elements and these logic elements are mapped onto physical units The design process is impacted by a set of constraints as well as technological information i e the logic elements and physical units used for the design

Algorithmic and Register-Transfer Level Synthesis: The System Architect's Workbench Donald E. Thomas, Elizabeth D. Lagnese, Robert A. Walker, Jayanth V. Rajan, Robert L. Blackburn, John A. Nestor, 2011-09-16 Recently there has been increased interest in the development of computer aided design programs to support the system level designer of integrated circuits more actively Such design tools hold the promise of raising the level of abstraction at which an integrated circuit is designed thus releasing the current designers from many of the details of logic and circuit level design The promise further suggests that a whole new group of designers in neighboring engineering and science disciplines with far less understanding of integrated circuit design will also be able to increase their productivity and the functionality of the systems they design This promise has been made repeatedly as each new higher level of computer aided design tool is introduced and has repeatedly fallen short of fulfillment This book presents the results of research aimed at introducing yet higher levels of design tools that will inch the integrated circuit design community closer to the fulfillment of that promise

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Algorithmic and Register-Transfer Level Synthesis: The System Architect's Workbench Donald E. Thomas, Elizabeth D. Lagnese, Robert A. Walker, Jayanth V. Rajan, Robert L. Blackburn, John A. Nestor, 2012-12-06 Recently

there has been increased interest in the development of computer aided design programs to support the system level designer of integrated circuits more actively. Such design tools hold the promise of raising the level of abstraction at which an integrated circuit is designed thus releasing the current designers from many of the details of logic and circuit level design. The promise further suggests that a whole new group of designers in neighboring engineering and science disciplines with far less understanding of integrated circuit design will also be able to increase their productivity and the functionality of the systems they design. This promise has been made repeatedly as each new higher level of computer aided design tool is introduced and has repeatedly fallen short of fulfillment. This book presents the results of research aimed at introducing yet higher levels of design tools that will inch the integrated circuit design community closer to the fulfillment of that promise.

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A Survey of High-Level Synthesis Systems Robert A. Walker, Raul Camposano, 2012-12-06 After long years of work that have seen little industrial application high level synthesis is finally on the verge of becoming a practical tool. The state of high level synthesis today is similar to the state of logic synthesis ten years ago. At present logic synthesis tools are widely used in digital system design. In the future high level synthesis will play a key role in mastering design complexity and in truly exploiting the potential of ASICs and PLDs which demand extremely short design cycles. Work on high level synthesis began over twenty years ago. Since substantial progress has been made in understanding the basic then problems involved although no single universally accepted theoretical framework has yet emerged. There is a growing number of publications devoted to high level synthesis specialized workshops are held regularly and tutorials on the topic are commonly held at major conferences. This book gives an extensive survey of the research and development in high level synthesis. In Part I a short tutorial explains the basic concepts used in high level synthesis and follows an example design throughout the synthesis process. In Part II current high level synthesis systems are surveyed.

Theorem Proving in Higher Order Logics Jim Grundy, Malcolm Newey, 1998-09-09 This book constitutes the refereed proceedings of the 11th International Conference on Theorem Proving in Higher Order Logics TPHOLs 98 held in Canberra Australia in September October 1998. The 26 revised full papers presented were carefully reviewed and selected from a total of 52 submissions. Also included are two invited papers. The papers address all current aspects of theorem proving in higher order logics and formal verification and program analysis. Besides the HOL system the theorem provers Coq Isabelle LAMBDA LEGO NuPrl and PVS are discussed.

The Synthesis Approach to Digital System Design Petra Michel, Ulrich Lauther, Peter Duzy, 2012-12-06 Over the past decade there has been a dramatic change in the role played by design automation for electronic systems. Ten years ago integrated circuit IC designers were content to

use the computer for circuit logic and limited amounts of high level simulation as well as for capturing the digitized mask layouts used for IC manufacture The tools were only aids to design the designer could always find a way to implement the chip or board manually if the tools failed or if they did not give acceptable results Today however design technology plays an indispensable role in the design of electronic systems and is critical to achieving time to market cost and performance targets In less than ten years designers have come to rely on automatic or semi automatic CAD systems for the physical design of complex ICs containing over a million transistors In the past three years practical logic synthesis systems that take into account both cost and performance have become a commercial reality and many designers have already relinquished control of the logic netlist level of design to automatic computer aids To date only in certain well defined areas especially digital signal processing and telecommunications have higher level design methods and tools found significant success However the forces of time to market and growing system complexity will demand the broad based adoption of high level automated methods and tools over the next few years

Encyclopedia of Computer Science and Technology Allen Kent, James G. Williams, 1993-04-05 This comprehensive reference work provides immediate fingertip access to state of the art technology in nearly 700 self contained articles written by over 900 international authorities Each article in the Encyclopedia features current developments and trends in computers software vendors and applications extensive bibliographies of leading figures in the field such as Samuel Alexander John von Neumann and Norbert Wiener and in depth analysis of future directions

Security and Fault Tolerance in Internet of Things Rajat Subhra Chakraborty, Jimson Mathew, Athanasios V. Vasilakos, 2018-12-13 This book covers various aspects of security privacy and reliability in Internet of Things IoT and Cyber Physical System design analysis and testing In particular various established theories and practices both from academia and industry are presented and suitably organized targeting students engineers and researchers Fifteen leading academicians and practitioners wrote this book pointing to the open problems and biggest challenges on which research in the near future will be focused

High-Level VLSI Synthesis Raul Camposano, Wayne Wolf, 2012-12-06 The time has come for high level synthesis When research into synthesizing hardware from abstract program like descriptions started in the early 1970 s there was no automated path from the register transfer design produced by high level synthesis to a complete hardware implementation As a result it was very difficult to measure the effectiveness of high level synthesis methods it was also hard to justify to users the need to automate architecture design when low level design had to be completed manually Today s more mature CAD techniques help close the gap between an automatically synthesized design and a manufacturable design Market pressures encourage designers to make use of any and all automated tools Layout synthesis logic synthesis and specialized datapath generators make it feasible to quickly implement a register transfer design in silicon leaving designers more time to consider architectural improvements As IC design becomes more automated customers are increasing their demands today s leading edge designers using logic synthesis systems are training themselves to be tomorrow s consumers

of high level synthesis systems The need for very fast turnaround a competitive fabrication market Which makes small quantity ASIC manufacturing possible and the ever growing complexity of the systems being designed all make higher level design automation inevitable

Graphs in VLSI Rasul Bairamkulov, Eby G. Friedman, 2022-11-28 Networks are pervasive Very large scale integrated VLSI systems are no different consisting of dozens of interconnected subsystems hundreds of modules and many billions of transistors and wires Graph theory is crucial for managing and analyzing these systems In this book VLSI system design is discussed from the perspective of graph theory Starting from theoretical foundations the authors uncover the link connecting pure mathematics with practical product development This book not only provides a review of established graph theoretic practices but also discusses the latest advancements in graph theory driving modern VLSI technologies covering a wide range of design issues such as synchronization power network models and analysis and interconnect routing and synthesis Provides a practical introduction to graph theory in the context of VLSI systems engineering Reviews comprehensively graph theoretic methods and algorithms commonly used during VLSI product development process Includes a review of novel graph theoretic methods and algorithms for VLSI system design

The Codesign of Embedded Systems: A Unified Hardware/Software Representation Sanjaya Kumar, James H. Aylor, Barry W. Johnson, Wm.A. Wulf, 2012-12-06 Current practice dictates the separation of the hardware and software development paths early in the design cycle These paths remain independent with very little interaction occurring between them until system integration In particular hardware is often specified without fully appreciating the computational requirements of the software Also software development does not influence hardware development and does not track changes made during the hardware design phase Thus the ability to explore hardware software tradeoffs is restricted such as the movement of functionality from the software domain to the hardware domain and vice versa or the modification of the hardware software interface As a result problems that are encountered during system integration may require modification of the software and or hardware resulting in potentially significant cost increases and schedule overruns To address the problems described above a cooperative design approach one that utilizes a unified view of hardware and software is described This approach is called hardware software codesign The Codesign of Embedded Systems develops several fundamental hardware software codesign concepts and a methodology that supports them A unified representation referred to as a decomposition graph is presented which can be used to describe hardware or software using either functional abstractions or data abstractions Using a unified representation based on functional abstractions an abstract hardware software model has been implemented in a common simulation environment called ADEPT Advanced Design Environment Prototyping Tool This model permits early hardware software evaluation and tradeoff exploration Techniques have been developed which support the identification of software bottlenecks and the evaluation of design alternatives with respect to multiple metrics The application of the model is demonstrated on several examples A unified representation based on data abstractions is also explored This work leads to

investigations regarding the application of object oriented techniques to hardware design The Codeline of Embedded Systems A Unified Hardware Software Representation describes a novel approach to a topic of immense importance to CAD researchers and designers alike **Handbook of Research on Power and Energy System Optimization** Kumar,

Pawan,Singh, Surjit,Ali, Ikbai,Ustun, Taha Selim,2018-03-16 In recent years the development of advanced structures for providing sustainable energy has been a topic at the forefront of public and political conversation Many are looking for advancements on pre existing sources and new and viable energy options to maintain a modern lifestyle The Handbook of Research on Power and Energy System Optimization is a critical scholarly resource that examines the usage of energy in relation to the perceived standard of living within a country and explores the importance of energy structure augmentation Featuring coverage on a wide range of topics including energy management micro grid and distribution generation this publication is targeted towards researchers academicians and students seeking relevant research on the augmentation of current energy structures to support existing standards of living Embedded System Design Daniel D. Gajski,Samar

Abdi,Andreas Gerstlauer,Gunar Schirner,2009-08-14 Embedded System Design Modeling Synthesis and Verification introduces a model based approach to system level design It presents modeling techniques for both computation and communication at different levels of abstraction such as specification transaction level and cycle accurate level It discusses synthesis methods for system level architectures embedded software and hardware components Using these methods designers can develop applications with high level models which are automatically translatable to low level implementations This book furthermore describes simulation based and formal verification methods that are essential for achieving design confidence The book concludes with an overview of existing tools along with a design case study outlining the practice of embedded system design Specifically this book addresses the following topics in detail System modeling at different abstraction levels Model based system design Hardware Software codesign Software and Hardware component synthesis System verification This book is for groups within the embedded system community students in courses on embedded systems embedded application developers system designers and managers CAD tool developers design automation and system engineering **Co-Design for System Acceleration** Nadia Nedjah,Luiza Mourelle,2007-05-17 In this book we are concerned with studying the co design methodology in general and how to determine the more suitable interface mechanism in a co design system in particular This will be based on the characteristics of the application and those of the target architecture of the system We provide guidelines to support the designer s choice of the interface mechanism **System**

Level Hardware/Software Co-Design Joris van den Hurk,Jochen A.G. Jess,2013-04-17 Hierarchical design methods were originally introduced for the design of digital ICs and they appeared to provide for significant advances in design productivity Time to Market and first time right design These concepts have gained increasing importance in the semiconductor industry in recent years In the course of time the supportive quality of hierarchical methods and their advantages were confirmed

System Level Hardware Software Co design An Industrial Approach demonstrates the applicability of hierarchical methods to hardware software codesign and mixed analogue digital design following a similar approach Hierarchical design methods provide for high levels of design support both in a qualitative and a quantitative sense In the qualitative sense the presented methods support all phases in the product life cycle of electronic products ranging from requirements analysis to application support Hierarchical methods furthermore allow for efficient digital hardware design hardware software codesign and mixed analogue digital design on the basis of commercially available formalisms and design tools In the quantitative sense hierarchical methods have prompted a substantial increase in design productivity System Level Hardware Software Co design An Industrial Approach reports on a six year study during which time the number of square millimeters of normalized complexity an individual designer contributed every week rose by more than a factor of five Hierarchical methods therefore enabled designers to keep track of the ever increasing design complexity while effectively reducing the number of design iterations in the form of redesigns System Level Hardware Software Co design An Industrial Approach is the first book to provide a comprehensive coherent system design methodology that has been proven to increase productivity in industrial practice The book will be of interest to all managers designers and researchers working in the semiconductor industry

Fundamentals and Standards in Hardware Description Languages Jean Mermet, 2012-12-06 The second half of this century will remain as the era of proliferation of electronic computers They did exist before but they were mechanical During next century they may perform other mutations to become optical or molecular or even biological Actually all these aspects are only fancy dresses put on mathematical machines This was always recognized to be true in the domain of software where machine or high level languages are more or less rigorous but immaterial variations of the universally accepted mathematical language aimed at specifying elementary operations functions algorithms and processes But even a mathematical machine needs a physical support and this is what hardware is all about The invention of hardware description languages HDL s in the early 60 s was an attempt to stay longer at an abstract level in the design process and to push the stage of physical implementation up to the moment when no more technology independent decisions can be taken It was also an answer to the continuous exponential growth of complexity of systems to be designed This problem is common to hardware and software and may explain why the syntax of hardware description languages has followed with a reasonable delay of ten years the evolution of the programming languages at the end of the 60 s they were Algol like a decade later Pascal like and now they are C or ADA like They have also integrated the new concepts of advanced software specification languages

Low-Noise Wide-Band Amplifiers in Bipolar and CMOS Technologies Zhong Yuan Chong, Willy M.C. Sansen, 2013-03-09 Analog circuit design has grown in importance because so many circuits cannot be realized with digital techniques Examples are receiver front ends particle detector circuits etc Actually all circuits which require high precision high speed and low power consumption need analog solutions High precision also needs low noise Much has been written

already on low noise design and optimization for low noise Very little is available however if the source is not resistive but capacitive or inductive as is the case with antennas or semiconductor detectors This book provides design techniques for these types of optimization This book is thus intended firstly for engineers on senior or graduate level who have already designed their first operational amplifiers and want to go further It is especially for engineers who do not want just a circuit but the best circuit Design techniques are given that lead to the best performance within a certain technology Moreover this is done for all important technologies such as bipolar CMOS and BiCMOS Secondly this book is intended for engineers who want to understand what they are doing The design techniques are intended to provide insight In this way the design techniques can easily be extended to other circuits as well Also the design techniques form a first step towards design automation Thirdly this book is intended for analog design engineers who want to become familiar with both bipolar and CMOS technologies and who want to learn more about which transistor to choose in BiCMOS Iterative Identification and

Restoration of Images Reginald L. Lagendijk, Jan Biemond, 2012-12-06 One of the most intriguing questions in image processing is the problem of recovering the desired or perfect image from a degraded version In many instances one has the feeling that the degradations in the image are such that relevant information is close to being recognizable if only the image could be sharpened just a little This monograph discusses the two essential steps by which this can be achieved namely the topics of image identification and restoration More specifically the goal of image identification is to estimate the properties of the imperfect imaging system blur from the observed degraded image together with some statistical characteristics of the noise and the original uncorrupted image On the basis of these properties the image restoration process computes an estimate of the original image Although there are many textbooks addressing the image identification and restoration problem in a general image processing setting there are hardly any texts which give an indepth treatment of the state of the art in this field This monograph discusses iterative procedures for identifying and restoring images which have been degraded by a linear spatially invariant blur and additive white observation noise As opposed to non iterative methods iterative schemes are able to solve the image restoration problem when formulated as a constrained and spatially variant optimization problem In this way restoration results can be obtained which outperform the less results of conventional restoration filters **Synchronization Design for Digital Systems** Teresa H. Meng, 2012-12-06 Synchronization is one of

the important issues in digital system design While other approaches have always been intriguing up until now synchronous operation using a common clock has been the dominant design philosophy However we have reached the point with advances in technology where other options should be given serious consideration This is because the clock periods are getting much smaller in relation to the interconnect propagation delays even within a single chip and certainly at the board and backplane level To a large extent this problem can be overcome with careful clock distribution in synchronous design and tools for computer aided design of clock distribution However this places global constraints on the design making it

necessary for example to redesign the clock distribution each time any part of the system is changed In this book some alternative approaches to synchronization in digital system design are described and developed We owe these techniques to a long history of effort in both digital system design and in digital communications the latter field being relevant because large propagation delays have always been a dominant consideration in design While synchronous design is discussed and contrasted to the other techniques in Chapter 6 the dominant theme of this book is alternative approaches

High Level Synthesis of ASICs under Timing and Synchronization Constraints David C. Ku, Giovanni DeMicheli, 2013-03-14

Computer aided synthesis of digital circuits from behavioral level specifications offers an effective means to deal with increasing complexity of digital hardware design High Level Synthesis of ASICs Under Timing and Synchronization Constraints addresses both theoretical and practical aspects in the design of a high level synthesis system that transforms a behavioral level description of hardware to a synchronous logic level implementation consisting of logic gates and registers High Level Synthesis of ASICs Under Timing and Synchronization Constraints addresses specific issues in applying high level synthesis techniques to the design of ASICs This complements previous results achieved in synthesis of general purpose and signal processors where data path design is of utmost importance In contrast ASIC designs are often characterized by complex control schemes to support communication and synchronization with the environment The combined design of efficient data path control unit is the major contribution of this book Three requirements are important in modeling ASIC designs concurrency external synchronization and detailed timing constraints The objective of the research work presented here is to develop a hardware model incorporating these requirements as well as synthesis algorithms that operate on this hardware model The contributions of this book address both the theory and the implementation of algorithm for hardware synthesis

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