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Bicmos Technology And Applications 2nd Edition The Springer International Series In Engineering And Computer Science

BiCMOS Inverters and improvements by G I SumaLata Skal 45 - CMOS or BiCMOS Process Technology \"Portable \u0026 Scalable High Voltage Circuits for Automotive Applications in BiCMOS Processes\" BiCMOS inverter | Circuit Diagram | BiPolar + CMOS | VLSI | Lec-21 S10-E3_Compound Semiconductors webinar series_SiGe BiCMOS technologies and PDKs for RF applications Lecture 30 BiCMOS Driver;BiCMOS 32-bit Adder S3-E3 - SiGe BiCMOS \u0026 Photonic BiCMOS Technologies for high speed fiber optics systems BiCMOS inverter @ExploretheWAY Electrostatic Discharge (ESD) Protection of Consumer Electronics: Challenges and Solutions Can Quantum Computers be Made From Novel 2D Materials? Girls Hostel Madness[\u2764] #shorts #short #girls #hostellife BiCMOS Amplifier The Ultimate e-ink review for note takers - Remarkable 2, Kindle Scribe, Boox Note Air3 C and more.. Salsa Night in IIT Bombay #shorts #salsa #dance #iit #iitbombay #motivation #trending #viral #jee CMOS Inverter Cosplay by b.tech final year at IIT Kharagpur An Introduction to VLSI Design|| IC Fabrication Process||IC Technologies||MOS Transistor-Types-Modes Asking MIT students their major A Unified Formalism for Exact Timing Analysis Circuit Design, Comparative Study, and Sensitivity Analysis Silicon Heterostructure Handbook Fabrication of SiGe HBT BiCMOS Technology Timed Boolean Functions Analog Device-Level Layout Automation A Unified Approach for Microelectronics Systems Manufacturing & Software Development Multigrid Methods for Process Simulation Asymptotic Waveform Evaluation BiCMOS Technology and Applications And Moment Matching for Interconnect Analysis Systems-Level Packaging for Millimeter-Wave Transceivers Wave Pipelining: Theory and CMOS Implementation A Hybrid Approach High-Performance Realizations in BiCMOS

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Technology
And
Applications
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RIVERA HARPER

A Unified Formalism for Exact Timing Analysis
Springer Science & Business Media
Advances in the state of the art mean the signal processing ICs of ever-increasing complexity are being introduced. While the typical portion of a large IC devoted to analog circuits has diminished, the performance of those surviving analog signal processing circuits remains vital and their design challenging. Moreover, the emerging high-definition TV technology has created a new area for IC development, one with formidable signal processing requirements. The antialiasing filters needed for one proposed HDTV decoder motivated the research documented in this book. Sharply selective filters place tight constraints on the permitted excess phase shifts of their constituent circuits. Combined with stringent requirements for low distortion at video

frequencies, these constraints challenge the IC filter designer. Integrated Video-Frequency Continuous-Time Filters: High-Performance Realizations in BiCMOS deals with what is arguably the mainstay of analog signal processing circuits. Prominent applications in computer disk-drive read channels, video receivers, rf circuits, and antialiasing and reconstruction in data converters testifies to their importance. Moreover, they are excellent benchmarks for more general analog signal processors. Bipolar and MOSFET transistors, freely combined at the lowest circuit levels, provide the designer with an opportunity to develop potent variations on the standard idioms. The book considers the general principles of BiCMOS circuit design, through to a demanding design problem. This case-study approach allows a concrete discussion of the justification for and practical trade-offs of each design decision. Audience: A reference work for experienced IC designers and a text for advanced IC design students.

Circuit Design, Comparative Study, and

Sensitivity Analysis
Springer Science & Business Media
Silicon-On-Insulator (SOI) CMOS technology has been regarded as another major technology for VLSI in addition to bulk CMOS technology. Owing to the buried oxide structure, SOI technology offers superior CMOS devices with higher speed, high density, and reduced second order effects for deep-submicron low-voltage, low-power VLSI circuits applications. In addition to VLSI applications, and because of its outstanding properties, SOI technology has been used to realize communication circuits, microwave devices, BiCMOS devices, and even fiber optics applications. CMOS VLSI Engineering: Silicon-On-Insulator addresses three key factors in engineering SOI CMOS VLSI - processing technology, device modelling, and circuit designs are all covered with their mutual interactions. Starting from the SOI CMOS processing technology and the SOI CMOS digital and analog circuits, behaviors of the SOI CMOS devices are presented, followed by a CAD program, ST-SPICE, which incorporates models for deep-

submicron fully-depleted mesa-isolated SOI CMOS devices and special purpose SOI devices including polysilicon TFTs. CMOS VLSI Engineering: Silicon-On-Insulator is written for undergraduate senior students and first-year graduate students interested in CMOS VLSI. It will also be suitable for electrical engineering professionals interested in microelectronics.

Silicon Heterostructure Handbook Springer Science & Business Media BiCMOS Technology and Applications, Second Edition provides a synthesis of available knowledge about the combination of bipolar and MOS transistors in a common integrated circuit - BiCMOS. In this new edition all chapters have been updated and completely new chapters on emerging topics have been added. In addition, BiCMOS Technology and Applications, Second Edition provides the reader with a knowledge of either CMOS or Bipolar technology/design a reference with which they can make educated decisions regarding the viability of BiCMOS in their own application. BiCMOS Technology and Applications, Second Edition is vital reading for

practicing integrated circuit engineers as well as technical managers trying to evaluate business issues related to BiCMOS. As a textbook, this book is also appropriate at the graduate level for a special topics course in BiCMOS. A general knowledge in device physics, processing and circuit design is assumed. Given the division of the book, it lends itself well to a two-part course; one on technology and one on design. This will provide advanced students with a good understanding of tradeoffs between bipolar and MOS devices and circuits.

Fabrication of SiGe HBT BiCMOS Technology Springer Science & Business Media Designing VLSI systems represents a challenging task. It is a transfunction among different specifications corresponding to different levels of design: abstraction, behavioral, structural and physical. The behavioral level describes the functionality of the design. It consists of two components; static and dynamic. The static component describes operations, whereas the dynamic component describes sequencing and

timing. The structural level contains information about components, control and connectivity. The physical level describes the constraints that should be imposed on the floor plan, the placement of components, and the geometry of the design. Constraints of area, speed and power are also applied at this level. To implement such multilevel transfunction, a design methodology should be devised, taking into consideration the constraints, limitations and properties of each level. The mapping process between any of these domains is non-isomorphic. A single behavioral component may be transfunctioned into more than one structural component. Design methodologies are the most recent evolution in the design automation era, which started off with the introduction and subsequent usage of module generation especially for regular structures such as PLA's and memories. A design methodology should offer an integrated design system rather than a set of separate unrelated routines and tools. A general outline of a desired integrated design

system is as follows: * Decide on a certain unified framework for all design levels. * Derive a design method based on this framework. * Create a design environment to implement this design method.

Timed Boolean

Functions Oxford

University Press, USA

The book gives a comprehensive coverage of ICs and can be divided into three parts. The first deals with processing, component formation, and device modelling. The second part covers digital and analogue circuits, including semiconductor memories, with performance summaries of commercial products. The final part explains the nature of application specific integrated circuits (ASICs), and the ASIC design process. The final chapter covers VLSI scaling and the dominant role of interconnections in the scaling process. The text caters for many engineers and scientists who need to have a grasp of IC capabilities and ASIC design rooted in an appreciation of processing, device, behaviour, and circuit practice.

ANALOG DEVICE-LEVEL

LAYOUT AUTOMATION

Springer Science & Business Media

No matter how you slice it, semiconductor devices power the communications revolution. Skeptical? Imagine for a moment that you could flip a switch and instantly remove all the integrated circuits from planet Earth. A moment's reflection would convince you that there is not a single field of human endeavor that would not come to a grinding halt, be it commerce, agriculture, education, medicine, or entertainment. Life, as we have come to expect it, would simply cease to exist. Drawn from the comprehensive and well-reviewed Silicon Heterostructure Handbook, this volume covers SiGe circuit applications in the real world. Edited by John D. Cressler, with contributions from leading experts in the field, this book presents a broad overview of the merits of SiGe for emerging communications systems. Coverage spans new techniques for improved LNA design, RF to millimeter-wave IC design, SiGe MMICs, SiGe Millimeter-Wave ICs, and

wireless building blocks using SiGe HBTs. The book provides a glimpse into the future, as envisioned by industry leaders.

A UNIFIED APPROACH FOR MICROELECTRONICS SYSTEMS MANUFACTURING & SOFTWARE DEVELOPMENT

World Scientific

Metal Oxide

Semiconductor (MOS)

transistors are the basic

building block of MOS

integrated circuits (IC).

Very Large Scale

Integrated (VLSI) circuits

using MOS technology

have emerged as the

dominant technology in

the semiconductor

industry. Over the past

decade, the complexity of

MOS IC's has increased at

an astonishing rate. This

is realized mainly through

the reduction of MOS

transistor dimensions in

addition to the

improvements in

processing. Today VLSI

circuits with over 3 million

transistors on a chip, with

effective or electrical

channel lengths of 0.5

microns, are in volume

production. Designing

such complex chips is

virtually impossible

without simulation tools

which help to predict circuit behavior before actual circuits are fabricated. However, the utility of simulators as a tool for the design and analysis of circuits depends on the adequacy of the device models used in the simulator. This problem is further aggravated by the technology trend towards smaller and smaller device dimensions which increases the complexity of the models. There is extensive literature available on modeling these short channel devices. However, there is a lot of confusion too. Often it is not clear what model to use and which model parameter values are important and how to determine them. After working over 15 years in the field of semiconductor device modeling, I have felt the need for a book which can fill the gap between the theory and the practice of MOS transistor modeling. This book is an attempt in that direction.

Multigrid Methods for Process Simulation

Springer Science & Business Media

When you see a nicely presented set of data, the natural response is: "How did they do that; what tricks did they use; and

how can I do that for myself?" Alas, usually, you must simply keep wondering, since such tricks-of-the-trade are usually held close to the vest and rarely divulged. Shamefully ignored in the technical literature, measurement and modeling of high-speed semiconductor devices is a fine art. Robust measuring and modeling at the levels of performance found in modern SiGe devices requires extreme dexterity in the laboratory to obtain reliable data, and then a valid model to fit that data. Drawn from the comprehensive and well-reviewed Silicon Heterostructure Handbook, this volume focuses on measurement and modeling of high-speed silicon heterostructure devices. The chapter authors provide experience-based tricks-of-the-trade and the subtle nuances of measuring and modeling advanced devices, making this an important reference for the semiconductor industry. It includes easy-to-reference appendices covering topics such as the properties of silicon and germanium, the generalized Moll-Ross relations, the integral

charge-control model, and sample SiGe HBT compact model parameters.

**ASYMPTOTIC
WAVEFORM
EVALUATION**

Springer Science & Business Media

' A reprint of the classic text, this book popularized compact modeling of electronic and semiconductor devices and components for college and graduate-school classrooms, and manufacturing engineering, over a decade ago. The first comprehensive book on MOS transistor compact modeling, it was the most cited among similar books in the area and remains the most frequently cited today. The coverage is device-physics based and continues to be relevant to the latest advances in MOS transistor modeling. This is also the only book that discusses in detail how to measure device model parameters required for circuit simulations. The book deals with the MOS Field Effect Transistor (MOSFET) models that are derived from basic semiconductor theory. Various models are developed, ranging from simple to more

sophisticated models that take into account new physical effects observed in submicron transistors used in today's (1993) MOS VLSI technology. The assumptions used to arrive at the models are emphasized so that the accuracy of the models in describing the device characteristics are clearly understood. Due to the importance of designing reliable circuits, device reliability models are also covered. Understanding these models is essential when designing circuits for state-of-the-art MOS ICs. Contents:

Overview
 Review of Basic Semiconductor and pn Junction Theory
 MOS Transistor Structure and Operation
 MOS Capacitor
 Threshold Voltage
 MOSFET DC Model
 Dynamic Modeling
 Hot-Carrier Effects
 Data Acquisition and Model Parameter Measurements
 Model Parameter Extraction Using Optimization Method
 SPICE Diode and MOSFET Models and Their Parameters
 Statistical Modeling and Worst-Case Design Parameters
 Readership: Integrated circuit chip designers, device model developers and circuit simulators. ' *BiCMOS Technology and*

Applications Springer Science & Business Media
 The international market is very competitive for high-tech manufacturers to day. Achieving competitive quality and reliability for products requires leadership from the top, good management practices, effective and efficient operation and maintenance systems, and use of appropriate up-to-date engineering design tools and methods. Furthermore, manufacturing yield and reliability are interrelated. Manufacturing yield depends on the number of defects found during both the manufacturing process and the warranty period, which in turn determines the reliability. the production of microelectronics has evolved into Since the early 1970's, one of the world's largest manufacturing industries. As a result, an important agenda is the study of reliability issues in fabricating microelectronic products and consequently the systems that employ these products, particularly, the new generation of microelectronics. Such an agenda should include: • the economic impact of

employing the microelectronics fabricated by industry, • a study of the relationship between reliability and yield, • the progression toward miniaturization and higher reliability, and • the correctness and complexity of new system designs, which include a very significant portion of software.

AND MOMENT MATCHING FOR INTERCONNECT ANALYSIS

Prentice Hall
 The quest for higher performance digital systems for applications such as general purpose computing, signal/image processing, and telecommunications and an increasing cost consciousness have led to a major thrust for high speed VLSI systems implemented in inexpensive and widely available technologies such as CMOS. This monograph, based on the first author's doctoral dissertation, concentrates on the technique of wave pipelining as one method toward achieving this goal. The primary focus of this monograph is to provide a coherent presentation of the theory of

wave pipelined operation of digital circuits and to discuss practical design techniques for the realization of wave pipelined circuits in the CMOS technology. Wave pipelining can be applied to a variety of circuits for increased performance. For example, many architectures that support systolic computation lend themselves to wave pipelined realization. Also, the wave pipeline design methodology emphasizes the role of controlled clock skew in extracting enhanced performance from circuits that are not deeply pipelined. Wave pipelining (also known as maximal rate pipelining) is a timing methodology used in digital systems to increase the number of effective pipeline stages without increasing the number of physical registers in the pipeline. Using this technique, new data is applied to the inputs of a combinational logic block before the outputs due to previous inputs are available thus effectively pipelining the combinational logic and maximizing the utilization of the logic.

Systems-Level Packaging for Millimeter-Wave Transceivers CRC Press
Foreword Looking back the past 30 years. we

have seen steady progress made in the area of speech science and technology. I still remember the excitement in the late seventies when Texas Instruments came up with a toy named "Speak-and-Spell" which was based on a VLSI chip containing the state-of-the-art linear prediction synthesizer. This caused a speech technology fever among the electronics industry. Particularly, applications of automatic speech recognition were rigorously attempted by many companies. Some of which were start-ups founded just for this purpose. Unfortunately, it did not take long before they realized that automatic speech recognition technology was not mature enough to satisfy the need of customers. The fever gradually faded away. In the meantime, constant efforts have been made by many researchers and engineers to improve the automatic speech recognition technology. Hardware capabilities have advanced impressively since that time. In the past few years, we have been witnessing and experiencing the advent of the "Information Revolution." What might

be called the second surge of interest to commercialize speech technology as a natural interface for man-machine communication began in much better shape than the first one. With computers much more powerful and faster, many applications look realistic this time. However, there are still tremendous practical issues to be overcome in order for speech to be truly the most natural interface between humans and machines.

WAVE PIPELINING: THEORY AND CMOS IMPLEMENTATION

Springer Science & Business Media
This book comprehensively reviews the state of the art in millimeter-wave antennas, traces important recent developments and provides information on a wide range of antenna configurations and applications. While fundamental theoretical aspects are discussed whenever necessary, the book primarily focuses on design principles and concepts, manufacture, measurement techniques, and practical results. Each of the various antenna

types scalable to millimeter-wave dimensions is considered individually, with coverage of leaky-wave and surface-wave antennas, printed antennas, integrated antennas, and reflector and lens systems. The final two chapters address the subject from a systems perspective, providing an overview of supporting circuitry and examining in detail diverse millimeter-wave applications, including high-speed wireless communications, radio astronomy, and radar. The vast amount of information now available on millimeter-wave systems can be daunting for researchers and designers entering the field. This book offers readers essential guidance, helping them to gain a thorough understanding based on the most recent research findings and serving as a sound basis for informed decision-making.

A Hybrid Approach

BiCMOS Technology and Applications
This book describes the newest implementations of integrated photodiodes fabricated in nanometer standard CMOS technologies. It also includes the required

fundamentals, the state-of-the-art, and the design of high-performance laser drivers, transimpedance amplifiers, equalizers, and limiting amplifiers fabricated in nanometer CMOS technologies. This book shows the newest results for the performance of integrated optical receivers, laser drivers, modulator drivers and optical sensors in nanometer standard CMOS technologies. Nanometer CMOS technologies rapidly advanced, enabling the implementation of integrated optical receivers for high data rates of several Giga-bits per second and of high-pixel count optical imagers and sensors. In particular, low cost silicon CMOS optoelectronic integrated circuits became very attractive because they can be extensively applied to short-distance optical communications, such as local area network, chip-to-chip and board-to-board interconnects as well as to imaging and medical sensors.

High-Performance Realizations in BiCMOS

CRC Press
An extraordinary combination of material science, manufacturing processes, and innovative

thinking spurred the development of SiGe heterojunction devices that offer a wide array of functions, unprecedented levels of performance, and low manufacturing costs. While there are many books on specific aspects of Si heterostructures, the *Silicon Heterostructure Handbook: Materials, Fabrication, Devices, Circuits, and Applications of SiGe and Si Strained-Layer Epitaxy* is the first book to bring all aspects together in a single source. Featuring broad, comprehensive, and in-depth discussion, this handbook distills the current state of the field in areas ranging from materials to fabrication, devices, CAD, circuits, and applications. The editor includes "snapshots" of the industrial state-of-the-art for devices and circuits, presenting a novel perspective for comparing the present status with future directions in the field. With each chapter contributed by expert authors from leading industrial and research institutions worldwide, the book is unequalled not only in breadth of scope, but also in depth of coverage, timeliness of results, and authority of

references. It also includes a foreword by Dr. Bernard S. Meyerson, a pioneer in SiGe technology. Containing nearly 1000 figures along with valuable appendices, the Silicon Heterostructure Handbook authoritatively surveys materials, fabrication, device physics, transistor optimization, optoelectronics components, measurement, compact modeling, circuit design, and device simulation. Mixed-Mode Simulation and Analog Multilevel Simulation Springer Science & Business Media This proceedings volume archives the contributions of the speakers who attended the NATO Advanced Research Workshop on "Science and Technology of Semiconductor-On-Insulator Structures and Devices Operating in a Harsh Environment" held at the Sanatorium Puscha Ozerna, th th Kyiv, Ukraine, from 25 to 29 April 2004. The semiconductor industry has maintained a very rapid growth during the last three decades through impressive technological achievements which have resulted in products with higher performance and

lower cost per function. After many years of development semiconductor-on-insulator materials have entered volume production and will increasingly be used by the manufacturing industry. The wider use of semiconductor (especially silicon) on insulator materials will not only enable the benefits of these materials to be further demonstrated but, also, will drive down the cost of substrates which, in turn, will stimulate the development of other novel devices and applications. In itself this trend will encourage the promotion of the skills and ideas generated by researchers in the Former Soviet Union and Eastern Europe and their incorporation in future collaborations.

Integrated Circuit Engineering Springer Science & Business Media SiGe HBTs are the most mature of the Si heterostructure devices and not surprisingly the most completely researched and discussed in the technical literature. However, new effects and nuances of device operation are uncovered year-after-year as transistor scaling advances and application

targets march steadily upward in frequency and sophistication. Providing a comprehensive treatment of SiGe HBTs, Silicon Heterostructure Devices covers an amazingly diverse set of topics, ranging from basic transistor physics to noise, radiation effects, reliability, and TCAD simulation. Drawn from the comprehensive and well-reviewed Silicon Heterostructure Handbook, this text explores SiGe heterojunction bipolar transistors (HBTs), heterostructure FETs, various other heterostructure devices, as well as optoelectronic components. The book provides an overview, characteristics, and derivative applications for each device covered. It discusses device physics, broadband noise, performance limits, reliability, engineered substrates, and self-assembling nanostructures. Coverage of optoelectronic devices includes Si/SiGe LEDs, near-infrared detectors, photonic transistors for integrated optoelectronics, and quantum cascade emitters. In addition to this substantial collection of material, the book

concludes with a look at the ultimate limits of SiGe HBTs scaling. It contains easy-to-reference appendices on topics including the properties of silicon and germanium, the generalized Moll-Ross relations, and the integral charge-control model, and sample SiGe HBT compact model parameters.

SiGe and Si Strained-Layer Epitaxy for Silicon Heterostructure Devices

CRC Press

Adaptive filtering is commonly used in many communication applications including speech and video predictive coding, mobile radio, ISDN subscriber loops, and multimedia systems. Existing adaptive filtering topologies are non-concurrent and cannot be pipelined. Pipelined Adaptive Digital Filters presents new pipelined topologies which are useful in reducing area and power and in increasing speed. If the adaptive filter portion of a system suffers from a power-speed-area bottleneck, a solution is provided. Pipelined Adaptive Digital Filters is required reading for all users of adaptive digital filtering algorithms. Algorithm, application and integrated circuit chip

designers can learn how their algorithms can be tailored and implemented with lower area and power consumption and with higher speed. The relaxed look-ahead techniques are used to design families of new topologies for many adaptive filtering applications including least mean square and lattice adaptive filters, adaptive differential pulse code modulation coders, adaptive differential vector quantizers, adaptive decision feedback equalizers and adaptive Kalman filters. Those who use adaptive filtering in communications, signal and image processing algorithms can learn the basis of relaxed look-ahead pipelining and can use their own relaxations to design pipelined topologies suitable for their applications. Pipelined Adaptive Digital Filters is especially useful to designers of communications, speech, and video applications who deal with adaptive filtering, those involved with design of modems, wireless systems, subscriber loops, beam formers, and system identification applications. This book can also be used as a text for advanced courses on the

topic.

MODERN METHODS OF SPEECH PROCESSING

Prentice Hall

Timing research in high performance VLSI systems has advanced at a steady pace over the last few years, while tools, especially theoretical mechanisms, lag behind. Much present timing research relies heavily on timing diagrams, which, although intuitive, are inadequate for analysis of large designs with many parameters. Further, timing diagrams offer only approximations, not exact solutions, to many timing problems and provide little insight in the cases where temporal properties of a design interact intricately with the design's logical functionalities. This book presents a methodology for timing research which facilitates analysis and design of circuits and systems in a unified temporal and logical domain. In the first part, we introduce an algebraic representation formalism, Timed Boolean Functions (TBF's), which integrates both logical and timing information of digital circuits and systems into a single formalism. We also give a canonical form, TBF BDD's, for

them, which can be used for efficient manipulation. In the second part, we apply Timed Boolean Functions to three problems in timing research, for which exact solutions are obtained for the first time: 1. computing the exact delays of combinational circuits and the minimum cycle times of finite state machines, 2. analysis and synthesis of wavepipelining circuits, a high speed architecture for which precise timing relations between signals are essential for correct operations, 3. verification of circuit and system performance and coverage of delay faults by testing.

Reliability, Yield, and Stress Burn-In Springer Science & Business Media Since the early 1980s, CAD frameworks have received a great deal of attention, both in the research community and in the commercial arena.

It is generally agreed that CAD framework technology promises much: advanced CAD frameworks can turn collections of individual tools into effective and user-friendly design environments. But how can this promise be fulfilled? CAD Frameworks: Principles and Architecture describes the design and construction of CAD frameworks. It presents principles for building integrated design environments and shows how a CAD framework can be based on these principles. It derives the architecture of a CAD framework in a systematic way, using well-defined primitives for representation. This architecture defines how the many different framework sub-topics, ranging from concurrency control to design flow management, relate to each other and come together into an overall

system. The origin of this work is the research and development performed in the context of the Nelsis CAD Framework, which has been a working system for well over eight years, gaining functionality while evolving from one release to the next. The principles and concepts presented in this book have been field-tested in the Nelsis CAD Framework. CAD Frameworks: Principles and Architecture is primarily intended for EDA professionals, both in industry and in academia, but is also valuable outside the domain of electronic design. Many of the principles and concepts presented are also applicable to other design-oriented application domains, such as mechanical design or computer-aided software engineering (CASE). It is thus a valuable reference for all those involved in computer-aided design.

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