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Chemical Reaction Engineering Introduction to VLSI Circuits
and Systems Design with Operational Amplifiers and Analog
Integrated Circuits CMOS Logic Circuit Design Principles of
Embedded Networked Systems Design Integrated Circuit Design
Localization Algorithms and Strategies for Wireless Sensor
Networks: Monitoring and Surveillance Techniques for Target
Tracking Electromagnetics for High-Speed Analog and Digital
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Methods for the Physical Sciences Advanced Signal Integrity
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Soft matter (polymers, colloids, surfactants, liquid crystals) are an important class of materials for modern and future technologies. They are complex materials that behave neither like a fluid nor a solid. This book describes the characteristics of such materials and how we can understand such characteristics in the language of physics. Embedded network systems (ENS) provide a set of technologies that can link the physical world to large-scale networks in applications such as monitoring of borders, infrastructure, health, the environment, automated production, supply chains, homes and places of business. This book details the fundamentals for this interdisciplinary and fast-moving field. The book begins with mathematical foundations and the

relevant background topics in signal propagation, sensors, detection and estimation theory, and communications. Key component technologies in ENS are discussed: synchronization and position localization, energy and data management, actuation, and node architecture. Ethical, legal and social implications are addressed. The final chapter summarizes some of the lessons learned in producing multiple ENS generations. A focus on fundamental principles together with extensive examples and problem sets make this text ideal for use on graduate courses in electrical engineering and computer science. It will also appeal to engineers involved in the design of ENS. The transformation of vibrations into electric energy through the use of piezoelectric devices is an exciting and rapidly developing area of research with a widening range of applications constantly materialising. With *Piezoelectric Energy Harvesting*, world-leading researchers provide a timely and comprehensive coverage of the electromechanical modelling and applications of piezoelectric energy harvesters. They present principal modelling approaches, synthesizing fundamental material related to mechanical, aerospace, civil, electrical and materials engineering disciplines for vibration-based energy harvesting using piezoelectric transduction. *Piezoelectric Energy Harvesting* provides the first comprehensive treatment of distributed-parameter electromechanical modelling for piezoelectric energy harvesting with extensive case studies including experimental validations, and is the first book to address modelling of various forms of excitation in piezoelectric energy harvesting, ranging from airflow excitation to moving loads, thus ensuring its relevance to engineers in fields as disparate as aerospace engineering and civil engineering. Coverage includes: Analytical and approximate analytical distributed-parameter electromechanical models with illustrative theoretical case studies as well as extensive experimental validations. Several problems of piezoelectric energy harvesting ranging from simple harmonic excitation to random vibrations. Details of introducing and modelling piezoelectric coupling for various problems. Modelling and exploiting nonlinear dynamics.

for performance enhancement, supported with experimental verifications Applications ranging from moving load excitation of slender bridges to airflow excitation of aeroelastic sections A review of standard nonlinear energy harvesting circuits with modelling aspects. CD-ROM contains: AIM SPICE (from AIM Software) -- Micro-Cap 6 (from Spectrum Software) -- Silos III Verilog Simulator (from Simucad) -- Adobe Acrobat Reader 4.0 (from Adobe). The fourth edition of CMOS Digital Integrated Circuits: Analysis and Design continues the well-established tradition of the earlier editions by offering the most comprehensive coverage of digital CMOS circuit design, as well as addressing state-of-the-art technology issues highlighted by the widespread use of nanometer-scale CMOS technologies. In this latest edition, virtually all chapters have been re-written, the transistor model equations and device parameters have been revised to reflect the significant changes that must be taken into account for new technology generations, and the material has been reinforced with up-to-date examples. The broad-ranging coverage of this textbook starts with the fundamentals of CMOS process technology, and continues with MOS transistor models, basic CMOS gates, interconnect effects, dynamic circuits, memory circuits, arithmetic building blocks, clock and I/O circuits, low power design techniques, design for manufacturability and design for testability. The mathematical methods that physical scientists need for solving substantial problems in their fields of study are set out clearly and simply in this tutorial-style textbook. Students will develop problem-solving skills through hundreds of worked examples, self-test questions and homework problems. Each chapter concludes with a summary of the main procedures and results and all assumed prior knowledge is summarized in one of the appendices. Over 300 worked examples show how to use the techniques and around 100 self-test questions in the footnotes act as checkpoints to build student confidence. Nearly 400 end-of-chapter problems combine ideas from the chapter to reinforce the concepts. Hints and outline answers to the odd-numbered problems are given at the end of each

chapter, with fully-worked solutions to these problems given in the accompanying Student Solutions Manual. Fully-worked solutions to all problems, password-protected for instructors, are available at www.cambridge.org/essential. Places emphasis on developing intuition and physical insight. This title includes numerous examples and problems that have been carefully thought out to promote problem solving methodologies of the type engineers apply daily on the job. The 2nd Edition of Analog Integrated Circuit Design focuses on more coverage about several types of circuits that have increased in importance in the past decade. Furthermore, the text is enhanced with material on CMOS IC device modeling, updated processing layout and expanded coverage to reflect technical innovations. CMOS devices and circuits have more influence in this edition as well as a reduced amount of text on BiCMOS and bipolar information. New chapters include topics on frequency response of analog ICs and basic theory of feedback amplifiers. The third edition of Hodges and Jackson's Analysis and Design of Digital Integrated Circuits has been thoroughly revised and updated by a new co-author, Resve Saleh of the University of British Columbia. The new edition combines the approachability and concise nature of the Hodges and Jackson classic with a complete overhaul to bring the book into the 21st century. The new edition has replaced the emphasis on BiPolar with an emphasis on CMOS. The outdated MOS transistor model used throughout the book will be replaced with the now standard deep submicron model. The material on memory has been expanded and updated. As well the book now includes more on SPICE simulation and new problems that reflect recent technologies. The emphasis of the book is on design, but it does not neglect analysis and has as a goal to provide enough information so that a student can carry out analysis as well as be able to design a circuit. This book provides an excellent and balanced introduction to digital circuit design for both students and professionals. STEEL DESIGN covers the fundamentals of structural steel design with an emphasis on the design of members and their connections, rather than the integrated design of buildings.

The book is designed so that instructors can easily teach LRFD, ASD, or both, time-permitting. The application of fundamental principles is encouraged for design procedures as well as for practical design, but a theoretical approach is also provided to enhance student development. While the book is intended for junior-and senior-level engineering students, some of the later chapters can be used in graduate courses and practicing engineers will find this text to be an essential reference tool for reviewing current practices.

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This Second Edition provides all the required information for a course in modern device electronics taken by undergraduate electrical engineers. Offers major new coverage of silicon technology, adds several topics in basic semiconductor physics not treated previously, and introduces Hall-effect sensors. The chapters on MOSFET have been entirely updated, focusing on mobility variations and threshold-voltage dependence. Additional topics include VLSI devices, short channel effects, and computer modeling. Wireless localization techniques are an area that has attracted interest from both industry and academia, with self-localization capability providing a highly desirable characteristic of wireless sensor networks.

Localization Algorithms and Strategies for Wireless Sensor Networks encompasses the significant and fast growing area of wireless localization techniques. This book provides comprehensive and up-to-date coverage of topics and fundamental theories underpinning measurement techniques and localization algorithms. A useful compilation for academicians, researchers, and practitioners, this Premier Reference Source contains relevant references and the latest studies emerging out of the wireless sensor network field. This edition presents broad and in-depth coverage of the entire field of modern CMOS VLSI Design. The authors draw upon extensive industry and classroom experience to introduce today's most advanced and effective chip design practices. A new approach to the study of arithmetic circuits In Synthesis of Arithmetic Circuits: FPGA, ASIC and

Embedded Systems, the authors take a novel approach of presenting methods and examples for the synthesis of arithmetic circuits that better reflects the needs of today's computer system designers and engineers. Unlike other publications that limit discussion to arithmetic units for general-purpose computers, this text features a practical focus on embedded systems. Following an introductory chapter, the publication is divided into two parts. The first part, Mathematical Aspects and Algorithms, includes mathematical background, number representation, addition and subtraction, multiplication, division, other arithmetic operations, and operations in finite fields. The second part, Synthesis of Arithmetic Circuits, includes hardware platforms, general principles of synthesis, adders and subtractors, multipliers, dividers, and other arithmetic primitives. In addition, the publication distinguishes itself with:

- * A separate treatment of algorithms and circuits—a more useful presentation for both software and hardware implementations
- * Complete executable and synthesizable VHDL models available on the book's companion Web site, allowing readers to generate synthesizable descriptions
- * Proposed FPGA implementation examples, namely synthesizable low-level VHDL models for the Spartan II and Virtex families
- * Two chapters dedicated to finite field operations

This publication is a must-have resource for students in computer science and embedded system designers, engineers, and researchers in the field of hardware and software computer system design and development. An Instructor Support FTP site is available from the Wiley editorial department.

The theory, design, construction, and operation of microbial fuel cells

Microbial fuel cells (MFCs), devices in which bacteria create electrical power by oxidizing simple compounds such as glucose or complex organic matter in wastewater, represent a new and promising approach for generating power. Not only do MFCs clean wastewater, but they also convert organics in these wastewaters into usable energy. Given the world's limited supply of fossil fuels and fossil fuels' impact on climate change, MFC technology's ability to create renewable, carbon-neutral energy has

generated tremendous interest around the world. This timely book is the first dedicated to MFCs. It not only serves as an introduction to the theory underlying the development and functioning of MFCs, it also serves as a manual for ongoing research. In addition, author Bruce Logan, a leading pioneer in MFC research and development, provides practical guidance for the effective design and operation of MFCs based on his own firsthand experience. This reference covers everything you need to fully understand MFCs, including:

- * Key topics such as voltage and power generation, MFC materials and architecture, mass transfer to bacteria and biofilms, bioreactor design, and fundamentals of electron transfer
- * Applications across a wide variety of scales, from power generation in the laboratory to approaches for using MFCs for wastewater treatment
- * The role of MFCs in the climate change debate
- * Detailed illustrations of bacterial and electrochemical concepts
- * Charts, graphs, and tables summarizing key design and operation variables
- * Practice problems and step-by-step examples

Microbial Fuel Cells, with its easy-to-follow explanations, is recommended as both a textbook for students and professionals interested in entering the field and as a complete reference for more experienced practitioners. Computer chip industry veteran Bartleson provides ideas for creating better standards, increasing respect for the standardization process, and ways for leveraging others' industry expertise to create more effective technical standards. ??????????????????, ?????CMOS?????????????????, ?????MOS?????????????????. Modern communications technology demands smaller, faster and more efficient circuits. This book reviews the fundamentals of electromagnetism in passive and active circuit elements, highlighting various effects and potential problems in designing a new circuit. The author begins with a review of the basics - the origin of resistance, capacitance, and inductance - then progresses to more advanced topics such as passive device design and layout, resonant circuits, impedance matching, high-speed switching circuits, and parasitic coupling and isolation techniques. Using examples and applications in RF and microwave systems, the author

describes transmission lines, transformers, and distributed circuits. State-of-the-art developments in Si based broadband analog, RF, microwave, and mm-wave circuits are reviewed. With up-to-date results, techniques, practical examples, illustrations and worked examples, this book will be valuable to advanced undergraduate and graduate students of electrical engineering, and practitioners in the IC design industry. Further resources for this title are available at www.cambridge.org/9780521853507. Contains the most extensive coverage of digital integrated circuits available in a single source. Provides complete qualitative descriptions of circuit operation followed by in-depth analytical analyses and spice simulations. The circuit families described in detail are transistor-transistor logic (TTL, STTL, and ASTTL), emitter-coupled logic (ECL), NMOS logic, CMOS logic, dynamic CMOS, BiCMOS structures and various GASFET technologies. In addition to detailed presentation of the basic inverter circuits for each digital logic family, complete details of other logic circuits for these families are presented. This book contains all the topics of importance to the low power designer. It first lays the foundation and then goes on to detail the design process. The book also discusses such special topics as power management and modal design, ultra low power, and low power design methodology and flows. In addition, coverage includes projections of the future and case studies.

Infrastructure for Homeland Security Environments Wireless Sensor Networks helps readers discover the emerging field of low-cost standards-based sensors that promise a high order of spatial and temporal resolution and accuracy in an ever-increasing universe of applications. It shares the latest advances in science and engineering paving the way towards a large plethora of new applications in such areas as infrastructure protection and security, healthcare, energy, food safety, RFID, ZigBee, and processing. Unlike other books on wireless sensor networks that focus on limited topics in the field, this book is a broad introduction that covers all the major technology, standards, and application topics. It contains everything readers need to know to enter

this burgeoning field, including current applications and promising research and development; communication and networking protocols; middleware architecture for wireless sensor networks; and security and management. The straightforward and engaging writing style of this book makes even complex concepts and processes easy to follow and understand. In addition, it offers several features that help readers grasp the material and then apply their knowledge in designing their own wireless sensor network systems:

- * Examples illustrate how concepts are applied to the development and application of wireless sensor networks
- * Detailed case studies set forth all the steps of design and implementation needed to solve real-world problems
- * Chapter conclusions that serve as an excellent review by stressing the chapter's key concepts
- * References in each chapter guide readers to in-depth discussions of individual topics

This book is ideal for networking designers and engineers who want to fully exploit this new technology and for government employees who are concerned about homeland security. With its examples, it is appropriate for use as a coursebook for upper-level undergraduates and graduate students. This is a practical book for computer engineers who want to understand or implement hardware/software systems. It focuses on problems that require one to combine hardware design with software design – such problems can be solved with hardware/software codesign. When used properly, hardware/software codesign works better than hardware design or software design alone: it can improve the overall performance of digital systems, and it can shorten their design time. Hardware/software codesign can help a designer to make trade-offs between the flexibility and the performance of a digital system. To achieve this, a designer needs to combine two radically different ways of design: the sequential way of decomposition in time, using software, with the parallel way of decomposition in space, using hardware.

Intended Audience
This book assumes that you have a basic understanding of hardware that you are familiar with standard digital hardware components such as registers, logic gates, and

components such as multiplexers and arithmetic operators. The book also assumes that you know how to write a program in C. These topics are usually covered in an introductory course on computer engineering or in a combination of courses on digital design and software engineering. This junior level electronics text provides a foundation for analyzing and designing analog and digital electronics throughout the book. Extensive pedagogical features including numerous design examples, problem solving technique sections, Test Your Understanding questions, and chapter checkpoints lend to this classic text. The author, Don Neamen, has many years experience as an Engineering Educator. His experience shines through each chapter of the book, rich with realistic examples and practical rules of thumb. The Third Edition continues to offer the same hallmark features that made the previous editions such a success.

Extensive Pedagogy: A short introduction at the beginning of each chapter links the new chapter to the material presented in previous chapters. The objectives of the chapter are then presented in the Preview section and then are listed in bullet form for easy reference.

Test Your Understanding Exercise Problems with provided answers have all been updated. Design Applications are included at the end of chapters. A specific electronic design related to that chapter is presented. The various stages in the design of an electronic thermometer are explained throughout the text.

Specific Design Problems and Examples are highlighted throughout as well. Pond treatment technology is used in tens of thousands of applications serving many millions of people across the globe - why? Simply because it is efficient and effective. While pond treatment technology offers relative simplicity in its application, it incorporates a host of complex and diverse mechanisms that work to treat and cleanse polluted waters before their return to our environment. This book offers a comprehensive review of the pond technology field including the newest ideas and latest findings. Topics covered include: The physical, chemical and biological characteristics of the pond environment; A detailed review of pond treatment

mechanisms and performance; Comprehensive guidance on pond design, operation and upgrade options; A range of chapters summarising new and emerging pond technologies; The integration of ponds with wetlands and aquaculture systems and their use as storage reservoirs; Special applications of pond technology in cold climates, for agricultural wastes and for treatment of stormwater. The objective of this book is to get this wealth of knowledge "out there" to the users to ensure the continuous improvement and ongoing success of this crucial technology. A synergistic approach to signal integrity for high-speed digital design This book is designed to provide contemporary readers with an understanding of the emerging high-speed signal integrity issues that are creating roadblocks in digital design. Written by the foremost experts on the subject, it leverages concepts and techniques from non-related fields such as applied physics and microwave engineering and applies them to high-speed digital design—creating the optimal combination between theory and practical applications. Following an introduction to the importance of signal integrity, chapter coverage includes: Electromagnetic fundamentals for signal integrity Transmission line fundamentals Crosstalk Non-ideal conductor models, including surface roughness and frequency-dependent inductance Frequency-dependent properties of dielectrics Differential signaling Mathematical requirements of physical channels S-parameters for digital engineers Non-ideal return paths and via resonance I/O circuits and models Equalization Modeling and budgeting of timing jitter and noise System analysis using response surface modeling Each chapter includes many figures and numerous examples to help readers relate the concepts to everyday design and concludes with problems for readers to test their understanding of the material. Advanced Signal Integrity for High-Speed Digital Designs is suitable as a textbook for graduate-level courses on signal integrity, for programs taught in industry for professional engineers, and as a reference for the high-speed digital designer. Electronics play a central role in our everyday lives, being at the heart of much of today's essential technology - from mobile phones to computers, from

cars to power stations. As such, all engineers, scientists and technologists need a basic understanding of this area, whilst many will require a far greater knowledge of the subject. The third edition of "Electronics: A Systems Approach" is an outstanding introduction to this fast-moving, important field. Fully updated, it covers the latest changes and developments in the world of electronics. It continues to use Neil Storey's well-respected systems approach, firstly explaining the overall concepts to build students' confidence and understanding, before looking at the more detailed analysis that follows. This allows the student to contextualise what the system is designed to achieve, before tackling the intricacies of the individual components. The book also offers an integrated treatment of analogue and digital electronics highlighting and exploring the common ground between the two fields. Throughout the book learning is reinforced by chapter objectives, end of chapter summaries, worked examples and exercises. This third edition is a significant update to the previous material, and includes: New chapters on Operational Amplifiers, Power Electronics, Implementing Digital Systems, and Positive Feedback, Oscillators and Stability . A new appendix providing a useful source of Standard Op-amp Circuits New material on CMOS, BiFET and BiMOS Op-amps New treatment of Single-Chip Microcomputers A greatly increased number of worked examples within the text Additional Self-Assessment questions at the end of each chapter Dr. Neil Storey is a member of the School of Engineering at the University of Warwick, where he has many years of experience in teaching electronics to a wide-range of undergraduate, postgraduate and professional engineers. He is also the author of "Safety-Critical Computer Systems" and "Electrical and Electronic Systems" both published by Pearson Education. The power consumption of microprocessors is one of the most important challenges of high-performance chips and portable devices. In chapters drawn from Piguet's recently published Low-Power Electronics Design, this volume addresses the design of low-power microprocessors in deep submicron technologies. It provides a focused reference for specialists involved in

systems-on-chips, from low-power microprocessors to DSP cores, reconfigurable processors, memories, ad-hoc networks, and embedded software. *Low-Power Processors and Systems on Chips* is organized into three broad sections for convenient access. The first section examines the design of digital signal processors for embedded applications and techniques for reducing dynamic and static power at the electrical and system levels. The second part describes several aspects of low-power systems on chips, including hardware and embedded software aspects, efficient data storage, networks-on-chips, and applications such as routing strategies in wireless RF sensing and actuating devices. The final section discusses embedded software issues, including details on compilers, retargetable compilers, and coverification tools. Providing detailed examinations contributed by leading experts, *Low-Power Processors and Systems on Chips* supplies authoritative information on how to maintain high performance while lowering power consumption in modern processors and SoCs. It is a must-read for anyone designing modern computers or embedded systems.

Internet of Things: Principles and Paradigms captures the state-of-the-art research in Internet of Things, its applications, architectures, and technologies. The book identifies potential future directions and technologies that facilitate insight into numerous scientific, business, and consumer applications. The Internet of Things (IoT) paradigm promises to make any electronic devices part of the Internet environment. This new paradigm opens the doors to new innovations and interactions between people and things that will enhance the quality of life and utilization of scarce resources. To help realize the full potential of IoT, the book addresses its numerous challenges and develops the conceptual and technological solutions for tackling them. These challenges include the development of scalable architecture, moving from closed systems to open systems, designing interaction protocols, autonomic management, and the privacy and ethical issues around data sensing, storage, and processing.

Addresses the main concepts and features of the IoT paradigm
Describes different architectures for managing IoT platforms

Provides insight on trust, security, and privacy in IoT environments Describes data management techniques applied to the IoT environment Examines the key enablers and solutions to enable practical IoT systems Looks at the key developments that support next generation IoT platforms Includes input from expert contributors from both academia and industry on building and deploying IoT platforms and applications This is an up-to-date treatment of the analysis and design of CMOS integrated digital logic circuits. The self-contained book covers all of the important digital circuit design styles found in modern CMOS chips, emphasizing solving design problems using the various logic styles available in CMOS. This book introduces the 3R concept applied to wastewater treatment and resource recovery under a double perspective. Firstly, it deals with innovative technologies leading to: Reducing energy requirements, space and impacts; Reusing water and sludge of sufficient quality; and Recovering resources such as energy, nutrients, metals and chemicals, including biopolymers. Besides targeting effective C,N&P removal, other issues such as organic micropollutants, gases and odours emissions are considered. Most of the technologies analysed have been tested at pilot- or at full-scale. Tools and methods for their Economic, Environmental, Legal and Social impact assessment are described. The 3R concept is also applied to Innovative Processes design, considering different levels of innovation: Retrofitting, where novel units are included in more conventional processes; Re-Thinking, which implies a substantial flowsheet modification; and Re-Imagining, with completely new conceptions. Tools are presented for Modelling, Optimising and Selecting the most suitable plant layout for each particular scenario from a holistic technical, economic and environmental point of view. Learn all you need to know about wireless sensor networks! Protocols and Architectures for Wireless Sensor Networks provides a thorough description of the nuts and bolts of wireless sensor networks. The authors give an overview of the state-of-the-art, putting all the individual solutions into perspective with one and other. Numerous practical

examples, case studies and illustrations demonstrate the theory, techniques and results presented. The clear chapter structure, listing learning objectives, outline and summarizing key points, help guide the reader expertly through the material. *Protocols and Architectures for Wireless Sensor Networks*: Covers architecture and communications protocols in detail with practical implementation examples and case studies. Provides an understanding of mutual relationships and dependencies between different protocols and architectural decisions. Offers an in-depth investigation of relevant protocol mechanisms. Shows which protocols are suitable for which tasks within a wireless sensor network and in which circumstances they perform efficiently. Features an extensive website with the bibliography, PowerPoint slides, additional exercises and worked solutions. This text provides academic researchers, graduate students in computer science, computer engineering, and electrical engineering, as well as practitioners in industry and research engineers with an understanding of the specific design challenges and solutions for wireless sensor networks. Check out www.wiley.com/go/wsn for accompanying course material! "I am deeply impressed by the book of Karl & Willig. It is by far the most complete source for wireless sensor networks...The book covers almost all topics related to sensor networks, gives an amazing number of references, and, thus, is the perfect source for students, teachers, and researchers. Throughout the book the reader will find high quality text, figures, formulas, comparisons etc. - all you need for a sound basis to start sensor network research." Prof. Jochen Schiller, Institute of Computer Science, Freie Universität Berlin

Franco's *"Design with Operational Amplifiers and Analog Integrated Circuits, 3e"* is intended for a design-oriented course in applications with operational amplifiers and analog ICs. It also serves as a comprehensive reference for practicing engineers. This new edition includes enhanced pedagogy (additional problems, more in-depth coverage of negative feedback, more effective layout), updated technology (current-feedback and folded-cascode amplifiers,

and low-voltage amplifiers), and increased topical coverage (current-feedback amplifiers, switching regulators and phase-locked loops). The book presents in a clear and concise manner the fundamentals of chemical reaction engineering. The structure of the book allows the student to solve reaction engineering problems through reasoning rather than through memorization and recall of numerous equations, restrictions, and conditions under which each equation applies. The fourth edition contains more industrial chemistry with real reactors and real engineering and extends the wide range of applications to which chemical reaction engineering principles can be applied (i.e., cobra bites, medications, ecological engineering) Beginning with discussions on the operation of electronic devices and analysis of the nucleus of digital design, the text addresses: the impact of interconnect, design for low power, issues in timing and clocking, design methodologies, and the effect of design automation on the digital design perspective. This title builds on the student's background from a first course in logic design and focuses on developing, verifying, and synthesizing designs of digital circuits. The Verilog language is introduced in an integrated, but selective manner, only as needed to support design examples.

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