

# **digital circuits and design 3e by arivazhagan s salivahanan**

Digital Circuits And Design 3e By Arivazhagan S Salivahanan digital circuits and design 3e by arivazhagan s salivahanan is a comprehensive textbook that has garnered widespread recognition among students, educators, and professionals involved in the field of digital electronics. Now in its third edition, this book offers an in-depth exploration of the fundamental principles, design methodologies, and practical applications of digital circuits. It serves as both an introductory guide for beginners and a detailed reference for advanced learners, making it an essential resource for anyone aspiring to excel in digital system design. --- Overview of Digital Circuits and Design Digital circuits form the backbone of modern electronic devices, ranging from simple calculators to complex computer systems. The book by Salivahanan emphasizes the importance of understanding the core concepts that govern the operation of digital systems, including logic gates, Boolean algebra, and combinational and sequential circuit design. What Makes Digital Circuits Unique? Digital circuits process discrete signals represented by binary values—0s and 1s. Unlike analog circuits that deal with continuous signals, digital circuits are valued for their robustness, noise immunity, and ease of design and troubleshooting. These features make them indispensable in contemporary electronic devices. Core Topics Covered The book covers a broad spectrum of topics essential to mastering digital circuit design: – Boolean algebra and logic simplification – Logic gates and their functions – Combinational circuit design – Sequential circuit design – Flip-flops, registers, and counters – Memory units and programmable devices – Digital system testing and fault analysis --- Key Features of the 3rd Edition Salivahanan's third edition is distinguished by its updated content, practical approach, and inclusion of recent technological advancements. Some notable features include: Enhanced explanations with clear diagrams and illustrations New chapters on VHDL and FPGA-based design Numerous examples and practice problems for better understanding 2 Detailed coverage of digital system applications Inclusion of recent developments like low-power design and modern memory technologies These features make the textbook more accessible and relevant to current industry standards and academic curricula. --- The

**Structure of the Book** The book is systematically organized into sections that build upon each other, facilitating a progressive learning experience. Part 1: Fundamentals of Digital Logic This section introduces basic concepts such as number systems, Boolean algebra, and logic gates, laying the foundation for more complex topics. Part 2: Combinational Logic Design Focuses on designing circuits like adders, subtractors, multiplexers, encoders, decoders, and code converters. It emphasizes techniques for simplifying Boolean expressions to optimize circuit performance. Part 3: Sequential Logic Design Examines flip-flops, registers, counters, and memory devices. It explains how sequential circuits are used to store and process data over time, crucial for designing processors and control units. Part 4: Digital System Design and Implementation Covers hardware description languages (HDL) like VHDL, FPGA architecture, and modern digital design methodologies. It bridges theoretical concepts with practical implementation. Part 5: Testing and Fault Analysis Discusses methods for testing digital systems, identifying faults, and ensuring reliability—a critical aspect of digital circuit design.

--- **Importance of Digital Circuit Design in Modern Technology** Digital circuit design is at the heart of technological innovation. Mastery of this subject enables the development of efficient, reliable, and scalable electronic systems. From consumer electronics to aerospace, digital circuits facilitate complex functionalities with minimal power consumption and maximum performance.

**Applications of Digital Circuits** Some key areas where digital circuits are pivotal include:

- Microprocessors and microcontrollers
- Digital signal processing
- Communication systems
- Embedded systems
- Consumer electronics like smartphones and smart TVs
- Automotive electronics and automation systems
- Medical devices and instrumentation

The book's comprehensive coverage equips learners with the skills needed to contribute meaningfully to these fields.

--- **Why Choose "Digital Circuits and Design 3e" by Arivazhagan S. Salivahanan?** Choosing the right textbook can significantly impact a student's understanding and performance. Here are some reasons why this book stands out:

- Clarity and Conciseness:** The explanations are straightforward, making complex topics approachable.
- Practical Focus:** The inclusion of real-world examples bridges theory and practice.
- Updated Content:** Reflects the latest trends and technologies in digital design.
- Rich Pedagogical Features:** End-of-chapter exercises, review questions, and summaries enhance learning outcomes.
- Authoritative Authorship:** Arivazhagan S. Salivahanan's expertise ensures the content's accuracy and relevance.

--- **How to Maximize Learning from This Book** To get the most out of "Digital Circuits and Design 3e," consider the following strategies:

- Read chapters actively, paying attention to

diagrams and examples. 1. Attempt the practice problems at the end of each chapter to reinforce understanding. 2. Use supplementary resources like simulation software (e.g., LogicWorks or Proteus). 3. to visualize circuit behavior. Participate in laboratory experiments to gain hands-on experience. 4. Discuss complex topics with peers or instructors to clarify doubts. 5. Stay updated with recent developments in digital design through industry journals and online courses. --- 4 Conclusion "Digital Circuits and Design 3e" by Arivazhagan S. Salivahanan is a vital resource for anyone interested in understanding the intricacies of digital systems. Its comprehensive coverage, practical approach, and clarity make it an ideal choice for students and professionals aiming to excel in digital circuit design. By mastering the concepts presented in this book, learners can build a strong foundation for careers in electronics, embedded systems, and computer engineering, contributing to innovations that shape our digital world. Whether you are starting your journey in digital electronics or seeking to deepen your knowledge, this book provides the tools, insights, and guidance necessary to succeed.

QuestionAnswer What are the key topics covered in 'Digital Circuits and Design 3e' by Arivazhagan S Salivahanan? The book covers foundational topics such as Boolean algebra, logic gates, combinational and sequential circuit design, flip-flops, counters, registers, memory units, and digital system design principles, along with recent advancements in digital technology. How does 'Digital Circuits and Design 3e' address modern digital circuit design challenges? The book integrates contemporary design techniques, including VHDL/Verilog basics, FPGA implementation, and low-power design strategies, helping students understand both traditional and modern digital system design challenges. Are there practical examples or exercises in 'Digital Circuits and Design 3e' to reinforce learning? Yes, the book includes numerous solved examples, practice problems, and design exercises that help students apply theoretical concepts to real-world digital circuit design scenarios. Does 'Digital Circuits and Design 3e' include coverage of programmable logic devices? Absolutely, the book discusses programmable logic devices such as PALs, GALs, FPGAs, and CPLDs, along with their programming and application in digital circuit design. Is 'Digital Circuits and Design 3e' suitable for beginners or advanced learners? The book is designed to cater to both beginners and advanced learners, providing clear explanations of basic concepts while also delving into complex design methodologies and current technologies. What makes 'Digital Circuits and Design 3e' a recommended resource in digital electronics education? Its comprehensive coverage, clear presentation, practical approach, and inclusion of recent

technological trends make it a highly recommended resource for students and educators in digital electronics and circuit design. Digital Circuits and Design 3E by Arivazhagan S Salivahanan stands as a comprehensive textbook that has been widely acclaimed for its clarity, depth, and practical approach to digital electronics. As a cornerstone resource in the field of digital circuit design, this book Digital Circuits And Design 3e By Arivazhagan S Salivahanan 5 not only delves into fundamental principles but also bridges theory with real-world applications, making it an invaluable guide for students, educators, and practicing engineers alike. In this article, we will explore the key features, pedagogical approach, and the significance of this book within the broader context of digital electronics education. ---

**Introduction to Digital Circuits and Design** Digital circuits form the backbone of modern electronic devices—from simple calculators to complex computing systems. The discipline involves understanding how digital signals are processed, stored, and transmitted to perform various functions efficiently and reliably. The third edition of Digital Circuits and Design by Arivazhagan S Salivahanan continues to build on foundational concepts while integrating recent advancements and contemporary design methodologies. This book emphasizes a structured approach to digital circuit design, highlighting systematic analysis, logical reasoning, and practical implementation. Whether you're a beginner or an advanced learner, the book offers a layered learning experience, gradually increasing in complexity and depth.

**Core Features of the Book**

- 1. Comprehensive Coverage** The book spans a wide array of topics, including:
  - Number systems and Boolean algebra
  - Logic gates and combinational circuit design
  - Simplification techniques like Karnaugh maps and Quine–McCluskey method
  - Sequential circuit design including flip-flops, counters, and registers
  - Memory and programmable logic devices
  - Digital IC families and their characteristics
  - Introduction to finite state machines (FSMs)
  - Basic microprocessor and digital system design concepts

**Pedagogical Approach** Arivazhagan S Salivahanan adopts a student-friendly approach, integrating theoretical explanations with numerous solved examples and practice problems.

The book emphasizes understanding over rote memorization, encouraging students to internalize the underlying principles.

**3. Practical Focus** Real-world applications are woven throughout the text, illustrating how theoretical concepts translate into actual digital systems.

The inclusion of practical design problems and exercises helps learners develop a hands-on understanding of digital circuit implementation.

**4. Updated Content** The third edition incorporates recent technological developments, including modern digital IC families and interface considerations, ensuring relevance in today's rapidly evolving electronics

landscape. --- Detailed Breakdown of Content Chapter 1: Number Systems and Codes This foundational chapter introduces various number systems—binary, octal, decimal, hexadecimal—and explores their conversions. It also discusses binary arithmetic, excess-3 code, Gray code, and error detection/correction codes, setting the stage for understanding digital logic. Key takeaways: – Mastery of different number representations – Importance of coding schemes in error detection – Practical conversion techniques --- Chapter 2: Boolean Algebra and Logic Gates Here, the focus shifts to Boolean algebra, which forms the mathematical basis for digital logic design. The chapter covers Boolean laws, theorems, and simplification methods. Highlights: – Logic gate symbols and functions – Constructing logical expressions – Digital Circuits And Design 3e By Arivazhagan S Salivahanan 6 Simplification using Boolean algebra and Karnaugh maps --- Chapter 3: Combinational Circuit Design This section teaches the design of circuits like adders, subtractors, multiplexers, decoders, encoders, and priority encoders. Practical insights: – Systematic design procedures – Use of truth tables – Optimization techniques to minimize gate count – --- Chapter 4: Simplification Techniques Focuses on Karnaugh maps and Quine–McCluskey methods to simplify Boolean functions, which are crucial for optimizing digital circuits. Advantages: – Reduces hardware complexity – Enhances circuit speed and reliability --- Chapter 5: Sequential Circuits and Memory Elements Introduces flip-flops, latches, registers, counters, and their design principles. Learning points: – State diagram representation – Timing considerations – Design of synchronous and asynchronous circuits --- Chapter 6: Digital System Design Expands on the integration of combinational and sequential circuits to create complete digital systems, including arithmetic logic units (ALUs) and control units. Key concepts: – Finite state machines (FSMs) – Design methodologies – Implementation of control logic --- Chapter 7: Digital IC Families Provides an overview of various digital integrated circuit families such as TTL, CMOS, ECL, and their characteristics. Critical understanding: – Power consumption – Speed – Compatibility and interfacing considerations --- Chapter 8: Memory and Programmable Devices Discusses ROM, RAM, PROM, EPROM, and programmable logic devices like PALs and FPGAs, emphasizing their use in flexible digital design. --- Pedagogical Strengths and Teaching Methodology Digital Circuits and Design 3E is renowned for its learner-centric approach. It combines: – Illustrative examples: Each concept is supplemented with practical examples that reinforce understanding. – End-of-chapter exercises: Ranging from basic to challenging problems, these serve as effective self-assessment tools. – Design oriented approach: Emphasizing real-world problem-

solving and circuit optimization. – Visual aids: Clear diagrams and truth tables facilitate learning complex concepts. This approach ensures that students not only learn the theoretical underpinnings but also develop practical skills necessary for designing efficient digital systems. --- Why Choose This Book? For Students: – Clear explanations with step-by-step procedures – Rich set of practice problems – Focus on both theory and application – Preparation for competitive exams and industry requirements For Educators: – Structured content suitable for curriculum planning – Extensive problem sets for classroom use – Contemporary examples to illustrate concepts For Practicing Engineers: – Refresher on core principles – Design methodologies aligned with current technology trends --- The Relevance of Digital Circuits and Design in Today's World In an era dominated by digital technology, understanding digital circuits is fundamental. From IoT devices to AI hardware accelerators, digital design principles underpin modern innovation. Digital Circuits and Design 3E equips learners with the knowledge to navigate this landscape effectively. Moreover, as industries shift towards more integrated and miniaturized solutions, the importance of optimized, reliable digital circuits grows. The book's emphasis on simplification, efficient design, and practical Digital Circuits And Design 3e By Arivazhagan S Salivahanan 7 implementation aligns well with industry needs. --- Final Thoughts Digital Circuits and Design 3E by Arivazhagan S Salivahanan remains a vital resource for understanding the intricacies of digital electronics. Its balanced focus on theory, design methodology, and practical application makes it an enduring favorite among students and professionals. Whether you're embarking on your journey into digital system design or refining your existing knowledge, this book offers a thorough, insightful, and approachable pathway into the world of digital circuits. In conclusion, mastering digital circuit design is a stepping stone toward innovative electronic solutions. With the guidance provided by this authoritative text, learners can develop the skills necessary to contribute meaningfully to the ever-evolving field of digital electronics. digital circuits, circuit design, logic gates, combinational circuits, sequential circuits, VHDL, FPGA, digital system design, hardware description language, digital electronics

Electronic Circuit Design  
Electronic Circuit Design and Application  
Electronic Circuit Design Ideas  
Circuit Design for Reliability  
Circuit Design: Know It All  
Advanced Electronic Circuit Design  
Industrial Automation  
Computer Oriented Circuit Design  
Electronic Circuits  
CMOS  
Analog Circuit Design  
Power Management Techniques for Integrated Circuit

Design  
Introduction to Electronic Circuit Design  
High-Frequency Circuit Design and Measurements  
Digital Electronics  
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Fundamentals of Electronic Circuit Design  
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Electronic Circuits CMOS  
Analog Circuit Design  
Power Management Techniques for Integrated Circuit Design  
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High-Frequency Circuit Design and Measurements  
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the theme of this new textbook is the practical element of electronic circuit design dr o dell whilst recognising that theoretical knowledge is essential has drawn from his many years of teaching experience to produce a book which emphasises learning by doing throughout however there is more to circuit design than a good theoretical foundation coupled to design itself where do new circuit ideas come from this is the topic of the first chapter and the discussion is maintained throughout the following eight chapters which deal with high and low frequency small signal circuits opto electronic circuits digital circuits oscillators translinear circuits and power amplifiers in each chapter one or more experimental circuits are described in detail for the reader to construct a total of thirteen project exercises in all the final chapter draws some conclusions about the fundamental problem of design in the light of the circuits that have been dealt with in the book the book is intended for use alongside a foundation text on the theoretical basis of electronic circuit design it is written not only for undergraduate students of electronic engineering but also for the far wider range of reader in the hard or soft sciences in industry or in education who have access to a simple electronics

laboratory

this textbook for core courses in electronic circuit design teaches students the design and application of a broad range of analog electronic circuits in a comprehensive and clear manner readers will be enabled to design complete functional circuits or systems the authors first provide a foundation in the theory and operation of basic electronic devices including the diode bipolar junction transistor field effect transistor operational amplifier and current feedback amplifier they then present comprehensive instruction on the design of working realistic electronic circuits of varying levels of complexity including power amplifiers regulated power supplies filters oscillators and waveform generators many examples help the reader quickly become familiar with key design parameters and design methodology for each class of circuits each chapter starts from fundamental circuits and develops them step by step into a broad range of applications of real circuits and systems written to be accessible to students of varying backgrounds this textbook presents the design of realistic working analog electronic circuits for key systems includes worked examples of functioning circuits throughout every chapter with an emphasis on real applications includes numerous exercises at the end of each chapter uses simulations to demonstrate the functionality of the designed circuits enables readers to design important electronic circuits including amplifiers power supplies and oscillators

electronic circuit design ideas covers a wide variety of electronic circuit design which consists of a circuit diagram waveforms and an explanation of how the circuit works this text contains 14 chapters and starts with a review of the principles of digital circuits and interface circuits frequently used in circuit design the next chapters describe the commonly used timer op amp and amplifier circuits other chapters present some examples of waveform generators and oscillators used in circuit design this work also looks into other classifications of circuits including phase locked loop power supply and voltage regulator circuits the final chapters are devoted to the methods of controlling dc servomotors and stepper motors these chapters also examine other design ideas specifically the use of slotted optical sensor based revolution detector photodiode and magnetic transducer detector and fsk circuit this book will prove useful to electrical engineers electronics professionals hobbyists and students

this book presents physical understanding modeling and simulation on chip characterization layout solutions and design techniques that are effective to enhance the reliability of various

circuit units the authors provide readers with techniques for state of the art and future technologies ranging from technology modeling fault detection and analysis circuit hardening and reliability management

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description building on fundamentals of electronics circuit design david and donald comer's new text advanced electronic circuit design extends their highly focused applied approach into the second and third semesters of the electronic circuit design sequence this new text covers more advanced topics such as oscillators power stages digital analog converters and communications circuits such as mixers and detectors the text also includes technologies that are emerging advanced electronic circuit design focuses exclusively on mosfet and bjt circuits allowing students to explore the fundamental methods of electronic circuit analysis and design in greater depth each type of circuit is first introduced without reference to the type of device used for implementation this initial discussion of general principles establishes a firm foundation on which to proceed to circuits using the actual devices features 1 provides concise coverage of several important electronic circuits that are not covered in a fundamentals textbook 2 focuses on mosfet and bjt circuits rather than offering exhaustive coverage of a wide range of devices and circuits 3 includes an important concepts summary at the beginning of each section that direct the reader's attention to these key points 4 includes several practical considerations sections that relate developed theory to practical circuits instructor supplements isbn supplement description online solutions manual brief table of contents 1 introduction 2 fundamental power amplifier stages 3 advanced power amplification 4 wideband amplifiers 5 narrowband amplifiers 6 sinusoidal oscillators 7 basic concepts in communications 8 amplitude modulation circuits 9 angle modulation circuits 10 mixed signal interfacing circuits 11 basic concepts in filter design 12 active synthesis 13

future directions

the first book to combine all of the various topics relevant to low cost automation practical approach covers methods immediately applicable to industrial problems showing how to select the most appropriate control method for a given application then design the necessary circuit focuses on the control circuits and devices electronic electro mechanical or pneumatic used in small to mid size systems stress is on on off binary control as opposed to continuous feedback analog control discusses well known procedures and their modifications and a number of original techniques and circuit design methods covers flexible automation including the use of microcomputers

electronic circuits covers all important aspects and applications of modern analog and digital circuit design the basics such as analog and digital circuits on operational amplifiers combinatorial and sequential logic and memories are treated in part i while part ii deals with applications each chapter offers solutions that enable the reader to understand ready made circuits or to proceed quickly from an idea to a working circuit and always illustrated by an example analog applications cover such topics as analog computing circuits the digital sections deal with ad and da conversion digital computing circuits microprocessors and digital filters this editions contains the basic electronics for mobile communications the accompanying cd rom contains pspice software an analog circuit simulation package plus simulation examples and model libraries related to the book topics

this edition provides an important contemporary view of a wide range of analog digital circuit blocks the bsim model data converter architectures and more the authors develop design techniques for both long and short channel cmos technologies and then compare the two

analog circuit design contains the contribution of 18 experts from the 13th international workshop on advances in analog circuit design it is number 13 in the successful series of analog circuit design it provides 18 excellent overviews of analog circuit design in sensor and actuator interfaces integrated high voltage electronics and power management and low power and high resolution adc s analog circuit design is an essential reference source for analog circuits designers and researchers wishing to keep abreast with the latest developments in the field the tutorial coverage also makes it suitable for use in an advanced design course

this book begins with the premise that energy demands are directing scientists towards ever greener methods of power management so highly integrated power control ics integrated chip circuit are increasingly in demand for further reducing power consumption a timely and comprehensive reference guide for ic designers dealing with the increasingly widespread demand for integrated low power management includes new topics such as led lighting fast transient response dvs tracking and design with advanced technology nodes leading author chen is an active and renowned contributor to the power management ic design field and has extensive industry experience accompanying website includes presentation files with book illustrations lecture notes simulation circuits solution manuals instructors manuals and program downloads

a basic understanding of circuit design is useful for many engineerseven those who may never actually design a circuitbecause it is likely that they will fabricate test or use these circuits in some way during their careers this book provides a thorough and rigorous explanation of circuit design with a focus on the underlying principlesof how different circuits workinstead of relying completely on design procedures or rules of thumb in this way readers develop the intuitionthat is essential to understanding and solving design problems in those instances where no procedure exists features a topical organization rather than a sequential one emphasizing the models and types of analyses used so they are less confusing to readers discusses complex topics such as small signal approximation frequency response feedback and model selection most of the examples and exercises compare the analytical results with simulationssimulation files are available on the cd rom a generic transistor is used to avoid repetition presenting many of the basic principles that are common to fet and bjt circuits devotes a whole chapter to device physics for reference use by professionals in the field of computer engineering or electronic circuit design

an elective course in the final year beng progamme in electronic engin eering in the city polytechnic of hong kong was generated in response to the growing need of local industry for graduate engineers capable of designing circuits and performing measurements at high frequencies up to a few gigahertz this book has grown out from the lecture and tutorial materials written specifically for this course this course should in the opinion of the author best be conducted if students can take a final year design project in the same area examples of projects in areas related to the subject matter of this book which have been

completed successfully in the last two years that the course has been run include low noise amplifiers dielectric resonator loaded oscillators and down converters in the 12 ghz as well as the 1 ghz bands mixers varactor tuned and non varactor tuned vcos low noise and power amplifiers and filters and duplexers in the 1 ghz 800 mhz and 500 mhz bands the book is intended for use in a course of forty lecture hours plus twenty tutorial hours and the prerequisite expected of the readers is a general knowledge of analogue electronic circuits and basic field theory readers with no prior knowledge in high frequency circuits are recommended to read the book in the order that it is arranged in **t r o d u c t i o n**

this practical introduction explains exactly how digital circuits are designed from the basic circuit to the advanced system it covers combinational logic circuits which collect logic signals to sequential logic circuits which embody time and memory to progress through sequences of states the primer also highlights digital arithmetic and the integrated circuits that implement the logic functions based on the author's extensive experience in teaching digital electronics to undergraduates the book translates theory directly into practice and presents the essential information in a compact digestible style worked problems and examples are accompanied by abbreviated solutions with demonstrations to ensure that the design material and the circuits operation are fully understood this is essential reading for any electronic or electrical engineering student new to digital electronics and requiring a succinct yet comprehensive introduction

an integrated presentation of electronic circuit design and vhdl with an emphasis on system examples and laboratory exercises

three chapters emphasize ic design with spice simulations integrated into each one concise streamlined presentation of topics

with vastly increased complexity and functionality in the nanometer era i e hundreds of millions of transistors on one chip increasing the performance of integrated circuits has become a challenging task connecting effectively interconnect design all of these chip elements has become the greatest determining factor in overall performance 3 d integrated circuit design may offer the best solutions in the near future this is the first book on 3 d integrated circuit design covering all of the technological and design aspects of this emerging design paradigm while proposing effective solutions to specific challenging problems

concerning the design of 3 d integrated circuits a handy comprehensive reference or a practical design guide this book provides a sound foundation for the design of 3 d integrated circuits demonstrates how to overcome interconnect bottleneck with 3 d integrated circuit design leading edge design techniques offer solutions to problems performance power consumption price faced by all circuit designers the first book on 3 d integrated circuit design provides up to date information that is otherwise difficult to find focuses on design issues key to the product development cycle good design plays a major role in exploiting the implementation flexibilities offered in the 3 d provides broad coverage of 3 d integrated circuit design including interconnect prediction models thermal management techniques and timing optimization offers practical view of designing 3 d circuits

analog circuit design contains the contribution of 18 tutorials of the 14th workshop on advances in analog circuit design each part discusses a specific todays topic on new and valuable design ideas in the area of analog circuit design each part is presented by six experts in that field and state of the art information is shared and overviewed this book is number 14 in this successful series of analog circuit design providing valuable information and excellent overviews of analog circuit design cad and rf systems analog circuit design is an essential reference source for analog circuit designers and researchers wishing to keep abreast with the latest development in the field the tutorial coverage also makes it suitable for use in an advanced design course

this introduction to basic circuit design reviews a variety of semiconductor devices integrated structures analog circuits and low power switching circuits it covers the electrical characteristics and applications of semiconductor devices and introduces the concept of cad design

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## Introduction

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