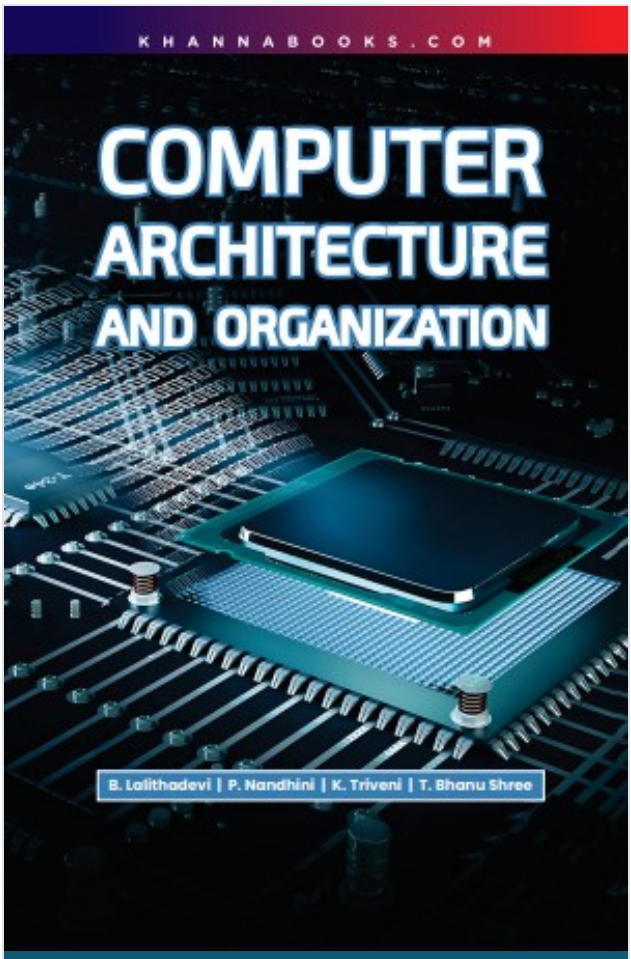

B. Lalithadevi, P. Nandhini, K. Triveni, T. Bhanu Shree

Computer Architecture and Organization

Author :	B. Lalithadevi, P. Nandhini, K. Triveni, T. Bhanu Shree
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Product Description

Computer Architecture and Organization

This book, "COMPUTER ARCHITECTURE AND ORGANIZATION," offers a comprehensive and structured exploration of the fundamental principles that govern the operation and design of modern computing systems. As technology continues its rapid advance across fields like artificial intelligence, healthcare, and communication, understanding the internal workings of a computer is crucial for creating high-performance and efficient architectures.

Designed specifically for students and professionals in computing technology, this text effectively balances theoretical concepts with practical applications to prepare readers for advanced studies and successful careers. The journey begins with the essential building blocks, detailing general register organization, instruction cycles, and the vital stack organization that facilitates efficient data manipulation and function calls.

The content systematically progresses through the core components, providing a clear explanation of the Arithmetic Logic Unit (ALU), including complex operations like Booth multiplication and floating-point arithmetic. Crucially, the book dedicates significant coverage to memory organization, exploring the essential memory hierarchy, cache memory (including mapping and replacement policies), and virtual memory implementation. Finally, it addresses contemporary system design challenges by covering Input-Output (I/O) mechanisms such as Direct Memory Access (DMA), and the complexities of modern multiprocessor systems, including interconnection structures and advanced cache coherence protocols. With its clear explanations and structured approach, this book serves as an indispensable resource for mastering the architecture and organization that powers the digital world.

Salient Features:

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- **General Register Organization**: Deep dive into how CPU registers (PC, AC, DR, IR) and the Last-In, First-Out (LIFO) stack organization manage data and control flow for high-speed instruction execution.
- **Instruction Set Comparison**: Compares and contrasts different instruction set architectures like MIPS, RISC, and CISC, alongside an analysis of one-, two-, and three-address instruction formats.
- **Advanced Arithmetic Units**: Comprehensive coverage of ALU micro-operations and complex computational algorithms, including Booth's multiplication and detailed procedures for floating-point arithmetic operations.
- **Memory Hierarchy Mastery**: In-depth analysis of the memory hierarchy, including the structure and function of cache memory, virtual memory, and specialized Content-Addressable Memory (CAM).
- **Efficient I/O Management**: Explores mechanisms for input-output data transfer, detailing concepts like Direct Memory Access (DMA), priority interrupts, and the principles of I/O processor (IOP) function.
- **Multiprocessor Architectures**: Essential concepts for parallel computing, examining interconnection structures, interprocessor communication and synchronization techniques, and interprocessor arbitration for shared resources.
- **Cache Coherence Protocols**: Critical focus on maintaining data integrity across multiple processor caches, explaining the need for and implementation of cache coherence mechanisms in high-performance computing.

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- General registers
- Arithmetic logic unit and computer arithmetic
- Memory organization
- Input-Output Organization
- Characteristics of multiprocessors

Author

B. Lalithadevi

B. Lalithadevi,

P. Nandhini

P. Nandhini P. Krishnaveni

K. Triveni

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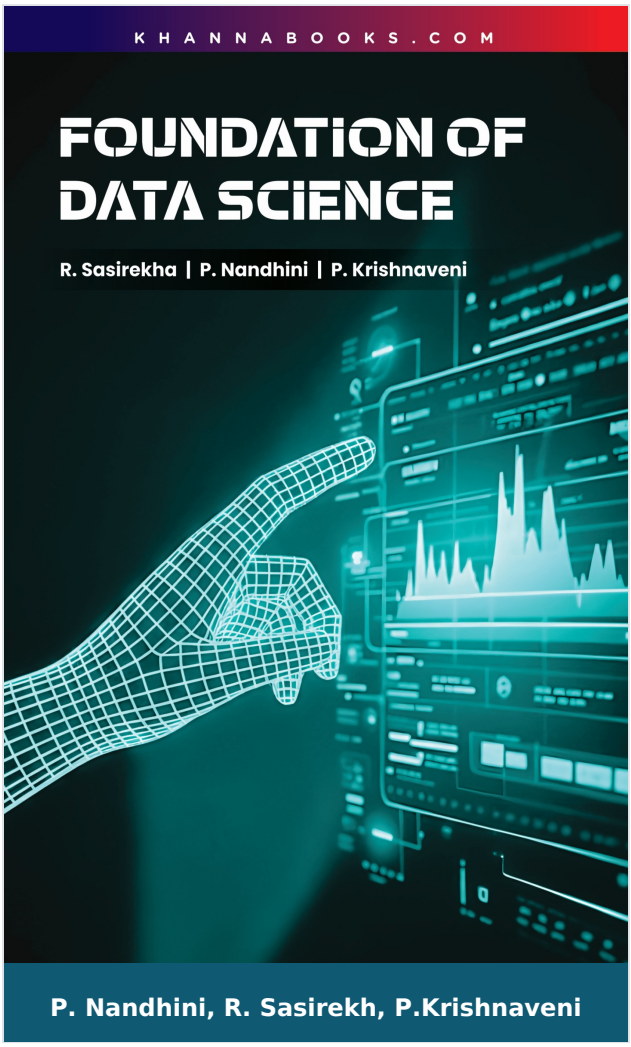

Foundation of Data Science

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Product Description

Foundation of Data Science is a comprehensive textbook designed to provide readers with a strong foundation in modern data science concepts, techniques, and applications. In today's data-driven world, the ability to collect, process, clean, analyze, and interpret large volumes of data is essential across industries. This book serves as a structured and practical guide to the complete data analysis pipeline, with a particular emphasis on Natural Language Processing (NLP) and Big Data Analytics.

The text begins with the fundamentals of data acquisition, covering methods for collecting data from multiple sources, including internal databases, external repositories, APIs, and web scraping techniques. It then explores critical data preprocessing activities such as data cleaning, transformation, quality control, handling missing values, and noise reduction, enabling readers to prepare datasets for accurate analysis and modeling.

A significant portion of the book is dedicated to Natural Language Processing, introducing key concepts such as Bag-of-Words, Regular Expressions, Tokenization, Stemming, Lemmatization, TF-IDF, and Sentiment Analysis. Through practical examples and case studies, readers learn how to transform unstructured textual information into meaningful insights for decision-making and business intelligence.

The book further extends into Exploratory Data Analysis (EDA), data visualization techniques, and modern Big Data frameworks such as Hadoop and Spark. Combining theoretical understanding with practical implementation, this resource is suitable for students, researchers, data analysts, and professionals seeking to build expertise in data science and text analytics. By integrating NLP methodologies with contemporary Big Data concepts, the book provides a complete toolkit for extracting value from data and succeeding in a data-centric environment.

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- Data Sourcing & APIs: Explains data acquisition techniques from internal and external sources, including web scraping and the use of APIs such as Google Maps and IBM Watson for real-time data collection.
- Data Cleaning & Wrangling: Covers systematic approaches to data preprocessing, transformation, data munging, handling noisy datasets, and resolving inconsistencies to improve data quality.
- Core NLP Toolkit: Introduces essential Natural Language Processing concepts, including Bag-of-Words, Regular Expressions, Tokenization, Sentence Splitting, and pattern matching techniques.
- Linguistic Normalization: Clearly differentiates between stemming and lemmatization, demonstrating how linguistic rules and morphological analysis are applied to derive meaningful root forms of words.
- Feature Engineering: Discusses advanced text representation techniques such as TF-IDF (Term Frequency–Inverse Document Frequency), stop-word removal, and feature extraction methods for enhanced analytical performance.
- Practical Visualization: Provides hands-on guidance on data visualization and Exploratory Data Analysis (EDA), including the use of professional tools such as Tableau for effective data presentation.
- Big Data Ecosystem: Introduces the principles, characteristics, and frameworks of Big Data, including technologies such as Hadoop and Spark for managing and processing large-scale datasets.
- Real-World NLP Case Study: Presents a comprehensive Sentiment Analysis case study demonstrating how NLP techniques can be applied to extract opinions, emotions, and actionable insights from textual data across diverse domains.

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Author

P. Nandhini

P. Nandhini P. Krishnaveni

R. Sasirekh

R. Sasirekha P. Nandhini P. Krishnaveni

P.Krishnaveni

R. Sasirekha P. Nandhini P. Krishnaveni

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