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Java Programming for IoT

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Product Description

JAVA PROGRAMMING FOR IOT is a comprehensive guide designed to bridge the gap between fundamental Object-Oriented Programming (OOP) concepts in Java and their practical application within the rapidly evolving landscape of the Internet of Things (IoT). The book's core purpose is to empower readers to develop complete, robust, and distributed application programs that can run across various connected systems. It meticulously covers the essentials of Java—from basic syntax, data types, and looping constructs to advanced OOP principles like Inheritance, Polymorphism, and Encapsulation.

The curriculum seamlessly transitions into specialized, high-value IoT topics. Readers will master critical methodologies such as Exceptions Handling and Multi-threading, as well as essential socket programming techniques required for effective communication with connected devices. A key focus is the Java Development Environment for IoT, offering hands-on expertise with Java ME 8 and its deployment on Raspberry Pi using the NetBeans IDE. The practical learning culminates in detailed coverage of Application Management Systems (AMS), which includes managing the application lifecycle, configuring remote devices, and implementing strategies for securing IoT applications and ensuring data integrity in real-world scenarios. This text is an essential resource for a broad audience, including students, novice programmers eager to start their IoT journey, and experienced developers seeking to master innovative, secure, and distributed IoT solutions with the robust Java platform.

Salient Features:

• Foundational OOP Skills: Comprehensive coverage of core Object-Oriented Programming (OOP) concepts in Java, including Inheritance, Polymorphism, Abstraction, and Encapsulation, essential for building robust software.

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• IoT Thread Management: Detailed units on multi-threading, thread synchronization, and managing the thread lifecycle (suspending/resuming) for building efficient and concurrent IoT Applications.

• Embedded Development Kit: Practical focus on setting up the Java development environment for IoT, utilizing Java ME 8, CLDC, and the NetBeans IDE for creating and deploying embedded applications.

• Raspberry Pi Integration: Step-by-step guidance on running the Java Runtime on a Raspberry Pi board, including using the Command Line Interface (CLI) for deployment and application testing.

• Secure IoT Deployment: Dedicated strategies for securing IoT applications and ensuring data integrity, covering topics like device authentication and the built-in security features of Java ME 8.

• Application Lifecycle: In-depth analysis of the Application Management System (AMS) for monitoring, remotely configuring, updating, and managing the entire lifecycle of deployed IoT solutions.

• Device Communication: Instruction on various socket programming methods to establish and manage communication channels, enabling Java programs to effectively interact with network-connected devices.

• Notification & Alarms: Practical modules on creating real-time event-driven notifications using PushRegistry and configuring Alarm Registration for comprehensive system monitoring in the AMS.

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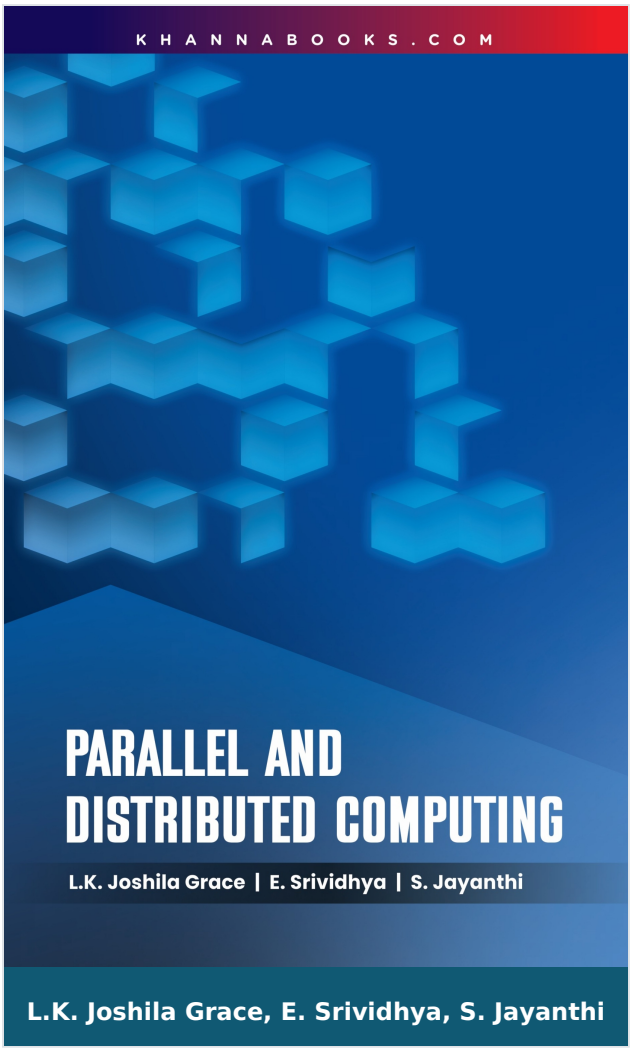
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Parallel and Distributed Computing

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Product Description

The rapid growth in data processing and the increasing complexity of computational problems have made Parallel and Distributed Computing (PDC) an essential field in modern technology. This book serves as a comprehensive and authoritative guide, providing both the theoretical foundations and practical insights required to master this evolving domain. It systematically explores how systems can execute multiple tasks simultaneously, fundamentally improving speed, efficiency, and resource utilization. The core theme is the detailed exposition of PDC principles, architectures, and applications, starting with the motivations for parallelism and modifications to the traditional von Neumann model. It offers a deep dive into parallel hardware like SIMD and MIMD systems, advanced architectures such as CMPs and GPUs, and crucial concepts like cache coherence and OpenCL programming. The book then transitions to distributed computing, covering critical areas like communication models, synchronization, deadlock handling, and distributed file systems and shared memory. With its structured five-unit approach, real-world applications, and problem-solving exercises, this resource is designed to equip a broad target audience—including students, researchers, and professionals—with the necessary knowledge to design and implement efficient, scalable systems. Mastering the concepts presented herein will be instrumental in shaping the future of high-performance computing.

Salient Features:

• Fundamental Architectures: Provides comprehensive coverage of parallel hardware, including Flynn’s taxonomy (SIMD/MIMD), cache coherence, and the evolution of modern architectures like CMPs and GPUs.

• Advanced Programming Models: Detailed exploration of key models of parallelism such as the PRAM and CTA models, alongside an essential introduction to OpenCL for heterogeneous parallel computing.

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• Interconnection Networks: Focuses on the crucial role of interconnection networks in parallel and distributed systems. It discusses both static and dynamic approaches to ensure high-speed and efficient communication among all processors.

• Distributed Communication: Covers essential goals, design issues, and models like the Client-Server Model. Includes in-depth topics such as Remote Procedure Calls (RPC) and Group Communication mechanisms.

• Synchronization & Control: Offers an in-depth analysis of synchronization algorithms, deadlock handling, and distributed scheduling techniques for effective resource and process management in multi-node systems.

• Memory Management Systems: Dedicated units on Distributed File Systems (DFS) design, implementation, and an introduction to shared memory consistency models, including a MACH system case study.

• Performance Optimization: Addresses practical considerations for performance, including floating-point precision, parallel reduction techniques, and managing common caveats like overhead and over-parallelization.

• Real-World Applications: Explores the wide scope of PDC, with applications in scientific simulations, AI, big data analytics, bioinformatics, and commercial systems like web and database services.

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