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The goal is to simplify the integration and scaling of big data and AI workflows onto the hybrid cloud, the company said.

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He is a recipient of the Turing Award in computer science, often referred to as the Nobel Prize of computing, in addition to numerous ... which was one of the foundations for distributed computation.

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IBM's CodeFlare framework is designed to help manage AI and machine learning pipelines in hybrid cloud environments.

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July 13, 2021 /PRNewswire/ -- Element Critical is ... recognize with 5G networks and edge computing on the horizon, that the future of infrastructure is distributed; IT architectures must be ...

A lucid and up-to-date introduction to the fundamentals of distributed computing systems As distributed systems become increasingly available, the need for a fundamental discussion of the subject has grown. Designed for first-year graduate students and advanced undergraduates as well as practicing computer engineers seeking a solid grounding in the subject, this well-organized text covers the fundamental concepts in distributed computing systems such as time, state, simultaneity, order, knowledge, failure, and agreement in distributed systems. Departing from the focus on shared memory and synchronous systems commonly taken by other texts, this is the first useful reference based on an asynchronous model of distributed computing, the most widely used in academia and industry. The emphasis of the book is on developing general mechanisms that can be applied to a variety of problems. Its examples-clocks, locks, cameras, sensors, controllers, slicers, and synchronizers-have been carefully chosen so that they are fundamental and yet useful in practical contexts. The text's advantages include: Emphasizes general mechanisms that can be applied to a variety of problems Uses a simple induction-based technique to prove correctness of all algorithms Includes a variety of exercises at the end of each chapter Contains material that has been extensively class tested Gives instructor flexibility in choosing appropriate balance between practice and theory of distributed computing

Concurrent and Distributed Computing in Java addresses fundamental concepts in concurrent computing with Java examples. The book consists of two parts. The first part deals with techniques for programming in shared-memory based systems. The book covers concepts in Java such as threads, synchronized methods, waits, and notify to expose students to basic concepts for multi-threaded programming. It also includes algorithms for mutual exclusion, consensus, atomic objects, and wait-free data structures. The second part of the book deals with programming in a message-passing system. This part covers resource allocation problems, logical clocks, global property detection, leader election, message ordering, agreement algorithms, checkpointing, and message logging. Primarily a textbook for upper-level undergraduates and graduate students, this thorough treatment will also be of interest to professional programmers.

Designing distributed computing systems is a complex process requiring a solid understanding of the design problems and the theoretical and practical aspects of their solutions. This comprehensive textbook covers the fundamental principles and models underlying the theory, algorithms and systems aspects of distributed computing. Broad and detailed coverage of the theory is balanced with practical systems-related issues such as mutual exclusion, deadlock detection, authentication, and failure recovery. Algorithms are carefully selected, lucidly presented, and described without complex proofs. Simple explanations and illustrations are used to elucidate the algorithms. Important emerging topics such as peer-to-peer networks and network security are also considered. With vital algorithms, numerous illustrations, examples and homework problems, this textbook is suitable for advanced undergraduate and graduate students of electrical and computer engineering and computer science. Practitioners in data networking and sensor networks will also find this a valuable resource. Additional resources are available online at www.cambridge.org/9780521876346.

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An introduction to fundamental theories of concurrent computation and associated programming languages for developing distributed and mobile computing systems. Starting from the premise that understanding the foundations of concurrent programming is key to developing distributed computing systems, this book first presents the fundamental theories of concurrent computing and then introduces the programming languages that help develop distributed computing systems at a high level of abstraction. The major theories of concurrent computation—including the π -calculus, the actor model, the join calculus, and mobile ambients—are explained with a focus on how they help design and reason about distributed and mobile computing systems. The book then presents programming languages that follow the theoretical models already described, including Pict, SALSA, and JoCaml. The parallel structure of the chapters in both part one (theory) and part two (practice) enable the reader not only to compare the different theories but also to see clearly how a programming language supports a theoretical model. The book is unique in bridging the gap between the theory and the practice of programming distributed computing systems. It can be used as a textbook for graduate and advanced undergraduate students in computer science or as a reference for researchers in the area of programming technology for distributed computing. By presenting theory first, the book allows readers to focus on the essential components of concurrency, distribution, and mobility without getting bogged down in syntactic details of specific programming languages. Once the theory is understood, the practical part of implementing a system in an actual programming language becomes much easier.

This title gives students an integrated and rigorous picture of applied computer science, as it comes to play in the construction of a simple yet powerful computer system.

Distributed Computing is rapidly becoming the principal computing paradigm in diverse areas of computing, communication, and control. Processor clusters, local and wide area networks, and the information highway evolved a new kind of problems which can be solved with distributed algorithms. In this textbook a variety of distributed algorithms are presented independently of particular programming languages or hardware, using the graphically suggestive technique of Petri nets which is both easy to comprehend intuitively and formally rigorous. By means of temporal logic the author provides surprisingly simple yet powerful correctness proofs for the algorithms. The scope of the book ranges from distributed control and synchronization of two sites up to algorithms on any kind of networks. Numerous examples show that description and analysis of distributed algorithms in this framework are intuitive and technically transparent.

Distributed computer systems are now widely available but, despite a number of recent advances, the design of software for these systems remains a challenging task, involving two main difficulties: the absence of a shared clock and the absence of a shared memory. The absence of a shared clock means that the concept of time is not useful in distributed systems. The absence of shared memory implies that the concept of a state of a distributed system also needs to be redefined. These two important concepts occupy a major portion of this book. Principles of Distributed Systems describes tools and techniques that have been successfully applied to tackle the problem of global time and state in distributed systems. The author demonstrates that the concept of time can be replaced by that of causality, and clocks can be constructed to provide causality information. The problem of not having a global state is alleviated by developing efficient algorithms for detecting properties and computing global functions. The author's major emphasis is in developing general mechanisms that can be applied to a variety of problems. For example, instead of discussing algorithms for standard problems, such as termination detection and deadlocks, the book discusses algorithms to detect general properties of a distributed computation. Also included are several worked examples and exercise problems that can be used for individual practice and classroom instruction. Audience: Can be used to teach a one-semester graduate course on distributed systems. Also an invaluable reference book for researchers and practitioners working on the many different aspects of distributed systems.

Future requirements for computing speed, system reliability, and cost-effectiveness entail the development of alternative computers to replace the traditional von Neumann organization. As computing networks come into being, one of the latest dreams is now possible - distributed computing. Distributed computing brings transparent access to as much computer power and data as the user needs for accomplishing any given task - simultaneously achieving high performance and reliability. The subject of distributed computing is diverse, and many researchers are investigating various issues concerning the structure of hardware and the design of distributed software. Distributed System Design defines a distributed system as one that looks to its users like an ordinary system, but runs on a set of autonomous processing elements (PEs) where each PE has a separate physical memory space and the message transmission delay is not negligible. With close cooperation among these PEs, the system supports an arbitrary number of processes and dynamic extensions. Distributed System Design outlines the main motivations for building a distributed system, including: inherently distributed applications performance/cost resource sharing flexibility and extendibility availability and fault tolerance scalability Presenting basic concepts, problems, and possible solutions, this reference serves graduate students in distributed system design as well as computer professionals analyzing and designing distributed/open/parallel systems. Chapters discuss: the scope of distributed computing systems general distributed programming languages and a CSP-like distributed control description language (DCDL) expressing parallelism, interprocess communication and synchronization, and fault-tolerant design two approaches describing a distributed system: the time-space view and the interleaving view mutual exclusion and related issues, including election, bidding, and self-stabilization prevention and detection of deadlock reliability, safety, and security as well as various methods of handling node, communication, Byzantine, and software faults efficient interprocessor communication mechanisms as well as these mechanisms without specific constraints, such as adaptiveness, deadlock-freedom, and fault-tolerance virtual channels and virtual networks load distribution problems synchronization of access to shared data while supporting a high degree of concurrency

Explore the power of distributed computing to write concurrent, scalable applications in Java About This Book Make the best of Java 9 features to write succinct code Handle large amounts of data using HPC Make use of AWS and Google App Engine along with Java to establish a powerful remote computation system Who This Book Is For This book is for basic to

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intermediate level Java developers who is aware of object-oriented programming and Java basic concepts. What You Will Learn Understand the basic concepts of parallel and distributed computing/programming Achieve performance improvement using parallel processing, multithreading, concurrency, memory sharing, and hpc cluster computing Get an in-depth understanding of Enterprise Messaging concepts with Java Messaging Service and Web Services in the context of Enterprise Integration Patterns Work with Distributed Database technologies Understand how to develop and deploy a distributed application on different cloud platforms including Amazon Web Service and Docker CaaS Concepts Explore big data technologies Effectively test and debug distributed systems Gain thorough knowledge of security standards for distributed applications including two-way Secure Socket Layer In Detail Distributed computing is the concept with which a bigger computation process is accomplished by splitting it into multiple smaller logical activities and performed by diverse systems, resulting in maximized performance in lower infrastructure investment. This book will teach you how to improve the performance of traditional applications through the usage of parallelism and optimized resource utilization in Java 9. After a brief introduction to the fundamentals of distributed and parallel computing, the book moves on to explain different ways of communicating with remote systems/objects in a distributed architecture. You will learn about asynchronous messaging with enterprise integration and related patterns, and how to handle large amount of data using HPC and implement distributed computing for databases. Moving on, it explains how to deploy distributed applications on different cloud platforms and self-contained application development. You will also learn about big data technologies and understand how they contribute to distributed computing. The book concludes with the detailed coverage of testing, debugging, troubleshooting, and security aspects of distributed applications so the programs you build are robust, efficient, and secure. Style and approach This is a step-by-step practical guide with real-world examples.

* Comprehensive introduction to the fundamental results in the mathematical foundations of distributed computing * Accompanied by supporting material, such as lecture notes and solutions for selected exercises * Each chapter ends with bibliographical notes and a set of exercises * Covers the fundamental models, issues and techniques, and features some of the more advanced topics

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