Fog Computing And Its Role In The Internet Of Things

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Fog Computing in the Internet of Things Amir M. Rahmani 2017-05-29 This book describes state-of-the-art approaches to Fog Computing, including the background of innovations achieved in recent years. Coverage includes various aspects of fog computing architectures for Internet of Things, driving reasons, variations and case studies. The authors discuss in detail key topics, such as meeting low latency and real-time requirements of applications, interoperability, federation and heterogeneous computing, energy efficiency and mobility, fog and cloud interplay, geo-distribution and location awareness, and case studies in healthcare and smart space applications.

Fog Computing for Healthcare 4.0 Environments Sudeep Tanwar 2020-08-02 This book provides an analysis of the role of fog computing, cloud computing, and Internet of Things in providing uninterrupted context-aware services as they relate to Healthcare 4.0. The book considers a three-layer patient-driven healthcare architecture for real-time data collection, processing, and transmission. It gives insight to the readers for the applicability of fog devices and gateways in Healthcare 4.0 environments for current and future applications. It also considers aspects required to manage the complexity of fog computing for Healthcare 4.0 and also develops a comprehensive taxonomy.

Fog and Fogonomics Yang Yang 2020-01-22 THE ONE-STOP RESOURCE FOR ANY INDIVIDUAL OR ORGANIZATION CONSIDERING FOG COMPUTING Fog and Fogonomics is a comprehensive and technology-centric resource that highlights the system model, architectures, building blocks, and IEEE standards for fog computing platforms and solutions. The "fog" is defined as the multiple interconnected layers of computing along the continuum from cloud to endpoints such as user devices and things including racks or microcells in server closets, residential gateways, factory control systems, and more. The authors—noted experts on the topic—review business models and metrics that allow for the economic assessment of fog-based information communication technology (ICT) resources, especially mobile resources. The book contains a wide range of templates and formulas for calculating quality-of-service values. Comprehensive in scope, it covers topics including fog computing technologies and reference architecture, fog-related standards and markets, fog-enabled applications and services, fog economics (fogonomics), and strategy. This important resource: Offers a comprehensive text on fog computing Discusses pricing, service level agreements, service delivery, and consumption of fog computing Examines how fog has the potential to change the information and communication technology industry in the next decade Describes how fog enables new business models, strategies, and competitive differentiation, as with ecosystems of connected and smart digital products and services Includes case studies featuring integration of fog computing, communication, and networking systems Written for product and systems engineers and designers, as well as for faculty and students, Fog and Fogonomics is an essential book that explores the technological and economic issues associated with fog computing.

Novel Practices and Trends in Grid and Cloud Computing Raj, Pethuru 2019-06-28 Business and IT organizations are currently embracing new strategically sound concepts in order to be more customer-centric, competitive, and cognitive in their daily operations. While useful, the various software tools, pioneering technologies, as well as their unique contributions largely go unused due to the lack of

information provided on their special characteristics. Novel Practices and Trends in Grid and Cloud Computing is a collection of innovative research on the key concerns of cloud computing and how they are being addressed, as well as the various technologies and tools empowering cloud theory to be participative, penetrative, pervasive, and persuasive. While highlighting topics including cyber security, smart technology, and artificial intelligence, this book is ideally designed for students, researchers, and business managers on the lookout for innovative IT solutions for all the business automation software and improvisations of computational technologies.

Intelligent Internet of Things Farshad Firouzi 2020-01-21 This holistic book is an invaluable reference for addressing various practical challenges in architecting and engineering Intelligent IoT and eHealth solutions for industry practitioners, academic and researchers, as well as for engineers involved in product development. The first part provides a comprehensive guide to fundamentals, applications, challenges, technical and economic benefits, and promises of the Internet of Things using examples of real-world applications. It also addresses all important aspects of designing and engineering cutting-edge IoT solutions using a cross-layer approach from device to fog, and cloud covering standards, protocols, design principles, reference architectures, as well as all the underlying technologies, pillars, and components such as embedded systems, network, cloud computing, data storage, data processing, big data analytics, machine learning, distributed ledger technologies, and security. In addition, it discusses the effects of Intelligent IoT, which are reflected in new business models and digital transformation. The second part provides an insightful guide to the design and deployment of IoT solutions for smart healthcare as one of the most important applications of IoT. Therefore, the second part targets smart healthcare-wearable sensors, body area sensors, advanced pervasive healthcare systems, and big data analytics that are aimed at providing connected health interventions to individuals for healthier lifestyles.

Fog Data Analytics for IoT Applications Sudeep Tanwar 2020-08-25 This book discusses the unique nature and complexity of fog data analytics (FDA) and develops a comprehensive taxonomy abstracted into a process model. The exponential increase in sensors and smart gadgets (collectively referred as smart devices or Internet of things (IoT) devices) has generated significant amount of heterogeneous and multimodal data, known as big data. To deal with this big data, we require efficient and effective solutions, such as data mining, data analytics and reduction to be deployed at the edge of fog devices on a cloud. Current research and development efforts generally focus on big data analytics and overlook the difficulty of facilitating fog data analytics (FDA). This book presents a model that addresses various research challenges, such as accessibility, scalability, fog nodes communication, nodal collaboration, heterogeneity, reliability, and quality of service (QoS) requirements, and includes case studies demonstrating its implementation. Focusing on FDA in IoT and requirements related to Industry 4.0, it also covers all aspects required to manage the complexity of FDA for IoT applications and also develops a comprehensive taxonomy.

Edge/Fog Computing Paradigm: The Concept, Platforms and Applications. 2022-05-01 Advances in Computers, Volume 127 presents innovations in computer hardware, software, theory, design and applications, with this updated volume including new chapters on Edge AI, Edge Computing, Edge Analytics, Edge Data Analytics, Edge Native Applications, Edge Platforms, Edge Computing, IoT, Internet of Things, etc.

Contains novel subject matter that is relevant to computer science Includes the expertise of contributing authors Presents an easy to comprehend writing style

Fog Computing: Breakthroughs in Research and Practice Management Association, Information Resources 2018-06-04 Fog computing is rapidly expanding in its applications and capabilities through various parts of society. Utilizing different types of virtualization technologies can push this branch of computing to even greater heights. Fog Computing: Breakthroughs in Research and Practice contains a compendium of the latest academic material on the evolving theory and practice related to fog computing. Including innovative studies on distributed fog computing environments, programming models, and access control mechanisms, this publication is an ideal source for programmers, IT professionals, students, researchers, and engineers.

Fog and Edge Computing Rajkumar Buyya 2019-01-04 A comprehensive guide to Fog and Edge applications, architectures, and technologies Recent years have seen the explosive growth of the Internet of Things (IoT): the internet-connected network of devices that includes everything from personal electronics and home appliances to automobiles and industrial machinery. Responding to the ever-increasing bandwidth demands of the IoT, Fog and Edge computing concepts have developed to collect, analyze, and process data more efficiently than traditional cloud architecture. Fog and Edge Computing: Principles and Paradigms provides a comprehensive overview of the state-of-the-art applications and architectures driving this dynamic field of computing while highlighting potential research directions and emerging technologies. Exploring topics such as developing scalable architectures, moving from closed systems to open systems, and ethical issues rising from data sensing, this timely book addresses both the challenges and opportunities that Fog and Edge computing presents. Contributions from leading IoT experts discuss federating Edge resources, middleware design issues, data management and predictive analysis, smart transportation and surveillance applications, and more. A coordinated and integrated presentation of topics helps readers gain thorough knowledge of the foundations, applications, and issues that are central to Fog and Edge computing. This valuable resource: Provides insights on transitioning from current Cloud-centric and 4G/5G wireless environments to Fog Computing Examines methods to optimize virtualized, pooled, and shared resources Identifies potential technical challenges and offers suggestions for possible solutions Discusses major components of Fog and Edge computing architectures such as middleware, interaction protocols, and autonomic management Includes access to a website portal for advanced online resources Fog and Edge Computing: Principles and Paradigms is an essential source of up-to-date information for systems architects, developers, researchers, and advanced undergraduate and graduate students in fields of computer science and engineering.

Fog Computing Zaigham Mahmood 2018-07-12 This authoritative text/reference describes the state of the art of fog computing, presenting insights from an international selection of renowned experts. A particular focus is provided on development approaches, architectural mechanisms, and measurement metrics for building smart adaptable environments. The coverage also includes important related topics such as device connectivity, security and interoperability, and communication methods. Topics and features: introduces the core concepts and principles of fog computing, and reviews the latest research and best practice relating to fog/edge environments; discusses the vision for an Internet of Things (IoT) in terms of fog computing and other related distributed computing paradigms, such as cloud computing; presents a survey of the key issues and broader aspects of the fog paradigm, as well as the factors that affect adoption of fog computing; examines frameworks and methodologies for fog-based architecture design, improving performance, and measuring quality of experience; proposes tools and methodologies for analyzing large amounts of sensor data from smart city initiatives; describes approaches for designing robust services, management of data-intensive applications, context-aware data analysis, and vehicular networking; identifies potential future research directions and technological innovations in relation to distributed computing environments such as the IoT. This enlightening volume offers essential perspectives for researchers of distributed computing and computer networking, as well as for advanced undergraduate and graduate students pursuing interests in this area. Professional engineers seeking to enhance security and connectivity in their IoT systems will also find this work to be a valuable reference.

Internet of Everything Beniamino Di Martino 2017-10-15 This book focuses on the Internet of Everything and related fields. The Internet of Everything adds connectivity and intelligence to just about every device, giving it special functions. The book provides a common platform for integrating information from heterogeneous sources. However, this can be quite reductive, as the Internet of Everything provides links not only among things, but also data, people, and business processes. The evolution of current sensor and device networks, with strong interactions between people and social environments, will have a dramatic impact on everything from city planning, first responders, the military and health. Such a shared ecosystem will allow for the interaction between data, sensor inputs and heterogeneous systems. Semantics is a fundamental component of this since semantic technologies are able to provide the necessary bridge between different data representations, and to solve terminology incongruence. Integrating data from distributed devices, sensor networks, social networks and biomedical instruments requires, first of all, the systematization of the current state of the art in such fields. Then, it is necessary to identify a common action thread to actually merge and homogenize standards and techniques applied in such a heterogeneous field. The exact requirements of an Internet of Everything environment need to be precisely identified and formally expressed, and finally, the role of modern computing paradigms, such as Cloud and Fog Computing, needs to be assessed with respect to the requirements expressed by an Internet of Everything ecosystem.

Encyclopedia of Big Data Technologies Sherif Sakr 2019-03-01 The Encyclopedia of Big Data Technologies provides researchers, educators, students and industry professionals with a comprehensive authority over the most relevant Big Data Technology concepts. With over 300 articles written by worldwide subject matter experts from both industry and academia, the encyclopedia covers topics such as big data storage systems, NoSQL database, cloud computing, distributed systems, data processing, data management, machine learning and social technologies, data science. Each peer-reviewed, highly structured entry provides the reader with basic terminology, subject overviews, key research results, application examples, future directions, cross references and a bibliography. The entries are expository and tutorial, making this reference a practical resource for students, academics, or professionals. In addition, the distinguished, international editorial board of the encyclopedia consists of well-respected scholars, each developing topics based upon their expertise.

Modeling and Simulation Design Phillip Tavel 2007-01-01

Fog Computing for Healthcare 4.0 Environments Sudeep Tanwar 2021-08-04 This book provides an analysis of the role of fog computing, cloud computing, and Internet of Things in providing uninterrupted context-aware services as they relate to Healthcare 4.0. The book considers a three-layer patient-driven healthcare architecture for real-time data collection, processing, and transmission. It gives insight to the readers for the applicability of fog devices and gateways in Healthcare 4.0 environments for current and future applications. It also considers aspects required to manage the complexity of fog computing for Healthcare 4.0 and also develops a comprehensive taxonomy.

Fog for 5G and IoT Mung Chiang 2017-04-03 Fog is starting to shape the future of the balance of power in information technology The book examines how fog will change the information technology industry in the next decade. Along the cloud-to-things continuum, fog distributes the services of computation, communication, control, and storage closer to the edge, access, and users. As a computing and networking architecture, fog enables key applications in wireless 5G, the Internet of things (IoT), and big data. The authors cover the fundamental trade-offs to major applications of fog. The book chapters are designed to motivate a transition from the current cloud architectures to the fog (Chapter 1) and the necessary architectural components to support such a transition (Chapters 2–6). The rest of the chapters (Chapters 7–11) are dedicated to reviewing various 5G and IoT applications that will benefit from fog networking. This volume is edited by pioneers in fog and includes contributions by active researchers in the field. Covers fog technologies and describes the interaction between fog and cloud Presents a view of fog and IoT that combines the aspects of both industry and academia Discusses the various architectural and design challenges in coordinating the interactions between M2M, D2D, and fog technologies "Fog for 5G and IoT" serves as an introduction to the evolving fog architecture, compiling work from different areas that collectively form this paradigm

Communication Networks and Service Management in the Era of Artificial Intelligence and Machine Learning Nur Zincir-Heywood 2021-09-03 COMMUNICATION NETWORKS AND SERVICE MANAGEMENT IN THE ERA OF ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING Discover the impact that new technologies are having on communication systems with this up-to-date and one-stop resource Communication Networks and Service

Management in the Era of Artificial Intelligence and Machine Learning delivers a comprehensive overview of the impact of artificial intelligence (AI) and machine learning (ML) on service and network management. Beginning with a fulsome description of ML and AI, the book moves on to discuss management models, architectures, and frameworks. The authors also explore how AI and ML can be used in service management functions like the generation of workload profiles, service provisioning, and more. The book includes a handpicked selection of applications and case studies, as well as a treatment of emerging technologies the authors predict could have a significant impact on network and service management in the future. Statistical analysis and data mining are also discussed, particularly with respect to how they allow for an improvement of the management and security of IT systems and networks. Readers will also enjoy topics like: A thorough introduction to network and service management, machine learning, and artificial intelligence An exploration of artificial intelligence and machine learning for management models, including autonomic management, policy-based management, intent based management, and network virtualization-based management Discussions of AI and ML for architectures and frameworks, including cloud systems, software defined networks, 5G and 6G networks, and Edge/Fog networks An examination of AI and ML for service management, including the automatic generation of workload profiles using unsupervised learning Perfect for information and communications technology educators, Communication Networks and Service Management in the Era of Artificial Intelligence and Machine Learning will also earn a place in the libraries of engineers and professionals who seek a structured reference on how the emergence of artificial intelligence and machine learning techniques is affecting service and network management.

Handbook of Large-Scale Distributed Computing in Smart Healthcare Samee U. Khan 2017-08-07 This volume offers readers various perspectives and visions for cutting-edge research in ubiquitous healthcare. The topics emphasize large-scale architectures and high performance solutions for smart healthcare, healthcare monitoring using large-scale computing techniques, Internet of Things (IoT) and big data analytics for healthcare, Fog Computing, mobile health, large-scale medical data mining, advanced machine learning methods for mining multidimensional sensor data, smart homes, and resource allocation methods for the BANs. The book contains high quality chapters contributed by leading international researchers working in domains, such as e-Health, pervasive and context-aware computing, cloud, grid, cluster, and big-data computing. We are optimistic that the topics included in this book will provide a multidisciplinary research platform to the researchers, practitioners, and students from biomedical engineering, health informatics, computer science, and computer engineering.

Advancing Consumer-Centric Fog Computing Architectures Munir, Kashif 2018-12-07 Due to a rapidly growing number of devices and communications, cloud computing has begun to fall behind on its ability to adequately process today's technology. Additionally, companies have begun to look for solutions that would help reduce their infrastructure costs and improve profitability. Fog computing, a paradigm that extends cloud computing and services to the edge of the network, has presented itself as a viable solution and cost-saving method. However, before businesses can implement this new method, concerns regarding its security, privacy, availability, and data protection must be addressed. Advancing Consumer-Centric Fog Computing Architectures is a collection of innovative research on the methods and applications of fog computing in technological, business, and organizational dimensions. Thoroughly examining fog computing with respect to issues of management, trust and privacy, governance, and interoperability, this publication highlights a range of topics including access control mechanism, data confidentiality, and service-oriented architecture. This book is ideally designed for academicians, researchers, software developers, IT professionals, policymakers, technology designers, graduate-level students, managers, and business owners.

Big Data and Internet of Things: A Roadmap for Smart Environments Nik Bessis 2014-03-11 This book presents current progress on challenges related to Big Data management by focusing on the particular challenges associated with context-aware data-intensive applications and services. The book is a state-of-the-art reference discussing progress made, as well as prompting future directions on the theories, practices, standards and strategies that are related to the emerging computational technologies and their association with supporting the Internet of Things advanced functioning for organizational settings including both business and e-science. Apart from inter-operable and inter-cooperative aspects, the book deals with a notable opportunity namely, the current trend in which a collectively shared and generated content is

emerged from Internet end-users. Specifically, the book presents advances on managing and exploiting the vast size of data generated from within the smart environment (i.e. smart cities) towards an integrated, collective intelligence approach. The book also presents methods and practices to improve large storage infrastructures in response to increasing demands of the data intensive applications. The book contains 19 self-contained chapters that were very carefully selected based on peer review by at least two expert and independent reviewers and is organized into the three sections reflecting the general themes of interest to the IoT and Big Data communities: Section I: Foundations and Principles Section II: Advanced Models and Architectures Section III: Advanced Applications and Future Trends The book is intended for researchers interested in joining interdisciplinary and transdisciplinary works in the areas of Smart Environments, Internet of Things and various computational technologies for the purpose of an integrated collective computational intelligence approach into the Big Data era.

The Rise of Fog Computing in the Digital Era K. G. Srinivasa 2018 "This book contains a compendium of the latest academic material on the evolving theory and practice related to fog computing. Including innovative studies on distributed fog computing environments, programming models, and access control mechanisms"--

Innovations in the Industrial Internet of Things (IIoT) and Smart Factory Goundar, Sam 2021-01-22 Industrial internet of things (IIoT) is changing the face of industry by completely redefining the way stakeholders, enterprises, and machines connect and interact with each other in the industrial digital ecosystem. Smart and connected factories, in which all the machinery transmits real-time data, enable industrial data analytics for improving operational efficiency, productivity, and industrial processes, thus creating new business opportunities, asset utilization, and connected services. IIoT leads factories to step out of legacy environments and arcane processes towards open digital industrial ecosystems. Innovations in the Industrial Internet of Things (IIoT) and Smart Factory is a pivotal reference source that discusses the development of models and algorithms for predictive control of industrial operations and focuses on optimization of industrial operational efficiency, rationalization, automation, and maintenance. While highlighting topics such as artificial intelligence, cyber security, and data collection, this book is ideally designed for engineers, manufacturers, industrialists, managers, IT consultants, practitioners, students, researchers, and industrial industry professionals.

Fog/Edge Computing For Security, Privacy, and Applications Wei Chang 2021-01-04 This book provides the state-of-the-art development on security and privacy for fog/edge computing, together with their system architectural support and applications. This book is organized into five parts with a total of 15 chapters. Each area corresponds to an important snapshot. The first part of this book presents an overview of fog/edge computing, focusing on its relationship with cloud technology and the future with the use of 5G communication. Several applications of edge computing are discussed. The second part of this book considers several security issues in fog/edge computing, including the secure storage and search services, collaborative intrusion detection method on IoT-fog computing, and the feasibility of deploying Byzantine agreement protocols in untrusted environments. The third part of this book studies the privacy issues in fog/edge computing. It first investigates the unique privacy challenges in fog/edge computing, and then discusses a privacy-preserving framework for the edge-based video analysis, a popular machine learning application on fog/edge. This book also covers the security architectural design of fog/edge computing, including a comprehensive overview of vulnerabilities in fog/edge computing within multiple architectural levels, the security and intelligent management, the implementation of network-function-virtualization-enabled multicasting in part four. It explains how to use the blockchain to realize security services. The last part of this book surveys applications of fog/edge computing, including the fog/edge computing in Industrial IoT, edge-based augmented reality, data streaming in fog/edge computing, and the blockchain-based application for edge-IoT. This book is designed for academics, researchers and government officials, working in the field of fog/edge computing and cloud computing. Practitioners, and business organizations (e.g., executives, system designers, and marketing professionals), who conduct teaching, research, decision making, and designing fog/edge technology will also benefit from this book The content of this book will be particularly useful for advanced-level students studying computer science, computer technology, and information systems, but also applies to students in business, education, and economics, who would benefit from the information, models, and case studies therein.

Advanced Information Networking and Applications Leonard Barolli

The Rise of Fog Computing in the Digital Era Srinivasa, K.G. 2018-08-31 With the immense growth of information, the prevalence of ubiquitously connected smart devices is rapidly increasing. Providing platforms that support computation, storage, and networking services between end devices is an essential aspect of an expanding digital society. The Rise of Fog Computing in the Digital Era provides innovative insights into the present generation of computing devices, as well as new approaches to computational platforms through fog computing. The content within this publication presents concepts and theories on data analytics, management systems, networking architectures, and many more. It is a vital reference source for IT professionals, computer programmers, software developers, computer engineers, researchers, and upper-level students seeking topics centered on the challenges and benefits of fog computing in mobile environments.

Applying Integration Techniques and Methods in Distributed Systems and Technologies Kecskemeti, Gabor 2019-04-12 Distributed systems intertwine with our everyday lives. The benefits and current shortcomings of the underpinning technologies are experienced by a wide range of people and their smart devices. With the rise of large-scale IoT and similar distributed systems, cloud bursting technologies, and partial outsourcing solutions, private entities are encouraged to increase their efficiency and offer unparalleled availability and reliability to their users. Applying Integration Techniques and Methods in Distributed Systems is a critical scholarly publication that defines the current state of distributed systems, determines further goals, and presents architectures and service frameworks to achieve highly integrated distributed systems and presents solutions to integration and efficient management challenges faced by current and future distributed systems. Highlighting topics such as multimedia, programming languages, and smart environments, this book is ideal for system administrators, integrators, designers, developers, researchers, and academicians.

Integration of Cloud Computing with Internet of Things Monika Mangla 2021-03-08 The book aims to integrate the aspects of IoT, Cloud computing and data analytics from diversified perspectives. The book also plans to discuss the recent research trends and advanced topics in the field which will be of interest to academicians and researchers working in this area. Thus, the book intends to help its readers to understand and explore the spectrum of applications of IoT, cloud computing and data analytics. Here, it is also worth mentioning that the book is believed to draw attention on the applications of said technology in various disciplines in order to obtain enhanced understanding of the readers. Also, this book focuses on the researches and challenges in the domain of IoT, Cloud computing and Data analytics from perspectives of various stakeholders.

Energy Conservation Solutions for Fog-Edge Computing Paradigms Rajeev Tiwari 2021-09-07 This book focuses on energy efficiency concerns in fog–edge computing and the requirements related to Industry 4.0 and next-generation networks like 5G and 6G. This book guides the research community about practical approaches, methodological, and moral questions in any nations' journey to conserve energy in fog–edge computing environments. It discusses a detailed approach required to conserve energy and comparative case studies with respect to various performance evaluation metrics, such as energy conservation, resource allocation strategies, task allocation strategies, VM migration, and load-sharing strategies with state-of-the-art approaches, with fog and edge networks.

Fog, Edge, and Pervasive Computing in Intelligent IoT Driven Applications Deepak Gupta 2021-01-07 A practical guide to the design, implementation, evaluation, and deployment of emerging technologies for intelligent IoT applications With the rapid development in artificially intelligent and hybrid technologies, IoT, edge, fog-driven, and pervasive computing techniques are becoming important parts of our daily lives. This book focuses on recent advances, roles, and benefits of these technologies, describing the latest intelligent systems from a practical point of view. Fog, Edge, and Pervasive Computing in Intelligent IoT Driven Applications is also valuable for engineers and professionals trying to solve practical, economic, or technical problems. With a uniquely practical approach spanning multiple fields of interest, contributors cover theory, applications, and design methodologies for intelligent systems. These technologies are rapidly transforming engineering, industry, and agriculture by enabling real-time processing of data via computational, resource-oriented metaheuristics and machine learning algorithms. As edge/fog computing and associated technologies are implemented far and wide, we are now able to solve previously intractable

problems. With chapters contributed by experts in the field, this book: Describes Machine Learning frameworks and algorithms for edge, fog, and pervasive computing Considers probabilistic storage systems and proven optimization techniques for intelligent IoT Covers 5G edge network slicing and virtual network systems that utilize new networking capacity Explores resource provisioning and bandwidth allocation for edge, fog, and pervasive mobile applications Presents emerging applications of intelligent IoT, including smart farming, factory automation, marketing automation, medical diagnosis, and more Researchers, graduate students, and practitioners working in the intelligent systems domain will appreciate this book's practical orientation and comprehensive coverage. Intelligent IoT is revolutionizing every industry and field today, and Fog, Edge, and Pervasive Computing in Intelligent IoT Driven Applications provides the background, orientation, and inspiration needed to begin.

Large-scale Data Streaming, Processing, and Blockchain Security Hemraj Saini 2020 "This book explores the latest methodologies, modeling, and simulations for coping with the generation and management of large-scale data in both scientific and individual applications"--

The Cloud-to-Thing Continuum Theo Lynn 2020-01-01 The Internet of Things offers massive societal and economic opportunities while at the same time significant challenges, not least the delivery and management of the technical infrastructure underpinning it, the deluge of data generated from it, ensuring privacy and security, and capturing value from it. This Open Access Pivot explores these challenges, presenting the state of the art and future directions for research but also frameworks for making sense of this complex area. This book provides a variety of perspectives on how technology innovations such as fog, edge and dew computing, 5G networks, and distributed intelligence are making us rethink conventional cloud computing to support the Internet of Things. Much of this book focuses on technical aspects of the Internet of Things, however, clear methodologies for mapping the business value of the Internet of Things are still missing. We provide a value mapping framework for the Internet of Things to address this gap. While there is much hype about the Internet of Things, we have yet to reach the tipping point. As such, this book provides a timely entrée for higher education educators, researchers and students, industry and policy makers on the technologies that promise to reshape how society interacts and operates. Theo Lynn is Full Professor of Digital Business at DCU Business School, Ireland and Director of the Irish Institute of Digital Business. John G. Mooney is Associate Professor of Information Systems and Technology Management at the Pepperdine Graziadio Business School, United States. Brian Lee is Director of the Software Research Institute at Athlone Institute of Technology. Patricia Takako Endo is a Postdoctoral Research Fellow at the Irish Institute of Digital Business, Dublin City University, Ireland, and a Professor at Universidade de Pernambuco, Brazil.

Fog Computing, Deep Learning and Big Data Analytics-Research Directions C.S.R. Prabhu 2019-01-04 This book provides a comprehensive picture of fog computing technology, including of fog architectures, latency aware application management issues with real time requirements, security and privacy issues and fog analytics, in wide ranging application scenarios such as M2M device communication, smart homes, smart vehicles, augmented reality and transportation management. This book explores the research issues involved in the application of traditional shallow machine learning and deep learning techniques to big data analytics. It surveys global research advances in extending the conventional unsupervised or clustering algorithms, extending supervised and semi-supervised algorithms and association rule mining algorithms to big data Scenarios. Further it discusses the deep learning applications of big data analytics to fields of computer vision and speech processing, and describes applications such as semantic indexing and data tagging. Lastly it identifies 25 unsolved research problems and research directions in fog computing, as well as in the context of applying deep learning techniques to big data analytics, such as dimensionality reduction in high-dimensional data and improved formulation of data abstractions along with possible directions for their solutions.

Data Lakes Anne Laurent 2020-04-09 The concept of a data lake is less than 10 years old, but they are already hugely implemented within large companies. Their goal is to efficiently deal with ever-growing volumes of heterogeneous data, while also facing various sophisticated user needs. However, defining and building a data lake is still a challenge, as no consensus has been reached so far. Data Lakes presents recent outcomes and trends in the field of data repositories. The main topics discussed are the data-driven

architecture of a data lake; the management of metadata – supplying key information about the stored data, master data and reference data; the roles of linked data and fog computing in a data lake ecosystem; and how gravity principles apply in the context of data lakes. A variety of case studies are also presented, thus providing the reader with practical examples of data lake management.

Architecture and Security Issues in Fog Computing Applications Goundar, Sam 2019-09-20 As the progression of the internet continues, society is finding easier, quicker ways of simplifying their needs with the use of technology. With the growth of lightweight devices, such as smart phones and wearable devices, highly configured hardware is in heightened demand in order to process the large amounts of raw data that are acquired. Connecting these devices to fog computing can reduce bandwidth and latency for data transmission when associated with centralized cloud solutions and uses machine learning algorithms to handle large amounts of raw data. The risks that accompany this advancing technology, however, have yet to be explored. Architecture and Security Issues in Fog Computing Applications is a pivotal reference source that provides vital research on the architectural complications of fog processing and focuses on security and privacy issues in intelligent fog applications. While highlighting topics such as machine learning, cyber-physical systems, and security applications, this publication explores the architecture of intelligent fog applications enabled with machine learning. This book is ideally designed for IT specialists, software developers, security analysts, software engineers, academicians, students, and researchers seeking current research on network security and wireless systems.

Fog Computing Based IoT Applications and Their Performance Santosh Reddy Gundala Palle 2018 Today's Internet of Things (IoT) is enabling innovations much faster to enhance the quality of life using various IoT applications such as Smart City, Smart Homes, Autonomous Driving Cars, Drone Monitoring Systems and many more applications. Cloud Computing in IoT has playing a significant role in providing its maximum services such as Data Storage, Computing or Processing, Analyzing and Securing Big Data etc for IoT applications. But, researchers estimated that the users are going to deploy 1 trillion IoT devices by the year 2025 which could have an economic impact of $11 trillion dollars per year. The unprecedented amount of data that is going to generate from those number of devices is pushing the cloud computing traditional systems to difficult situations to handle. Along with this situation there are certain applications (Self Driving, Health Monitoring, Gamming, Real-Time Big Data Analytics, Live Streaming and Controlling Applications etc.) in IoT which requires quick response to react and control the situations if necessary. The traditional Cloud Computing systems in this scenario cannot satisfy the service level agreement (SLA) made between the cloud service providers and cloud users. Balancing this scenario, cloud service providers must maintain a reasonable performance while reducing the energy consumption and cost of maintenance. In this thesis work a new computing paradigm called Fog Computing has been used for our newly proposed application models to overcome the problems or drawbacks of Cloud Computing and to enhance the performance for our application models by satisfying the quality of service level agreements (QOSLA). By using Fog Computing distributed strategy our models achieved better performance and worked more efficient than in Cloud. It also reduced the network usage, energy consumption in cloud and cost of execution. To simulate our work, we used iFogSim simulation toolkit which is currently growing significantly for the past couple of years.

Cloud and Fog Computing Platforms for Internet of Things Pankaj Bhambri 2022-06-08 Today, relevant data are typically delivered to cloud-based servers for storing and analysis in order to extract key features and enable enhanced applications beyond the basic transmission of raw data and to realize the possibilities associated with the impending Internet of Things (IoT). To allow for quicker, more efficient, and expanded privacy-preserving services, a new trend called Fog Computing has emerged: moving these responsibilities to the network's edge. Traditional centralized cloud computing paradigms confront new problems posed by IoT application growth, including high latency, limited storage, and outages due to a lack of available resources. Fog Computing puts the cloud and IoT devices closer together to address these issues. Instead of sending IoT data to the cloud, the fog processes and stores it locally at IoT devices. Unlike the cloud, fog-based services have a faster reaction time and better quality overall. Fog Computing, Cloud Computing, and their connectivity with the IoT are discussed in this book, with an emphasis on the advantages and implementation issues. It also explores the various architectures and appropriate IoT applications. Fog Computing, Cloud Computing, and Internet of Things are being suggested as potential research directions.

Features: A systematic overview of the state-of-the-art in Cloud Computing, Fog Computing, and Internet of Things Recent research results and some pointers to future advancements in architectures and methodologies Detailed examples from clinical studies using several different data sets

Handbook of Research on Cloud and Fog Computing Infrastructures for Data Science Raj, Pethuru 2018-05-18 Fog computing is quickly increasing its applications and uses to the next level. As it continues to grow, different types of virtualization technologies can thrust this branch of computing further into mainstream use. The Handbook of Research on Cloud and Fog Computing Infrastructures for Data Science is a key reference volume on the latest research on the role of next-generation systems and devices that are capable of self-learning and how those devices will impact society. Featuring wide-ranging coverage across a variety of relevant views and themes such as cognitive analytics, data mining algorithms, and the internet of things, this publication is ideally designed for programmers, IT professionals, students, researchers, and engineers looking for innovative research on software-defined cloud infrastructures and domain-specific analytics.

Fog Computing Assad Abbas 2020-04-21 Summarizes the current state and upcoming trends within the area of fog computing Written by some of the leading experts in the field, Fog Computing: Theory and Practice focuses on the technological aspects of employing fog computing in various application domains, such as smart healthcare, industrial process control and improvement, smart cities, and virtual learning environments. In addition, the Machine-to-Machine (M2M) communication methods for fog computing environments are covered in depth. Presented in two parts—Fog Computing Systems and Architectures, and Fog Computing Techniques and Application—this book covers such important topics as energy efficiency and Quality of Service (QoS) issues, reliability and fault tolerance, load balancing, and scheduling in fog computing systems. It also devotes special attention to emerging trends and the industry needs associated with utilizing the mobile edge computing, Internet of Things (IoT), resource and pricing estimation, and virtualization in the fog environments. Includes chapters on deep learning, mobile edge computing, smart grid, and intelligent transportation systems beyond the theoretical and foundational concepts Explores real-time traffic surveillance from video streams and interoperability of fog computing architectures Presents the latest research on data quality in the IoT, privacy, security, and trust issues in fog computing Fog Computing: Theory and Practice provides a platform for researchers, practitioners, and graduate students from computer science, computer engineering, and various other disciplines to gain a deep understanding of fog computing.

Privacy-Enhancing Fog Computing and Its Applications Xiaodong Lin 2018-11-12 This SpringerBrief covers the security and privacy challenges in fog computing, and proposes a new secure and privacy-preserving mechanisms to resolve these challenges for securing fog-assisted IoT applications. Chapter 1 introduces the architecture of fog-assisted IoT applications and the security and privacy challenges in fog computing. Chapter 2 reviews several promising privacy-enhancing techniques and illustrates examples on how to leverage these techniques to enhance the privacy of users in fog computing. Specifically, the authors divide the existing privacy-enhancing techniques into three categories: identity-hidden techniques, location privacy protection and data privacy enhancing techniques. The research is of great importance since security and privacy problems faced by fog computing impede the healthy development of its enabled IoT applications. With the advanced privacy-enhancing techniques, the authors propose three secure and privacy-preserving protocols for fog computing applications, including smart parking navigation, mobile crowdsensing and smart grid. Chapter 3 introduces identity privacy leakage in smart parking navigation systems, and proposes a privacy-preserving smart parking navigation system to prevent identity privacy exposure and support efficient parking guidance retrieval through road-side units (fogs) with high retrieving probability and security guarantees. Chapter 4 presents the location privacy leakage, during task allocation in mobile crowdsensing, and propose a strong privacy-preserving task allocation scheme that enables location-based task allocation and reputation-based report selection without exposing knowledge about the location and reputation for participators in mobile crowdsensing. Chapter 5 introduces the data privacy leakage in smart grid, and proposes an efficient and privacy-preserving smart metering protocol to allow collectors (fogs) to achieve real-time measurement collection with privacy-enhanced data aggregation. Finally, conclusions and future research directions are given in Chapter 6. This brief validates the significant feature extension and efficiency improvement of IoT devices without sacrificing the security and privacy of users against dishonest

fog nodes. It also provides valuable insights on the security and privacy protection for fog-enabled IoT applications. Researchers and professionals who carry out research on security and privacy in wireless communication will want to purchase this SpringerBrief. Also, advanced level students, whose main research area is mobile network security will also be interested in this SpringerBrief.

Fog and Fogonomics Yang Yang 2020-01-14 THE ONE-STOP RESOURCE FOR ANY INDIVIDUAL OR ORGANIZATION CONSIDERING FOG COMPUTING Fog and Fogonomics is a comprehensive and technology-centric resource that highlights the system model, architectures, building blocks, and IEEE standards for fog computing platforms and solutions. The "fog" is defined as the multiple interconnected layers of computing along the continuum from cloud to endpoints such as user devices and things including racks or microcells in server closets, residential gateways, factory control systems, and more. The authors—noted experts on the topic—review business models and metrics that allow for the economic assessment of fog-based information communication technology (ICT) resources, especially mobile resources. The book contains a wide range of templates and formulas for calculating quality-of-service values. Comprehensive in scope, it covers topics including fog computing technologies and reference architecture, fog-related standards and markets, fog-enabled applications and services, fog economics (fogonomics), and strategy. This important resource: Offers a comprehensive text on fog computing Discusses pricing, service level agreements, service delivery, and consumption of fog computing Examines how fog has the potential to change the information and communication technology industry in the next decade Describes how fog enables new business models, strategies, and competitive differentiation, as with ecosystems of connected and smart digital products and services Includes case studies featuring integration of fog computing, communication, and networking systems Written for product and systems engineers and designers, as well as for faculty and students, Fog and Fogonomics is an essential book that explores the technological and economic issues associated with fog computing.

Research Anthology on Privatizing and Securing Data Management Association, Information Resources 2021-04-23 With the immense amount of data that is now available online, security concerns have been an issue from the start, and have grown as new technologies are increasingly integrated in data collection, storage, and transmission. Online cyber threats, cyber terrorism, hacking, and other cybercrimes have begun to take advantage of this information that can be easily accessed if not properly handled. New privacy and security measures have been developed to address this cause for concern and have become an essential area of research within the past few years and into the foreseeable future. The ways in which data is secured and privatized should be discussed in terms of the technologies being used, the methods and models for security that have been developed, and the ways in which risks can be detected, analyzed, and mitigated. The Research Anthology on Privatizing and Securing Data reveals the latest tools and technologies for privatizing and securing data across different technologies and industries. It takes a deeper dive into both risk detection and mitigation, including an analysis of cybercrimes and cyber threats, along with a sharper focus on the technologies and methods being actively implemented and utilized to secure data online. Highlighted topics include information governance and privacy, cybersecurity, data protection, challenges in big data, security threats, and more. This book is essential for data analysts, cybersecurity professionals, data scientists, security analysts, IT specialists, practitioners, researchers, academicians, and students interested in the latest trends and technologies for privatizing and securing data.