Power Distribution In Data Centers Raritan Inc

As the demand for efficient energy sources continues to grow around the globe, electrical systems are becoming more essential in an effort to meet these increased needs. As these systems are being utilized more frequently, it becomes imperative to find ways of optimizing their overall function. The Handbook of Research on Emerging Technologies for Electrical Power Planning, Analysis, and Optimization features emergent methods and research in the systemic and strategic planning of energy usage. Highlighting theoretical perspectives and empirical research, this handbook is a comprehensive reference source for researchers, practitioners, students, and professionals interested in the current advancements and efficient use in power systems.

This book gives a comprehensive guide on the fundamental concepts, applications, algorithms, protocols, new trends and challenges, and research results in the area of Green Information and Communications Systems. It is an invaluable resource giving knowledge on the core and specialized issues in the field, making it highly suitable for both the new and experienced researcher in this area. Key Features: Core research topics of green information and communication systems are covered from a network design perspective, giving both theoretical and practical perspectives Provides a unified covering of otherwise disperse selected topics on green computing, information, communication and networking Includes a set of downloadable PowerPoint slides and glossary of terms for each chapter A 'whose-who' of international contributors Extensive bibliography for enhancing further knowledge Coverage includes: Smart grid technologies and communications Spectrum management Cognitive and autonomous radio systems Computing and communication architectures Data centres Distributed networking Cloud computing Next generation wireless communication systems 4G access networking Optical core networks Cooperation transmission Security and privacy Core research topics of green information and communication systems are covered from a network design perspective, giving both a theoretical and practical perspective A 'whose-who' of international contributors Extensive bibliography for enhancing further knowledge The comprehensive and authoritative guide to power electronics in renewable energy systems Power electronics plays a significant role in modern industrial automation and high- efficiency energy systems. With contributions from an international group of noted experts, Power Electronics in Renewable Energy Systems and Smart Grid: Technology and Applications offers a comprehensive review of the technology and applications of power electronics in renewable energy systems and smart grids. The authors cover information on a variety of energy systems including wind, solar, ocean, and geothermal energy systems as well as fuel cell systems and bulk energy storage systems. They also examine smart grid elements, modeling, simulation, control, and AI applications. The book's twelve chapters offer an application-oriented and tutorial viewpoint and also contain technology status review. In addition, the book contains illustrative examples of applications and discussions of future perspectives. This important resource: Includes descriptions of power semiconductor devices, two level and multilevel converters, HVDC systems, FACTS, and more Offers discussions on various energy systems such as wind, solar, ocean, and geothermal energy systems, and also fuel cell systems and bulk energy storage systems Explores smart grid elements, modeling, simulation, control, and AI applications Contains state-of-the-art technologies and future perspectives Provides the expertise of international authorities in the field Written for graduate students, professors in power electronics, and industry engineers, Power Electronics in Renewable Energy Systems and Smart Grid: Technology and Applications offers an up-to-date guide to technology and applications of a wide-range of power electronics in energy systems and smart grids.

"This book covers a wide spectrum of topics relevant to implementing and managing a modern data center. The chapters are comprehensive and the flow of concepts is easy to understand." -Cisco reviewer Gain a practical knowledge of data center concepts To create a well-designed data center (including storage and network architecture, VoIP implementation, and server consolidation) you must understand a variety of key concepts and technologies. This book explains those factors in a way that smoothes the path to implementation and management. Whether you need an introduction to the technologies, a refresher course for IT managers and data center personnel, or an additional resource for advanced study, you'll find these guidelines and solutions provide a solid foundation for building reliable designs and secure data center policies. * Understand the common causes and high costs of service outages * Learn how to measure high availability and achieve maximum levels * Design a data center using optimum physical, environmental, and technological elements * Explore a modular design for cabling, Points of Distribution, and WAN connections from ISPs * See what must be considered when consolidating data center resources * Expand your knowledge of best practices and security * Create a data center environment that is user- and manager-friendly * Learn how high availability, clustering, and disaster recovery solutions can be deployed to protect critical information * Find out how to use a single network infrastructure for IP data, voice, and storage

As we move towards becoming a smarter planet and the world becomes more instrumented, interconnected, and intelligent, the demands for data center resources are increasing rapidly. Smaller and more densely packed servers providing greater amounts of computing power can substantially increase power and cooling needs, while growing data volumes necessitate larger storage and network bandwidth capacities. Environmental and regulatory requirements can introduce additional limits on carbon emissions and water consumption. To satisfy these demands while keeping costs in check, our data centers need to be smarter as well. Comprehensive views of data center inventories, operational and environmental conditions, and consumption across multiple capacity types that span both facilities and IT are required. You can achieve greater efficiency using hardware, software, services, and design both in facilities and IT, but you need a comprehensive data center strategy to tie them together and thus obtain a complete picture of your data center environments. This IBM® RedpaperTM publication discusses important considerations when creating and implementing your smarter data center strategy. Notable techniques, best practices, and technological advances that can become

critical components of success are included, along with methods for bringing them together to gain in-depth knowledge of data center operations. With such insight comes increased resiliency, rapid responsiveness, profitable access to detailed analytics, and reliable planning for the future. Although not all-inclusive, this document provides a guide to getting started, points you to additional sources of information, and suggests ways IBM can partner with you in your pursuit of a smarter data center.

Keywords: safe overprovisioning, server cluster power, feedback, dvs.

The book provides step-by-step guidance on the design of electrical installations, from domestic installation final circuit design to fault level calculations for LV systems. Amendment 3 publishes on 5 January 2015 and comes into effect on 1 July 2015. All new installations from this point must comply with Amendment 3 to BS 7671:2008. Updated to include the new requirements in Amendment 3 to BS 7671:2008, the Electrical Installation Design Guide,/I> reflects important changes expected to: * Definitions throughout the Regulations * Earth fault loop impedances for all protective devices

To maintain a healthy ecosystem for contemporary society, and for future generations, policies must be implemented to protect the environment. This can be achieved by consistent evaluation of new initiatives and strategies. Sustainable Development: Concepts, Methodologies, Tools, and Applications is a comprehensive source of scholarly information on the latest research for sustainability concerns across a multidisciplinary perspective. Highlighting a broad range of innovative topics such as renewable energy, urban development, and green technologies, this multi-volume book is ideally designed for academics, researchers, professionals, students, and practitioners interested in the preservation of the environment.

PUEA Comprehensive Examination of the MetricAshrae

This book provides a comprehensive view of green communicationsconsidering all areas of ICT including wireless and wirednetworks. It analyses particular concepts and practices,addressing holistic approaches in future networks considering asystem perspective. It makes full use of tables,illustrations, performance graphs, case studies and examplesmaking it accessible for a wide audience.

Introductory technical guidance for mechanical and electrical engineers and construction managers interested in improved energy efficiency for electronic data centers. Here is what is discussed: 1. INTRODUCTION 2. INFORMATION TECHNOLOGY (IT) SYSTEMS 3. ENVIRONMENTAL CONDITIONS 4. AIR MANAGEMENT 5. COOLING SYSTEMS 6. ELECTRICAL SYSTEMS 7. OTHER OPPORTUNITIES FOR ENERGY-EFFICIENT DESIGN 8. DATA CENTER METRICS AND BENCHMARKING.

This book describes warehouse-scale computers (WSCs), the computing platforms that power cloud computing and all the great web services we use every day. It discusses how these new systems treat the datacenter itself as one massive computer designed at warehouse scale, with hardware and software working in concert to deliver good levels of internet service performance. The book details the architecture of WSCs and covers the main factors influencing their design, operation, and cost structure, and the characteristics of their software base. Each chapter contains multiple real-world examples, including detailed case studies and previously unpublished details of the infrastructure used to power Google's online services. Targeted at the architects and programmers of today's WSCs, this book provides a great foundation for those looking to innovate in this fascinating and important area, but the material will also be broadly interesting to those who just want to understand the infrastructure powering the internet. The third edition reflects four years of advancements since the previous edition and nearly doubles the number of pictures and figures. New topics range from additional workloads like video streaming, machine learning, and public cloud to specialized silicon accelerators, storage and network building blocks, and a revised discussion of data center power and cooling, and uptime. Further discussions of emerging trends and opportunities ensure that this revised edition will remain an essential resource for educators and professionals working on the next generation of WSCs.

Presents design strategies, operational approaches, and technologies to help data centers improve energy efficiency and become eco-friendly.

Energy Efficient Servers: Blueprints for Data Center Optimization introduces engineers and IT professionals to the power management technologies and techniques used in energy efficient servers. The book includes a deep examination of different features used in processors, memory, interconnects, I/O devices, and other platform components. It outlines the power and performance impact of these features and the role firmware and software play in initialization and control. Using examples from cloud, HPC, and enterprise environments, the book demonstrates how various power management technologies are utilized across a range of server utilization. It teaches the reader how to monitor, analyze, and optimize their environment to best suit their needs. It shares optimization techniques used by data center administrators and system optimization experts at the world's most advanced data centers.

This book provides basic and fundamental knowledge of various aspects of energy-aware computing at the component, software, and system level. It provides a broad range of topics dealing with power-, energy-, and temperature-related research areas for individuals from industry and academia.

The US, Europe, Japan and China are racing to develop the next generation of supercomputers – exascale machines capable of 10 to the 18th power calculations a second – by 2020. But the barriers are daunting: the challenge is to change the paradigm of high-performance computing. The 2012 biennial high performance workshop, held in Cetraro, Italy in June 2012, focused on the challenges facing the computing research community to reach exascale performance in the next decade. This book presents papers from this workshop, arranged into four major topics: energy, scalability, new architectural concepts and programming of heterogeneous computing systems. Chapter 1 introduces the status of present supercomputers, which are still about two orders of magnitude separated from the exascale mark. Chapter 2 examines energy demands, a major limiting factor of today's fastest supercomputers; the quantum leap in performance required for exascale computing will require a shift in architectures and technology. In Chapter 3, scalable computer paradigms for dense linear algebra on massive heterogeneous systems are presented, and Chapter 4 discusses architectural concepts. Finally, Chapter 5 addresses the programming of heterogeneous systems. This book will be of interest to all those wishing to understand how the development of modern supercomputers is set to advance in the next decade.

This book examines various ways of making computing and information systems greener -- environmentally sustainable -- as well as several means of using Information Technology (IT) as a tool and an enabler to improve the environmental sustainability. The book focuses on both greening of IT and greening by IT -- complimentary approaches to attaining environmental sustainability. This book comprehensively covers several key aspects of Green IT - green technologies, design, standards, maturity models, strategies and adoption -, and presents a clear approach to greening IT encompassing green use, green disposal, green design, and green manufacturing. It also illustrates how to stratgically apply green IT in practice in several areas.

Management of power in data centers is driven by the need to not exceed circuit capacity. Such techniques are evolving from ad hoc methods based on maximum node power usage to systematic methods that employ power-scalable components. These components allow for dynamically controlling power consumption with an accompanying effect on performance. Because the incremental performance gain from

operating in a higher performance state is less than the increase in power, it is possible to overprovision the hardware infrastructure to increase throughput and yet still remain below an aggregate power limit. In overprovisioning, if each component operates at maximum power the limit would be exceeded with disastrous results. However, safe overprovisioning regulates power consumption locally to meet the global power budget. This research work presents PICLE, the Power Infrastructure Controller for Limited Environments. This framework is designed for boosting throughput through intelligent monitoring of server clusters by load-balancing available aggregate power under a set of operating constraints. The solution is useful for data centers that cannot expand the number of power circuits or seek effective usage of the available power budget due to power fluctuations. The framework is also ideally suited for environments with a heterogeneous workload and hence, a non-uniform power allocation requirement. Synthetic benchmarks indicate overprovisioning throughput gains of nearly 6% from a staticly assigned, power managed environment and over 30% from an unmanaged environment. In addition, based on a representative workload for a two minute period, a non-uniform power allocation scheme is shown to increase throughput by over 16% versus a uniform power allocation mechanism.

The Green and Virtual Data Center sets aside the political aspects of what is or is not considered green to instead focus on the opportunities for organizations that want to sustain environmentally-friendly economical growth. If you are willing to believe that IT infrastructure resources deployed in a highly virtualized manner can be combined with other technologies to achieve simplified and cost-effective delivery of services in a green, profitable manner, this book is for you. Savvy industry veteran Greg Schulz provides real-world insight, addressing best practices, server, software, storage, networking, and facilities issues concerning any current or next-generation virtual data center that relies on underlying physical infrastructures. Coverage includes: Energy and data footprint reduction Cloud-based storage and computing Intelligent and adaptive power management Server, storage, and networking virtualization Tiered servers and storage, network, and data centers Energy avoidance and energy efficiency Many current and emerging technologies can enable a green and efficient virtual data center to support and sustain business growth with a reasonable return on investment. This book presents virtually all critical IT technologies and techniques to discuss the interdependencies that need to be supported to enable a dynamic, energy-efficient, economical, and environmentally-friendly green IT data center. This is a path that every organization must ultimately follow. Take a tour of the Green and Virtual Data Center website. CRC Press is pleased to announce that The Green and Virtual Data Center has been added to Intel Corporation's Recommended Reading List. Intel's Recommended Reading program provides technical professionals a simple and handy reference list of what to read to stay abreast of new technologies. Dozens of industry technologists, corporate fellows, and engineers have helped by suggesting books and reviewing the list. This is the most comprehensive reading list available for professional computer developers.

Data Centers are the drivers of the digital economy. Understanding how data centers are designed, how they work and how they interact with the services we use is key towards building a great career in a digital world. This book will provide the reader with a firm foundation for understanding Data Center design.

Due to its high impact on the cost of electricity and its direct correlation with customer satisfaction, distribution reliability continues to be one of the most important topics in the electric power industry. Continuing in the unique tradition of the bestselling first edition, Electric Power Distribution Reliability, Second Edition consolidates all pertinent topics on electric power distribution into one comprehensive volume balancing theory, practical knowledge, and real world applications. Updated and expanded with new information on benchmarking, system hardening, underground conversion, and aging infrastructure, this timely reference enables you to— · Manage aging infrastructure · Harden electric power distribution systems · Avoid common benchmarking pitfalls · Apply effective risk management The electric power industry will continue to make distribution system reliability and customer-level reliability a top priority. Presenting a wealth of useful knowledge, Electric Power Distribution Reliability, Second Edition remains the only book that is completely dedicated to this important topic.

This book introduces the reader to the optical switching technology for its application to data centers. In addition, it takes a picture of the status of the technology and system architecture evolution and of the research in the area of optical switching in data center. The book is organized in four parts: the first part is focused on the system aspects of optical switching in intra-data center networking, the second part is dedicated to describing the recently demonstrated optical switching networks, the third part deals with the latest technologies developed to enable optical switching and, finally, the fourth part of the book outlines the future prospects and trends.

This book focuses on the interaction between different energy vectors, that is, between electrical, thermal, gas, and transportation systems, with the purpose of optimizing the planning and operation of future energy systems. More and more renewable energy is integrated into the electrical system, and to optimize its usage and ensure that its full production can be hosted and utilized, the power system has to be controlled in a more flexible manner. In order not to overload the electrical distribution grids, the new large loads have to be controlled using demand response, perchance through a hierarchical control set-up where some controls are dependent on price signals from the spot and balancing markets. In addition, by performing local real-time control and coordination based on local voltage or system frequency measurements, the grid hosting limits are not violated.

In the age of corporate responsibility, green technology and sustainability continue to grip the consciousness of business and academic institutions. However, development of appropriate business-driven green applications requires an awareness of best practices of the green agenda. Green Technology Applications for Enterprise and Academic Innovation addresses the importance of green technology and sustainability for technology, enterprise, and academic innovation in energy management, renewable energy, and carbon reduction strategies. This book acts as the bridge for practitioners, academia, businesses, industrialists, governmental executives, and students seeking research in this emerging area.

This edited volume covers essential and recent development in the engineering and management of data centers. Data centers are complex systems requiring ongoing support, and their high value for keeping business continuity operations is crucial. The book presents core topics on the planning, design, implementation, operation and control, and sustainability of a data center from a didactical and practitioner viewpoint. Chapters include: · Foundations of data centers: Key Concepts and Taxonomies · ITSDM: A Methodology for IT Services Design · Managing Risks on Data Centers through Dashboards · Risk Analysis in Data Center Disaster Recovery Plans · Best practices in Data Center Management Case: KIO Networks · QoS in NaaS (Network as a Service) using Software Defined Networking · Optimization of Data Center Fault-Tolerance Design · Energetic Data Centre Design Considering Energy Efficiency Improvements During Operation · Demand-side Flexibility and Supply-side Management: The Use Case of Data Centers and Energy Utilities · DevOps: Foundations and its Utilization in Data Centers · Sustainable and Resilient Network Infrastructure Design for Cloud Data Centres · Application Software in Cloud-Ready Data Centers This book bridges the gap between academia and the industry, offering essential reading for practitioners in data centers, researchers in the area, and faculty teaching related courses on data centers. The book can be used as a complementary text for traditional courses on Computer Networks, as well as innovative courses on IT Architecture, IT Service Management, IT Operations, and Data Centers.

The need for sustainable sources of energy has become more prevalent in an effort to conserve natural resources, as well as optimize the performance of wireless networks in daily life. Renewable sources of energy also help to cut costs while still providing a reliable power sources. Biologically-Inspired Energy Harvesting through Wireless Sensor Technologies highlights emerging research in the areas of sustainable energy management and transmission technologies. Featuring technological advancements in green technology, energy harvesting, sustainability, networking, and autonomic computing, as well as bio-inspired algorithms and solutions utilized in energy

management, this publication is an essential reference source for researchers, academicians, and students interested in renewable or sustained energy in wireless networks.

Provides the fundamentals, technologies, and best practices in designing, constructing and managing mission critical, energy efficient data centers Organizations in need of high-speed connectivity and nonstop systems operations depend upon data centers for a range of deployment solutions. A data center is a facility used to house computer systems and associated components, such as telecommunications and storage systems. It generally includes multiple power sources, redundant data communications connections, environmental controls (e.g., air conditioning, fire suppression) and security devices. With contributions from an international list of experts, The Data Center Handbook instructs readers to: Prepare strategic plan that includes location plan, site selection, roadmap and capacity planning Design and build "green" data centers, with mission critical and energy-efficient infrastructure Apply best practices to reduce energy consumption and carbon emissions Apply IT technologies such as cloud and virtualization Manage data centers in order to sustain operations with minimum costs Prepare and practice disaster reovery and business continuity plan The book imparts essential knowledge needed to implement data center design and construction, apply IT technologies, and continually improve data center operations.

This book constitutes the thoroughly refereed post-conference proceedings of the First International Workshop on Energy Efficient Data Centers (E2DC 2012) held in Madrid, Spain, in May 2012. The 13 revised full papers presented were carefully selected from 32 submissions. The papers cover topics from information and communication technologies of green data centers to business models and GreenSLA solutions. The first section presents contributions in form of position and short papers, related to various European projects. The other two sections comprise papers with more in-depth technical details. The topics covered include energy-efficient data center management and service delivery as well as energy monitoring and optimization techniques for data centers.

This book provides readers with guidelines for designing integrated multi-MHz-switching converters for input voltages/system supplies up to 50V or higher. Coverage includes converter theory, converter architectures, circuit design, efficiency, sizing of passives, technology aspects, etc. The author discusses new circuit designs, new architectures and new switching concepts, including dead-time control and soft-switching techniques that overcome current limitations of these converters. The discussion includes technology related issues and helps readers to choose the right technology for fast-switching converters. This book discusses benefits and drawbacks in terms of integration, size and cost, efficiency and complexity, and enables readers to make trade-offs in design, given different converter parameters. Describes a study for increasing switching frequencies up to 30 MHz at input voltages up to 50V or higher in the scaling of the size of switching converter passives; Analyzes various buck converter implementations and shows that a preference due to higher efficiency depends on the operating point, on the available switch technologies, and on the implementation of the high-side supply generation; Describes an efficiency model based on a four-phase model, which enables separation of loss causes and loss locations.

This book describes the use of free air cooling to improve the efficiency of, and cooling of, equipment for use in telecom infrastructures. Discussed at length is the cooling of communication installation rooms such as data centers or base stations, and this is intended as a valuable tool for the people designing and manufacturing key parts of communication networks. This book provides an introduction to current cooling methods used for energy reduction, and also compares present cooling methods in use in the field. The qualification methods and standard reliability assessments are reviewed, and their inability to assess the risks of free air cooling is discussed. The method of identifying the risks associated with free air cooling on equipment performance and reliability is introduced. A novel method of assessment for free air cooling is also proposed that utilizes prognostics and health management (PHM). This book also: Describes how the implementation of free air cooling can save energy for cooling within the telecommunications infrastructure. Analyzes the potential risks and failures of mechanisms possible in the implementation of free air cooling, which benefits manufacturers and equipment designers. Presents prognostics-based assessments to identify and mitigate the risks of telecommunications equipment under free air cooling conditions, which can provide the early warning of equipment failures at operation stage without disturbing the data centers' service. Optimum Cooling for Data Centers is an ideal book for researchers and engineers interested in designing and manufacturing equipment for use in telecom infrastructures.

This book reports the latest findings on intelligent energy management of Internet data centers in smart-grid environments. The book gathers novel research ideas in Internet data center energy management, especially scenarios with cyber-related vulnerabilities, power outages and carbon emission constraints. The book will be of interest to university researchers, R&D engineers and graduate students in communication and networking areas who wish to learn the core principles, methods, algorithms, and applications of energy management of Internet data centers in smart grids.

"Simplifies the absorption and use of the PUE metric and allows executives to gain understanding of the concepts surrounding PUE, while providing application knowledge and resources to those implementing and reporting data center metrics"--

Green technology is not only good for the environment; it's also good for your bottom line. If your organization is exploring ways to save energy and reduce environmental waste, Green IT For Dummies can help you get there. This guide is packed with cost-saving ways to make your company a leader in green technology. The book is also packed with case studies from organizations that have gone green, so you can benefit from their experience. You'll discover how to: Perform an energy audit to determine your present consumption and identify where to start greening Develop and roll out a green technology project Build support from management and employees Use collaboration tools to limit the need for corporate travel Improve electronic document management Extend hardware life, reduce data center floor space, and improve efficiency Formalize best practices for green IT, understand your company's requirements, and design an infrastructure to meet them Make older desktops and lighting fixtures more efficient with a few small upgrades Lower costs with virtual meetings, teleconferences, and telecommuting options Reduce your organization's energy consumption You'll also learn what to beware of when developing your green plan, and get familiar with all the terms relating to green IT. Green IT For Dummies starts you on the road to saving money while you help save the planet.

This book investigates the coordinated power management of multi-tenant data centers that account for a large portion of the data center industry. The authors include discussion of their quick growth and their electricity consumption, which has huge economic and environmental impacts. This book covers the various coordinated management solutions in the existing literature focusing on efficiency, sustainability, and demand response aspects. First, the authors provide a background on the multi-tenant data center covering the stake holders, components, power infrastructure, and energy usage. Then, each power management mechanism is described in terms of motivation, problem formulation, challenges and solution.

Implementing energy-efficient CPUs and peripherals as well as reducing resource consumption have become emerging trends in computing. As computers increase in speed and power, their energy issues become more and more prevalent. The need to develop and promote environmentally friendly computer technologies and systems has also come to the forefront

Continuous improvements in data analysis and cloud computing have allowed more opportunities to develop systems with user-focused designs. This not only leads to higher success in day-to-day usage, but it increases the overall probability of technology adoption. Advancing Cloud Database Systems and Capacity Planning With Dynamic Applications is a key resource on the latest

innovations in cloud database systems and their impact on the daily lives of people in modern society. Highlighting multidisciplinary studies on information storage and retrieval, big data architectures, and artificial intelligence, this publication is an ideal reference source for academicians, researchers, scientists, advanced level students, technology developers and IT officials. Advances in Computers carries on a tradition of excellence, presenting detailed coverage of innovations in computer hardware, software, theory, design, and applications. The book provides contributors with a medium in which they can explore their subjects in greater depth and breadth than journal articles typically allow. The articles included in this book will become standard references, with lasting value in this rapidly expanding field. Presents detailed coverage of recent innovations in computer hardware, software, theory, design, and applications Includes in-depth surveys and tutorials on new computer technology pertaining to computing: combinatorial testing, constraint-based testing, and black-box testing Written by well-known authors and researchers in the field Includes extensive bibliographies with most chapters Presents volumes devoted to single themes or subfields of computer science

Cloud Data Centers and Cost Modeling establishes a framework for strategic decision-makers to facilitate the development of cloud data centers. Just as building a house requires a clear understanding of the blueprints, architecture, and costs of the project; building a cloud-based data center requires similar knowledge. The authors take a theoretical and practical approach, starting with the key questions to help uncover needs and clarify project scope. They then demonstrate probability tools to test and support decisions, and provide processes that resolve key issues. After laying a foundation of cloud concepts and definitions, the book addresses data center creation, infrastructure development, cost modeling, and simulations in decision-making, each part building on the previous. In this way the authors bridge technology, management, and infrastructure as a service, in one complete guide to data centers that facilitates educated decision making. Explains how to balance cloud computing functionality with data center efficiency Covers key requirements for power management, cooling, server planning, virtualization, and storage management Describes advanced methods for modeling cloud computing cost including Real Option Theory and Monte Carlo Simulations Blends theoretical and practical discussions with insights for developers, consultants, and analysts considering data center development

Energy Efficient Thermal Management of Data Centers examines energy flow in today's data centers. Particular focus is given to the state-of-the-art thermal management and thermal design approaches now being implemented across the multiple length scales involved. The impact of future trends in information technology hardware, and emerging software paradigms such as cloud computing and virtualization, on thermal management are also addressed. The book explores computational and experimental characterization approaches for determining temperature and air flow patterns within data centers. Thermodynamic analyses using the second law to improve energy efficiency are introduced and used in proposing improvements in cooling methodologies. Reduced-order modeling and robust multi-objective design of next generation data centers are discussed.

This book consists of one hundred and twenty-five selected papers presented at the 2015 International Conference on Applied Mechanics, Mechatronics and Intelligent Systems (AMMIS2015), which was held in Nanjing, China during June 19–20, 2015. AMMIS2015 focuses on seven main areas, namely, applied mechanics, control and automation, intelligent systems, computer technology, electronics engineering, electrical engineering, and materials science and technology. Experts in this field from all over the world contributed to the collection of research results and development activities. AMMIS2015 provides an excellent international exchange platform for researchers to share their development works and results in these areas. All papers selected for this proceeding were subjected to a rigorous peer-review process. Contents: Applied and Computational MechanicsResearch and Design in Mechanical EngineeringTechnology and Method for Measurement, Test, Detection and MonitoringIntelligent Systems, Processing of Signal and DataControl and AutomationApplied Information TechnologyMaterial Science and Material Processing TechnologyComputational TechnologyElectronics and Electrical EngineeringSystem Science and Engineering Readership: Researchers and professionals interested in applied mechanics, mechatronics and intelligent systems. Key Features:This is a conference that focuses on the latest research effort funded by the Chinese government in applied mechanics and mechatronics in the development of intelligent systems. The readers are mainly participants and contributors to the conference who will be given e-access to the proceedingsKeywords:Applied Mechanics;Control and Automation;Intelligent Systems;Computer Technology;Electronics Engineering;Electrical Engineering;Materials Science and Technology