

Load Balancing In Cloud Computing

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Comparative Analysis of Load Balancing Algorithms in Cloud Computing -

Mohit Tomar 2017

Abstract: Cloud computing is a novel trend emerging in Information Technology (IT) environments with immense infrastructure and resources. An integral aspect of cloud computing is load balancing. Efficient load balancing in cloud computing ensures effective resource utilization. There are two types of load balancers: the static load balancer and the dynamic load balancer. While both types of load balancers are widely used in the industry, they differ in performance. In this project, the performances of the most widely used static and dynamic load balancers, namely the round robin and the throttled, are compared. Specifically, the project examines whether the throttled algorithm takes less time than the round robin algorithm to access data in cloud computing. The results show that the throttled algorithm takes less time than the round robin algorithm to access data, and that this difference is due to a faultiness in the implementation of the round robin algorithm.

Evolutionary Approaches for Load Balancing in Cloud Computing -

Subhadarshini Mohanty 2022-09-24

Introduction 1.1 Cloud computing at a glance The advancement in Information and communication technology has evolved many computing paradigms [1, 2]. Cloud computing is a well-known technology among them. The main backbone of cloud computing is the combination and advancement of system technologies especially hardware, internet technologies, distributed computing, and system management [3]. In distributed computing, the resources are distributed worldwide.

Swarm Intelligence for Cloud Computing - Indrajit Pan 2020-07-19
Swarm Intelligence in Cloud Computing is an invaluable treatise for researchers involved in delivering intelligent optimized solutions for reliable deployment, infrastructural stability, and security issues of cloud-based resources. Starting with a bird's eye view on the prevalent state-of-the-art techniques, this book enriches the readers with the knowledge of evolving swarm intelligent optimized techniques for addressing different cloud computing issues including task scheduling, virtual machine allocation, load balancing and optimization, deadline handling, power-aware profiling, fault resilience, cost-effective design, and energy efficiency. The book offers

comprehensive coverage of the most essential topics, including: Role of swarm intelligence on cloud computing services Cloud resource sharing strategies Cloud service provider selection Dynamic task and resource scheduling Data center resource management. Indrajit Pan is an Associate Professor in Information Technology of RCC Institute of Information Technology, India. He received his PhD from Indian Institute of Engineering Science and Technology, Shibpur, India. With an academic experience of 14 years, he has published around 40 research publications in different international journals, edited books, and conference proceedings. Mohamed Abd Elaziz is a Lecturer in the Mathematical Department of Zagazig University, Egypt. He received his PhD from the same university. He is the author of more than 100 articles. His research interests include machine learning, signal processing, image processing, cloud computing, and evolutionary algorithms. Siddhartha Bhattacharyya is a Professor in Computer Science and Engineering of Christ University, Bangalore. He received his PhD from Jadavpur University, India. He has published more than 230 research publications in international journals and conference proceedings in his 20 years of academic experience.

Quantum Particle Swarm Optimization Technique for Load Balancing in Cloud Computing - Elrasheed Ismail Sultan 2013

Cloud Computing systems are widely applied in many fields such as communication data management, web application, network monitoring, financial management and so on. The distributed Cloud Computing technology has been produced as the development of the computer network and distributed computing technology. Researches on data Cloud Computing become the necessary trend in the distributed Cloud Computing system domain since the sources and application of the data are distributed and the scale of the applications enlarges quickly. Load management is the focus of research in both of the area in distributed Cloud Computing systems and centralized Cloud Computing systems. Although researches on the load

management in the cloud systems is similar to that of traditional parallel and distributed systems in many aspects, essential differences exist between them. The choice of a scheduling strategy has significant impact on the runtime Central Processing Unit, memory consumption as well as the storage systems. Load balancing optimization techniques such as Ant Colony Optimization (ACO), First Come First Served (FCFS), Round Robin (RR) and Particle Swarm Optimization (PSO) are popular techniques being used for scheduling and load balancing. However, these techniques have its weaknesses in terms of minimizing makespan, computation cost and communication cost. In this study, load balancing technique in Cloud Computing called Quantum Particle Swarm Optimization (QPSO) technique proposed by considering only minimization of makespan, computation cost and communication cost. Performance of the QPSO technique based on many heuristic algorithms it is comprised the following steps. Firstly, tasks are assigned averagely to the machines according to a special initialization policy. Then the optimal criterion for exchanging tasks between two machines is proposed and exploited to speed up the improving process towards load balance. Secondly, this thesis proposes job-combination based static algorithm for load balancing where all jobs should organized into the standard job combinations, each task of which consists of one to four jobs. Then they are assigned to the machines according to the assignment algorithm for job combinations, which is a special integer partition algorithm. Finally, the result of experiment shows that QPSO can achieve at least three times cost saving as compared with ACO, FCFS, RR and PSO.

A Novel Approach To Enhance The Performance Of Cloud Computing File System Using Load Balancing Algorithm - Pradheep Manisekaran 2015-02-19
Doctoral Thesis / Dissertation from the year 2014 in the subject Computer Science - IT-Security, Lovely Professional University, Punjab (Lovely Professional University, Phagwara, Punjab), course: M.Tech Information

Technology, language: English, abstract: Cloud computing is one of the biggest thing in computing in recent time. Cloud computing uses the internet and the central remote servers to support different data and applications. Cloud computing is that emerging technology which is used for providing various computing and storage services over the Internet. In the cloud computing, the internet is viewed as a cloud. Internet users can receive services from a cloud as if they were employing a super computer which be using cloud computing. To storing data in the cloud instead of on their own devices and it making ubiquitous data access possible. Load balancing helps to make resource utilization effective and also used to improve the response time of the job. The load balancing helps to remove the nodes which are unbalanced. In this situation, it removes the nodes, which are overloaded or under loaded. It is dynamic in nature. In the cloud computing, file system management is the big issue. We use round robin algorithm with load balancing in the file systems. It will help to enhance the performance of file system. It also helps to increase the access of file systems in cloud computing.

Algorithms for Energy Efficient Load Balancing in Cloud Environments -

Norman Peitek 2014-12-30

Seminar paper from the year 2013 in the subject Computer Science -

Commercial Information Technology, grade: 1.0, Otto-von-Guericke-

University Magdeburg (Faculty of Computer Science), course: Recent Topics

in Business Informatics, language: English, abstract: Energy efficiency has a

rising importance throughout society. With the growth of large data centers, the energy consumption becomes centralized and nowadays takes a significant

amount of the overall electricity consumption of a country. Load balancing

algorithms are able to make an existing infrastructure more efficient without

major drawbacks. This structured literature research presents the state of the

art technology regarding the load balancing approach to make data centers

more en-ergy efficient. The state of the art approaches are reviewed for

techniques, im-provements and consideration of performance effects.

Load Balancing Servers, Firewalls, and Caches -

Chandra Kopparapu
2002-10-15

From an industry insider--a close look at high-performance,end-to-end switching solutions Load balancers are fast becoming an indispensable solution forhandling the huge traffic demands of the Web. Their ability tosolve a multitude of network and server bottlenecks in the Internetage ranges from dramatic improvements in server farm scalability toremoving the firewall as a network bottleneck. This book provides adetailed, up-to-date, technical discussion of this fast-growing,multibillion dollar market, covering the full spectrum oftopics--from server and firewall load balancing to transparentcache switching to global server load balancing. In the process,the author delivers insight into the way new technologies aredeployed in network infrastructure and how they work. Written by anindustry expert who hails from a leading Web switch vendor, thisbook will help network and server administrators improve thescalability, availability, manageability, and security of theirservers, firewalls, caches, and Web sites.

Sustainable Communication Networks and Application -

P. Karrupusamy
2019-11-06

This book presents state-of-the-art theories and technologies and discusses developments in the two major fields: engineering and sustainable computing. In this modern era of information and communication technologies [ICT], there is a growing need for new sustainable and energy-efficient communication and networking technologies. The book highlights significant current and potential international research relating to theoretical and practical methods toward developing sustainable communication and networking technologies. In particular, it focuses on emerging technologies such as wireless communications, mobile networks, Internet of things [IoT], sustainability, and edge network models. The contributions cover a number of

key research issues in software-defined networks, blockchain technologies, big data, edge/fog computing, computer vision, sentiment analysis, cryptography, energy-efficient systems, and cognitive platforms.

Cloud Computing - Martin Gilje Jaatun 2009-11-24

This volume contains the proceedings of CloudCom 2009, the First International Conference on Cloud Computing. The conference was held in Beijing, China, during December 1–4, 2009, and was the first in a series initiated by the Cloud Computing Association (www.cloudcom.org). The Cloud Computing Association was founded in 2009 by Chunming Rong, Martin Gilje Jaatun, and Frode Eika Sandnes. This first conference was organized by the Beijing Ji-tong University, Chinese Institute of Electronics, and Wuhan University, and co-organized by Huazhong University of Science and Technology, South China Normal University, and Sun Yat-sen University. Ever since the inception of the Internet, a “Cloud” has been used as a metaphor for a network-accessible infrastructure (e.g., data storage, computing hardware, or entire networks) which is hidden from users. To some, the concept of cloud computing may seem like a throwback to the days of big mainframe computers, but we believe that cloud computing makes data truly mobile, allowing a user to access services anywhere, anytime, with any Internet browser. In cloud computing, IT-related capabilities are provided as services, accessible without requiring control of, or even knowledge of, the underlying technology. Cloud computing provides dynamic scalability of services and computing power, and although many mature technologies are used as components in cloud computing, there are still many unresolved and open problems.

Practical Load Balancing - Peter Membrey 2012-06-13

The emergence of the cloud and modern, fast corporate networks demands that you perform judicious balancing of computational loads. Practical Load Balancing presents an entire analytical framework to increase performance

not just of one machine, but of your entire infrastructure. Practical Load Balancing starts by introducing key concepts and the tools you'll need to tackle your load-balancing issues. You'll travel through the IP layers and learn how they can create increased network traffic for you. You'll see how to account for persistence and state, and how you can judge the performance of scheduling algorithms. You'll then learn how to avoid performance degradation and any risk of the sudden disappearance of a service on a server. If you're concerned with running your load balancer for an entire network, you'll find out how to set up your network topography, and condense each topographical variety into recipes that will serve you in different situations. You'll also learn about individual servers, and load balancers that can perform cookie insertion or improve your SSL throughput. You'll also explore load balancing in the modern context of the cloud. While load balancers need to be configured for high availability once the conditions on the network have been created, modern load balancing has found its way into the cloud, where good balancing is vital for the very functioning of the cloud, and where IPv6 is becoming ever more important. You can read Practical Load Balancing from end to end or out of sequence, and indeed, if there are individual topics that interest you, you can pick up this book and work through it once you have read the first three chapters.

Model-Driven Development and Operation of Multi-Cloud Applications - Elisabetta Di Nitto 2016-12-22

This book is open access under a CC BY 4.0 license. This book summarizes work being undertaken within the collaborative MODAClouds research project, which aims to facilitate interoperability between heterogeneous Cloud platforms and remove the constraints of deployment, portability, and reversibility for end users of Cloud services. Experts involved in the project provide a clear overview of the MODAClouds approach and explain how it operates in a variety of applications. While the wide spectrum of available

Clouds constitutes a vibrant technical environment, many early-stage issues pose specific challenges from a software engineering perspective.

MODAClouds will provide methods, a decision support system, and an open source IDE and run-time environment for the high-level design, early prototyping, semiautomatic code generation, and automatic deployment of applications on multiple Clouds. It will free developers from the need to commit to a fixed Cloud technology stack during software design and offer benefits in terms of cost savings, portability of applications and data between Clouds, reversibility (moving applications and data from Cloud to non-Cloud environments), risk management, quality assurance, and flexibility in the development process.

Innovations in Cyber Physical Systems - Jawar Singh 2021-09-09

The book presents a collection of peer-reviewed articles from the International Conference on Innovations in Cyber Physical Systems (ICICPS 2020). The conference provided opportunities for the presentation of new research results and discussion about them. It was also an opportunity to generation of new ideas in all CPS aspects, including theory, tools, applications, systems, test-beds and field deployments. The range of topics explored is wide, and covers security, control, optimization, machine learning, game theory, mechanism design, mobile and cloud computing, model-based design, verification, data mining/analytics, signal processing, and human-in-the-loop shared or supervisory control. This book will be useful to researchers, students, industrialist, developers, and practitioners alike.

Advanced Computing, Networking and Informatics- Volume 2 - Malay Kumar Kundu 2014-05-26

Advanced Computing, Networking and Informatics are three distinct and mutually exclusive disciplines of knowledge with no apparent sharing/overlap among them. However, their convergence is observed in many real world applications, including cyber-security, internet banking,

healthcare, sensor networks, cognitive radio, pervasive computing amidst many others. This two-volume proceedings explore the combined use of Advanced Computing and Informatics in the next generation wireless networks and security, signal and image processing, ontology and human-computer interfaces (HCI). The two volumes together include 148 scholarly papers, which have been accepted for presentation from over 640 submissions in the second International Conference on Advanced Computing, Networking and Informatics, 2014, held in Kolkata, India during June 24-26, 2014. The first volume includes innovative computing techniques and relevant research results in informatics with selective applications in pattern recognition, signal/image processing and HCI. The second volume on the other hand demonstrates the possible scope of the computing techniques and informatics in wireless communications, networking and security.

Information and Communication Technology for Competitive Strategies (ICTCS 2020) - M. Shamim Kaiser 2021-07-05

This book contains the best selected research papers presented at ICTCS 2020: Fifth International Conference on Information and Communication Technology for Competitive Strategies. The conference was held at Jaipur, Rajasthan, India during 11–12 December 2020. The book covers state-of-the-art as well as emerging topics pertaining to ICT and effective strategies for its implementation for engineering and managerial applications. This book contains papers mainly focused on ICT for computation, algorithms and data analytics and IT security.

2019 9th International Conference on Cloud Computing, Data Science and Engineering (Confluence) - IEEE Staff 2019-01-10

The scope of 9th International Conference Confluence 2019 covers the broad spectrum of Influential areas in the field of Information Technology and Computer Science The major topics include, but not limited to Ad hoc and Sensor Networks Artificial Intelligence Autonomic Computing Big Data

Business Clouds Cloud Computing Architectures Cloud Computing Consulting Methods Cloud Security, Privacy and Compliance Challenges Content Management Data Mining & Ontology Grid Computing, Image Processing, Intelligent Information System Interaction of Mobile Computing, mCommerce and Clouds Natural Language Processing, Network Architectures and Protocols Network Security & Cryptography Pattern Recognition Quantum Computing Remote Sensing & GIS Service Oriented Architecture and Cloud Computing Soft Computing Software Engineering Software Security & Risk Management Ubiquitous Computing Virtual and Overlay Networks Web Mining Wireless Communication and any other Relevant Topics Field 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.

Application Delivery and Load Balancing in Microsoft Azure - Derek DeJonghe 2020-12-04

With more and more companies moving on-premises applications to the

cloud, software and cloud solution architects alike are busy investigating ways to improve load balancing, performance, security, and high availability for workloads. This practical book describes Microsoft Azure's load balancing options and explains how NGINX can contribute to a comprehensive solution. Cloud architects Derek DeJonghe and Arlan Nugara take you through the steps necessary to design a practical solution for your network. Software developers and technical managers will learn how these technologies have a direct impact on application development and architecture. While the examples are specific to Azure, these load balancing concepts and implementations also apply to cloud providers such as AWS, Google Cloud, DigitalOcean, and IBM Cloud. Understand application delivery and load balancing--and why they're important Explore Azure's managed load balancing options Learn how to run NGINX OSS and NGINX Plus on Azure Examine similarities and complementing features between Azure-managed solutions and NGINX Use Azure Front Door to define, manage, and monitor global routing for your web traffic Monitor application performance using Azure and NGINX tools and plug-ins Explore security choices using NGINX and Azure Firewall solutions

A Comparison of Select Load Balancing Algorithms in Cloud Computing - Varsha Thakur 2015

This paper compares the performances of three algorithms with different service broker policies, namely, Round Robin, Equally Spread Current Execution(ESCE), and Throttled Load Balancing. CloudSim and CloudSim-based tool are used for simulation. The results reveal that Throttled load balancing algorithm with optimistic service broker policy is superior to others. However, from the cost point of view, Round Robin under closest service broker policy is most cost-effective due to little migration overheads.

Role of Edge Analytics in Sustainable Smart City Development - G. R. Kanagachidambaresan 2020-07-15

Efficient Single Board Computers (SBCs) and advanced VLSI systems have resulted in edge analytics and faster decision making. The QoS parameters like energy, delay, reliability, security, and throughput should be improved on seeking better intelligent expert systems. The resource constraints in the Edge devices, challenges the researchers to meet the required QoS. Since these devices and components work in a remote unattended environment, an optimum methodology to improve its lifetime has become mandatory. Continuous monitoring of events is mandatory to avoid tragic situations; it can only be enabled by providing high QoS. The applications of IoT in digital twin development, health care, traffic analysis, home surveillance, intelligent agriculture monitoring, defense and all common day to day activities have resulted in pioneering embedded devices, which can offer high computational facility without much latency and delay. The book address industrial problems in designing expert system and IoT applications. It provides novel survey and case study report on recent industrial approach towards Smart City development.

Anticipatory Models of Load Balancing in Cloud Computing - Shahrzad Aslanzadeh 2016

Cloud Computing and Virtualization - Dac-Nhuong Le 2018-03-12

The purpose of this book is first to study cloud computing concepts, security concern in clouds and data centers, live migration and its importance for cloud computing, the role of firewalls in domains with particular focus on virtual machine (VM) migration and its security concerns. The book then tackles design, implementation of the frameworks and prepares test-beds for testing and evaluating VM migration procedures as well as firewall rule migration. The book demonstrates how cloud computing can produce an effective way of network management, especially from a security perspective.

Istio in Action - Christian E. Posta 2022-05-03

Solve difficult service-to-service communication challenges around security, observability, routing, and resilience with an Istio-based service mesh. Istio allows you to define these traffic policies as configuration and enforce them consistently without needing any service-code changes. In Istio in Action you will learn: Why and when to use a service mesh Envoy's role in Istio's service mesh Allowing "North-South" traffic into a mesh Fine-grained traffic routing Make your services robust to network failures Gain observability over your system with telemetry "golden signals" How Istio makes your services secure by default Integrate cloud-native applications with legacy workloads such as in VMs Reduce the operational complexity of your microservices with an Istio-powered service mesh! Istio in Action shows you how to implement this powerful new architecture and move your application-networking concerns to a dedicated infrastructure layer. Non-functional concerns stay separate from your application, so your code is easier to understand, maintain, and adapt regardless of programming language. In this practical guide, you'll go hands-on with the full-featured Istio service mesh to manage microservices communication. Helpful diagrams, example configuration, and examples make it easy to understand how to control routing, secure container applications, and monitor network traffic. About the technology Offload complex microservice communication layer challenges to Istio! The industry-standard Istio service mesh radically simplifies security, routing, observability, and other service-to-service communication challenges. With Istio, you use a straightforward declarative configuration style to establish application-level network policies. By separating communication from business logic, your services are easier to write, maintain, and modify. About the book Istio in Action teaches you how to implement an Istio-based service mesh that can handle complex routing scenarios, traffic encryption, authorization, and other common network-related tasks. You'll start by defining a basic service mesh and exploring the data plane with Istio's service

proxy, Envoy. Then, you'll dive into core topics like traffic routing and visualization and service-to-service authentication, as you expand your service mesh to workloads on multiple clusters and legacy VMs. What's inside

Comprehensive coverage of Istio resources Practical examples to showcase service mesh capabilities Implementation of multi-cluster service meshes How to extend Istio with WebAssembly Traffic routing and observability VM integration into the mesh About the reader For developers, architects, and operations engineers. About the author Christian Posta is a well-known architect, speaker, and contributor. Rinor Maluku is an engineer at Solo.io working on application networking solutions. Table of Contents PART 1 UNDERSTANDING ISTIO 1 Introducing the Istio service mesh 2 First steps with Istio 3 Istio's data plane: The Envoy proxy PART 2 SECURING, OBSERVING, AND CONTROLLING YOUR SERVICE'S NETWORK TRAFFIC 4 Istio gateways: Getting traffic into a cluster 5 Traffic control: Fine-grained traffic routing 6 Resilience: Solving application networking challenges 7 Observability: Understanding the behavior of your services 8 Observability: Visualizing network behavior with Grafana, Jaeger, and Kiali 9 Securing microservice communication PART 3 ISTIO DAY-2 OPERATIONS 10 Troubleshooting the data plane 11 Performance-tuning the control plane PART 4 ISTIO IN YOUR ORGANIZATION 12 Scaling Istio in your organization 13 Incorporating virtual machine workloads into the mesh 14 Extending Istio on the request path

Intelligent Techniques and Applications in Science and Technology - Subhojit Dawn 2020-03-02

This book provides innovative ideas on achieving sustainable development and using green technologies to conserve our ecosystem. Innovation is the successful exploitation of a new idea. Through innovation, we can achieve MORE while using LESS. Innovations in science & technology will not only help mankind as a whole, but also contribute to the economic growth of

individual countries. It is essential that the global problem of environmental degradation be addressed immediately, and thus, we need to rethink the concept of sustainable development. Indeed, new environmentally friendly technologies are fundamental to attaining sustainable development. The book shares a wealth of innovative green technological ideas on how to preserve and improve the quality of the environment, and how to establish a more resource-efficient and sustainable society. The book provides an interdisciplinary approach to addressing various technical issues and capitalizing on advances in computing & optimization for scientific & technological development, smart information, communication, bio-monitoring, smart cities, food quality assessment, waste management, environmental aspects, alternative energies, sustainable infrastructure development, etc. In short, it offers valuable information and insights for budding engineers, researchers, upcoming young minds and industry professionals, promoting awareness for recent advances in the various fields mentioned above.

Cloud Computing - Lizhe Wang 2017-12-19

Cloud computing has created a shift from the use of physical hardware and locally managed software-enabled platforms to that of virtualized cloud-hosted services. Cloud assembles large networks of virtual services, including hardware (CPU, storage, and network) and software resources (databases, message queuing systems, monitoring systems, and load-balancers). As Cloud continues to revolutionize applications in academia, industry, government, and many other fields, the transition to this efficient and flexible platform presents serious challenges at both theoretical and practical levels—ones that will often require new approaches and practices in all areas. Comprehensive and timely, *Cloud Computing: Methodology, Systems, and Applications* summarizes progress in state-of-the-art research and offers step-by-step instruction on how to implement it. Summarizes Cloud Developments,

Identifies Research Challenges, and Outlines Future Directions Ideal for a broad audience that includes researchers, engineers, IT professionals, and graduate students, this book is designed in three sections: Fundamentals of Cloud Computing: Concept, Methodology, and Overview Cloud Computing Functionalities and Provisioning Case Studies, Applications, and Future Directions It addresses the obvious technical aspects of using Cloud but goes beyond, exploring the cultural/social and regulatory/legal challenges that are quickly coming to the forefront of discussion. Properly applied as part of an overall IT strategy, Cloud can help small and medium business enterprises (SMEs) and governments in optimizing expenditure on application-hosting infrastructure. This material outlines a strategy for using Cloud to exploit opportunities in areas including, but not limited to, government, research, business, high-performance computing, web hosting, social networking, and multimedia. With contributions from a host of internationally recognized researchers, this reference delves into everything from necessary changes in users' initial mindset to actual physical requirements for the successful integration of Cloud into existing in-house infrastructure. Using case studies throughout to reinforce concepts, this book also addresses recent advances and future directions in methodologies, taxonomies, IaaS/SaaS, data management and processing, programming models, and applications.

Research Anthology on Architectures, Frameworks, and Integration Strategies for Distributed and Cloud Computing - Management Association, Information Resources 2021-01-25

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. The

Research Anthology on Architectures, Frameworks, and Integration Strategies for Distributed and Cloud Computing is a vital reference source that provides valuable insight into current and emergent research occurring within the field of distributed computing. It also presents architectures and service frameworks to achieve highly integrated distributed systems and solutions to integration and efficient management challenges faced by current and future distributed systems. Highlighting a range of topics such as data sharing, wireless sensor networks, and scalability, this multi-volume book is ideally designed for system administrators, integrators, designers, developers, researchers, academicians, and students.

An Improved Throttled Virtual Machine Load Balancer for Cloud - Moses Timothy 2018

With the growing popularity of cloud computing today, its model will one day serve as the fifth utility service outside electricity, telephone, water and gas. Visualizing how this utility model will revolutionize the way people use computing resources requires that we take the big challenge of performance unpredictability associated with load imbalance, computing resource distribution inefficiency and minimum resource consumption into consideration. There is a need for developing a better model that will not only reduce cost but also make enterprise as per user's satisfaction. Improving resource utility and performance of distributed system in a way that will yield better response time, processing time and efficient virtual machine monitoring is therefore, the concern of this research work. Throttled load balancing algorithm was analyzed and its deficiencies serve as a basis for improvement in the proposed system. The proposed system rearranges Virtual Machines (VMs) according to their threshold value and 80% threshold value for each machine serving as the maximum utilization range for cloudlets allocation. The proposed system then spreads load across all VMs until each machine attains 80% of its threshold value. If this level is attained

and there are still cloudlets at the global queue, the 20% un-utilized threshold value can then be used. The system also monitors VM efficiency and stops allocation to any VM that does not perform to its optimum level. An extensive simulation was carried out to evaluate the proposed system using Cloud Analyst simulator in order to compare the existing system and the proposed system. The results show that the proposed system yields a better response time and lower turnaround time and provides efficient VM monitoring than the existing throttled load balancer.

Cloud Computing for Optimization: Foundations, Applications, and Challenges
- Bhabani Shankar Prasad Mishra 2018-02-26

This book discusses harnessing the real power of cloud computing in optimization problems, presenting state-of-the-art computing paradigms, advances in applications, and challenges concerning both the theories and applications of cloud computing in optimization with a focus on diverse fields like the Internet of Things, fog-assisted cloud computing, and big data. In real life, many problems – ranging from social science to engineering sciences – can be identified as complex optimization problems. Very often these are intractable, and as a result researchers from industry as well as the academic community are concentrating their efforts on developing methods of addressing them. Further, the cloud computing paradigm plays a vital role in many areas of interest, like resource allocation, scheduling, energy management, virtualization, and security, and these areas are intertwined with many optimization problems. Using illustrations and figures, this book offers students and researchers a clear overview of the concepts and practices of cloud computing and its use in numerous complex optimization problems.

Web Information Systems and Mining - Fu Lee Wang 2010

Annotation This book constitutes the refereed proceedings of the International Conference on Web Information Systems and Mining, WISM 2010, held in Sanya, China, on October 23-24, 2010. The 54 revised full papers presented in

this volume were carefully reviewed and selected from 603 submissions. The papers are organized in topical sections on applications of web information systems, applications of web mining, distributed systems, e-government and e-commerce, geographic information systems, information security, intelligent networked systems, management information systems, mobile computing, web content mining, web information classification, web information retrieval, web services and e-learning, and XML and semi-structured data.

Cloud Computing - Lizhe Wang 2017-12-19

Cloud computing has created a shift from the use of physical hardware and locally managed software-enabled platforms to that of virtualized cloud-hosted services. Cloud assembles large networks of virtual services, including hardware (CPU, storage, and network) and software resources (databases, message queuing systems, monitoring systems, and load-balancers). As Cloud continues to revolutionize applications in academia, industry, government, and many other fields, the transition to this efficient and flexible platform presents serious challenges at both theoretical and practical levels—ones that will often require new approaches and practices in all areas. Comprehensive and timely, *Cloud Computing: Methodology, Systems, and Applications* summarizes progress in state-of-the-art research and offers step-by-step instruction on how to implement it. Summarizes Cloud Developments, Identifies Research Challenges, and Outlines Future Directions Ideal for a broad audience that includes researchers, engineers, IT professionals, and graduate students, this book is designed in three sections: Fundamentals of Cloud Computing: Concept, Methodology, and Overview Cloud Computing Functionalities and Provisioning Case Studies, Applications, and Future Directions It addresses the obvious technical aspects of using Cloud but goes beyond, exploring the cultural/social and regulatory/legal challenges that are quickly coming to the forefront of discussion. Properly applied as part of an

overall IT strategy, Cloud can help small and medium business enterprises (SMEs) and governments in optimizing expenditure on application-hosting infrastructure. This material outlines a strategy for using Cloud to exploit opportunities in areas including, but not limited to, government, research, business, high-performance computing, web hosting, social networking, and multimedia. With contributions from a host of internationally recognized researchers, this reference delves into everything from necessary changes in users' initial mindset to actual physical requirements for the successful integration of Cloud into existing in-house infrastructure. Using case studies throughout to reinforce concepts, this book also addresses recent advances and future directions in methodologies, taxonomies, IaaS/SaaS, data management and processing, programming models, and applications.

Cloud Computing - Thomas Erl 2013

Explores cloud computing, breaking down the concepts, models, mechanisms, and architectures of this technology while allowing for the financial assessment of resources and how they compare to traditional storage systems.

On Occupancy Based Randomized Load Balancing for Large Systems with General Distributions - Thirupathaiah Vasantam 2019

Multi-server architectures are ubiquitous in today's information infrastructure whether for supporting cloud services, web servers, or for distributed storage. The performance of multi-server systems is highly dependent on the load distribution. This is affected by the use of load balancing strategies. Since both latency and blocking are important features, it is most reasonable to route an incoming job to a server that is lightly loaded. Hence a good load balancing policy should be dependent on the states of servers. Since obtaining information about the remaining workload of servers for every arrival is very hard, it is preferable to design load balancing policies that depend on occupancy or the number of progressing jobs of servers. Furthermore, if the system has a large number of servers, it is not practical to use the occupancy

information of all the servers to dispatch or route an arrival due to high communication cost. In large-scale systems that have tens of thousands of servers, the policies which use the occupancy information of only a finite number of randomly selected servers to dispatch an arrival result in lower implementation cost than the policies which use the occupancy information of all the servers. Such policies are referred to as occupancy based randomized load balancing policies. Motivated by cloud computing systems and web-server farms, we study two types of models. In the first model, each server is an Erlang loss server, and this model is an abstraction of Infrastructure-as-a-Service (IaaS) clouds. The second model we consider is one with processor sharing servers that is an abstraction of web-server farms which serve requests in a round-robin manner with small time granularity. The performance criterion for web-servers is the response time or the latency for the request to be processed. In most prior works, the analysis of these models was restricted to the case of exponential job length distributions and in this dissertation we study the case of general job length distributions. To analyze the impact of a load balancing policy, we need to develop models for the system's dynamics. In this dissertation, we show that one can construct useful Markovian models. For occupancy based randomized routing policies, due to complex inter-dependencies between servers, an exact analysis is mostly intractable. However, we show that the multi-server systems that have an occupancy based randomized load balancing policy are examples of weakly interacting particle systems. In these systems, servers are interacting particles whose states lie in an uncountable state space. We develop a mean-field analysis to understand a server's behavior as the number of servers becomes large. We show that under certain assumptions, as the number of servers increases, the sequence of empirical measure-valued Markov processes which model the systems' dynamics converges to a deterministic measure-valued process referred to as the mean-field limit. We observe that the mean-field

equations correspond to the dynamics of the distribution of a non-linear Markov process. A consequence of having the mean-field limit is that under minor and natural assumptions on the initial states of servers, any finite set of servers can be shown to be independent of each other as the number of servers goes to infinity. Furthermore, the mean-field limit approximates each server's distribution in the transient regime when the number of servers is large. A salient feature of loss and processor sharing systems in the setting where their time evolution can be modeled by reversible Markov processes is that their stationary occupancy distribution is insensitive to the type of job length distribution; it depends only on the average job length but not on the type of the distribution. This property does not hold when the number of servers is finite in our context due to lack of reversibility. We show however that the fixed-point of the mean-field is insensitive to the job length distributions for all occupancy based randomized load balancing policies when the fixed-point is unique for job lengths that have exponential distributions. We also provide some deeper insights into the relationship between the mean-field and the distributions of servers and the empirical measure in the stationary regime. Finally, we address the accuracy of mean-field approximations in the case of loss models. To do so we establish a functional central limit theorem under the assumption that the job lengths have exponential distributions. We show that a suitably scaled fluctuation of the stochastic empirical process around the mean-field converges to an Ornstein-Uhlenbeck process. Our analysis is also valid for the Halfin-Whitt regime in which servers are critically loaded. We then exploit the functional central limit theorem to quantify the error between the actual blocking probability of the system with a large number of servers and the blocking probability obtained from the fixed-point of the mean-field. In the Halfin-Whitt regime, the error is of the order inverse square root of the number of servers. On the other hand, for a light load regime, the error is smaller than the inverse

square root of the number of servers.

Expert Clouds and Applications - I. Jeena Jacob 2021-07-15

This book features original papers from International Conference on Expert Clouds and Applications (ICOECA 2021), organized by GITAM School of Technology, Bangalore, India during February 18–19, 2021. It covers new research insights on artificial intelligence, big data, cloud computing, sustainability, and knowledge-based expert systems. The book discusses innovative research from all aspects including theoretical, practical, and experimental domains that pertain to the expert systems, sustainable clouds, and artificial intelligence technologies.

Deep Learning Approaches to Cloud Security - Pramod Singh Rathore 2021-12-29

DEEP LEARNING APPROACHES TO CLOUD SECURITY Covering one of the most important subjects to our society today, cloud security, this editorial team delves into solutions taken from evolving deep learning approaches, solutions allowing computers to learn from experience and understand the world in terms of a hierarchy of concepts, with each concept defined through its relation to simpler concepts. Deep learning is the fastest growing field in computer science. Deep learning algorithms and techniques are found to be useful in different areas like automatic machine translation, automatic handwriting generation, visual recognition, fraud detection, and detecting developmental delay in children. However, applying deep learning techniques or algorithms successfully in these areas needs a concerted effort, fostering integrative research between experts ranging from diverse disciplines from data science to visualization. This book provides state of the art approaches of deep learning in these areas, including areas of detection and prediction, as well as future framework development, building service systems and analytical aspects. In all these topics, deep learning approaches, such as artificial neural networks, fuzzy logic, genetic algorithms, and hybrid

mechanisms are used. This book is intended for dealing with modeling and performance prediction of the efficient cloud security systems, thereby bringing a newer dimension to this rapidly evolving field. This groundbreaking new volume presents these topics and trends of deep learning, bridging the research gap, and presenting solutions to the challenges facing the engineer or scientist every day in this area. Whether for the veteran engineer or the student, this is a must-have for any library. *Deep Learning Approaches to Cloud Security: Is the first volume of its kind to go in-depth on the newest trends and innovations in cloud security through the use of deep learning approaches Covers these important new innovations, such as AI, data mining, and other evolving computing technologies in relation to cloud security Is a useful reference for the veteran computer scientist or engineer working in this area or an engineer new to the area, or a student in this area Discusses not just the practical applications of these technologies, but also the broader concepts and theory behind how these deep learning tools are vital not just to cloud security, but society as a whole Audience: Computer scientists, scientists and engineers working with information technology, design, network security, and manufacturing, researchers in computers, electronics, and electrical and network security, integrated domain, and data analytics, and students in these areas*

Load Balancing and Rate Limiting Based Algorithms for Improving Cloud Computing Performance - Joseph Doyle 2012

Computational Intelligence in Data Mining - Himansu Sekhar Behera

2018-07-03

The International Conference on “Computational Intelligence in Data Mining” (ICCIDM), after three successful versions, has reached to its fourth version with a lot of aspiration. The best selected conference papers are reviewed and compiled to form this volume. The proceedings discusses the latest solutions,

scientific results and methods in solving intriguing problems in the fields of data mining, computational intelligence, big data analytics, and soft computing. The volume presents a sneak preview into the strengths and weakness of trending applications and research findings in the field of computational intelligence and data mining along with related field.

Cloud Application Architectures - George Reese 2009-04-01

If you're involved in planning IT infrastructure as a network or system architect, system administrator, or developer, this book will help you adapt your skills to work with these highly scalable, highly redundant infrastructure services. While analysts hotly debate the advantages and risks of cloud computing, IT staff and programmers are left to determine whether and how to put their applications into these virtualized services. *Cloud Application Architectures* provides answers -- and critical guidance -- on issues of cost, availability, performance, scaling, privacy, and security. With *Cloud Application Architectures*, you will: Understand the differences between traditional deployment and cloud computing Determine whether moving existing applications to the cloud makes technical and business sense Analyze and compare the long-term costs of cloud services, traditional hosting, and owning dedicated servers Learn how to build a transactional web application for the cloud or migrate one to it Understand how the cloud helps you better prepare for disaster recovery Change your perspective on application scaling To provide realistic examples of the book's principles in action, the author delves into some of the choices and operations available on Amazon Web Services, and includes high-level summaries of several of the other services available on the market today. *Cloud Application Architectures* provides best practices that apply to every available cloud service. Learn how to make the transition to the cloud and prepare your web applications to succeed.

Cloud Computing - Rajkumar Buyya 2010-12-17

The primary purpose of this book is to capture the state-of-the-art in Cloud Computing technologies and applications. The book will also aim to identify potential research directions and technologies that will facilitate creation a global market-place of cloud computing services supporting scientific, industrial, business, and consumer applications. We expect the book to serve as a reference for larger audience such as systems architects, practitioners, developers, new researchers and graduate level students. This area of research is relatively recent, and as such has no existing reference book that addresses it. This book will be a timely contribution to a field that is gaining considerable research interest, momentum, and is expected to be of increasing interest to commercial developers. The book is targeted for professional computer science developers and graduate students especially at Masters level. As Cloud Computing is recognized as one of the top five emerging technologies that will have a major impact on the quality of science and society over the next 20 years, its knowledge will help position our readers at the forefront of the field.

NGINX Cookbook - Derek DeJonghe 2020-10-28

NGINX is one of the most widely used web servers available today, in part because of its capabilities as a load balancer and reverse proxy server for HTTP and other network protocols. This cookbook provides easy-to-follow examples to real-world problems in application delivery. The practical recipes will help you set up and use either the open source or commercial offering to solve problems in various use cases. For professionals who understand modern web architectures, such as n-tier or microservice designs, and common web protocols including TCP and HTTP, these recipes provide proven solutions for security, software load balancing, and monitoring and maintaining NGINX's application delivery platform. You'll also explore advanced features of both NGINX and NGINX Plus, the free and licensed versions of this server. You'll

find recipes for: High-performance load balancing with HTTP, TCP, and UDP
Securing access through encrypted traffic, secure links, HTTP authentication subrequests, and more
Deploying NGINX to Google Cloud, AWS, and Azure cloud computing services
Setting up and configuring NGINX Controller
Installing and configuring the NGINX Plus App Protect module
Enabling WAF
~~WAF~~ ~~Blazing~~ ~~Control~~ ~~CDN~~ ~~Cloud~~ ~~Computing Environment Using Greedy Algorithms~~

- Md Akram Khan 2017-08-08

Advances in Computer and Computational Sciences - Sanjiv K. Bhatia
2017-10-03

Exchange of information and innovative ideas are necessary to accelerate the development of technology. With advent of technology, intelligent and soft computing techniques came into existence with a wide scope of implementation in engineering sciences. Keeping this ideology in preference, this book includes the insights that reflect the 'Advances in Computer and Computational Sciences' from upcoming researchers and leading academicians across the globe. It contains high-quality peer-reviewed papers of 'International Conference on Computer, Communication and Computational Sciences (ICCCCS 2016), held during 12-13 August, 2016 in Ajmer, India'. These papers are arranged in the form of chapters. The content of the book is divided into two volumes that cover variety of topics such as intelligent hardware and software design, advanced communications, power and energy optimization, intelligent techniques used in internet of things, intelligent image processing, advanced software engineering, evolutionary and soft computing, security and many more. This book helps the perspective readers' from computer industry and academia to derive the advances of next generation computer and communication technology and shape them into real life applications.