

SPRINGER BRIEFS IN COMPUTER SCIENCE

Xiao Liu · Dong Yuan · Gaofeng Zhang
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The Design of Cloud Workflow Systems



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Borko Furht



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The Design of Cloud Workflow Systems Xiao Liu, Dong Yuan, Gaofeng Zhang, Wenhao Li, Dahai Cao, Qiang He, Jinjun Chen, Yun Yang, 2011-11-02 Cloud computing is the latest market oriented computing paradigm which brings software design and development into a new era characterized by XaaS i.e everything as a service Cloud workflows as typical software applications in the cloud are composed of a set of partially ordered cloud software services to achieve specific goals However due to the low QoS quality of service nature of the cloud environment the design of workflow systems in the cloud becomes a challenging issue for the delivery of high quality cloud workflow applications To address such an issue this book presents a systematic investigation to the three critical aspects for the design of a cloud workflow system viz system architecture system functionality and quality of service Specifically the system architecture for a cloud workflow system is designed based on the general four layer cloud architecture viz application layer platform layer unified resources layer and fabric layer The system functionality for a cloud workflow system is designed based on the general workflow reference model but with significant extensions to accommodate software services in the cloud The support of QoS is critical for the quality of cloud workflow applications This book presents a generic framework to facilitate a unified design and development process for software components that deliver lifecycle support for different QoS requirements While the general QoS requirements for cloud workflow applications can have many dimensions this book mainly focuses on three of the most important ones viz performance reliability and security In this book the architecture functionality and QoS management of our SwinDeW C prototype cloud workflow system are demonstrated in detail as a case study to evaluate our generic design for cloud workflow systems To conclude this book offers a general overview of cloud workflow systems and provides comprehensive introductions to the design of the system architecture system functionality and QoS management *Process-Aware Systems* Jian Cao, Xiao Liu, Kaijun Ren, 2016-04-07 This book constitutes the refereed proceedings of the Second International Workshop on Process Aware Systems PAS 2015 held in Hangzhou China in October 2015 The four revised full papers and two short papers presented together with five demo papers were carefully reviewed and selected from 16 submissions The papers are organized in topical sections on process modeling and comparison process data analysis Cloud workflow applications **Web Information Systems Engineering - WISE 2013 Workshops** Zhisheng Huang, Chengfei Liu, Jing He, Guangyan Huang, 2014-02-25 This book constitutes the revised selected papers of the combined workshops on Web Information Systems Engineering WISE 2013 held in Nanjing China in October 2013 The seven workshops of WISE 2013 have reported the recent developments and advances in the contemporary topics in the related fields of the big data problem on the Web Big Web Data 2013 mobile business MBC 2013 personalization in cloud and service computing PCS 2013 data quality and trust in dig data QUAT 2013 e health and social computing SCEH 2013 semantic technology for e health STeH 2013 and semantic technology for smarter cities STSC 2013 **Service-Oriented Computing--ICSOC 2013 Workshops**

Alessio Lomuscio,Surya Nepal,Fabio Patrizi,Boualem Benatallah,Ivona Brandić,2014-05-02 This book constitutes the revised selected papers of the workshops of the 11th International Conference on Service Oriented Computing ICSOC 2013 held in Berlin Germany in December 2013 The conference hosted the following five workshops 3rd International Workshop on Cloud Computing and Scientific Applications CCSA 13 1st International Workshop on Cloud Service Brokerage CSB 13 1st International Workshop on Pervasive Analytical Service Clouds for the Enterprise and Beyond PASCEB 13 9th International Workshop on Semantic Web Enabled Software Engineering SWESE 13 9th International Workshop on Engineering Service Oriented Applications WESOA 13 and a PhD Symposium with best papers also being included in this book The 54 papers included in this volume were carefully reviewed and selected from numerous submissions They address various topics in the service oriented computing domain and its emerging applications

Cloud Broker and Cloudlet for Workflow

Scheduling Chan-Hyun Youn,Min Chen,Patrizio Dazzi,2017-06-26 This book blends the principles of cloud computing theory and discussion of emerging technologies in cloud broker systems enabling users to realise the potential of an integrated broker system for scientific applications and the Internet of Things IoT Due to dynamic situations in user demand and cloud resource status scalability has become crucial in the execution of complex scientific applications Therefore data analysts and computer scientists must grasp workflow management issues in order to better understand the characteristics of cloud resources allocate these resources more efficiently and make critical decisions intelligently Thus this book addresses these issues through discussion of some novel approaches and engineering issues in cloud broker systems and cloudlets for workflow scheduling This book closes the gaps between cloud programmers and scientific applications designers describing the fundamentals of cloud broker system technology and the state of the art applications in implementation and performance evaluation The books gives details of scheduling structures and processes providing guidance and inspiration for users including cloud programmers application designers and decision makers with involvement in cloud resource management

Temporal QOS Management in Scientific Cloud Workflow Systems Xiao Liu,Jinjun Chen,Yun Yang,2012-02-20 Cloud computing can provide virtually unlimited scalable high performance computing resources Cloud workflows often underlie many large scale data computation intensive e science applications such as earthquake modelling weather forecasting and astrophysics During application modelling these sophisticated processes are redesigned as cloud workflows and at runtime the models are executed by employing the supercomputing and data sharing ability of the underlying cloud computing infrastructures Temporal QOS Management in Scientific Cloud Workflow Systems focuses on real world scientific applications which often must be completed by satisfying a set of temporal constraints such as milestones and deadlines Meanwhile activity duration as a measurement of system performance often needs to be monitored and controlled This book demonstrates how to guarantee on time completion of most if not all workflow applications Offering a comprehensive framework to support the lifecycle of time constrained workflow applications this book will enhance the overall performance

and usability of scientific cloud workflow systems Explains how to reduce the cost to detect and handle temporal violations while delivering high quality of service QoS Offers new concepts innovative strategies and algorithms to support large scale sophisticated applications in the cloud Improves the overall performance and usability of cloud workflow systems **Survey of Cloud Computing** Borko Furht,2012-01-01 A Survey of Cloud Computing covers a wide range of topics making it a great tool for anyone looking for a quick yet comprehensive reference on this subject **Cloud Computing Solutions** Souvik Pal,Dac-Nhuong Le,Prasant Kumar Pattnaik,2022-05-11 CLOUD COMPUTING SOLUTIONS The main purpose of this book is to include all the cloud related technologies in a single platform so that researchers academicians postgraduate students and those in the industry can easily understand the cloud based ecosystems This book discusses the evolution of cloud computing through grid computing and cluster computing It will help researchers and practitioners to understand grid and distributed computing cloud infrastructure virtual machines virtualization live migration scheduling techniques auditing concept security and privacy business models and case studies through the state of the art cloud computing countermeasures This book covers the spectrum of cloud computing related technologies and the wide ranging contents will differentiate this book from others The topics treated in the book include The evolution of cloud computing from grid computing cluster computing and distributed systems Covers cloud computing and virtualization environments Discusses live migration database auditing and applications as part of the materials related to cloud computing Provides concepts of cloud storage cloud strategy planning and management cloud security and privacy issues Explains complex concepts clearly and covers information for advanced users and beginners Audience The primary audience for the book includes IT computer science specialists researchers graduate students designers experts and engineers who are occupied with research **Automated Workflow Scheduling in Self-Adaptive Clouds** G. Kousalya,P. Balakrishnan,C. Pethuru Raj,2017-05-25 This timely text reference presents a comprehensive review of the workflow scheduling algorithms and approaches that are rapidly becoming essential for a range of software applications due to their ability to efficiently leverage diverse and distributed cloud resources Particular emphasis is placed on how workflow based automation in software defined cloud centers and hybrid IT systems can significantly enhance resource utilization and optimize energy efficiency Topics and features describes dynamic workflow and task scheduling techniques that work across multiple on premise and off premise clouds presents simulation based case studies and details of real time test bed based implementations offers analyses and comparisons of a broad selection of static and dynamic workflow algorithms examines the considerations for the main parameters in projects limited by budget and time constraints covers workflow management systems workflow modeling and simulation techniques and machine learning approaches for predictive workflow analytics This must read work provides invaluable practical insights from three subject matter experts in the cloud paradigm which will empower IT practitioners and industry professionals in their daily assignments Researchers and students interested in next generation software defined cloud environments will also greatly

benefit from the material in the book *Designing a New Class of Distributed Systems* Rao Mikkilineni,2011-11-02
Designing a New Class of Distributed Systems closely examines the Distributed Intelligent Managed Element DIME Computing Model a new model for distributed systems and provides a guide to implementing Distributed Managed Workflows with High Reliability Availability Performance and Security The book also explores the viability of self optimizing self monitoring autonomous DIME based computing systems Designing a New Class of Distributed Systems is designed for practitioners as a reference guide for innovative distributed systems design Researchers working in a related field will also find this book valuable **Data-Intensive Workflow Management** Daniel C. M. de Oliveira, Ji Liu, Esther

Pacitti,2019-05-13 Workflows may be defined as abstractions used to model the coherent flow of activities in the context of an in silico scientific experiment They are employed in many domains of science such as bioinformatics astronomy and engineering Such workflows usually present a considerable number of activities and activations i e tasks associated with activities and may need a long time for execution Due to the continuous need to store and process data efficiently making them data intensive workflows high performance computing environments allied to parallelization techniques are used to run these workflows At the beginning of the 2010s cloud technologies emerged as a promising environment to run scientific workflows By using clouds scientists have expanded beyond single parallel computers to hundreds or even thousands of virtual machines More recently Data Intensive Scalable Computing DISC frameworks e g Apache Spark and Hadoop and environments emerged and are being used to execute data intensive workflows DISC environments are composed of processors and disks in large commodity computing clusters connected using high speed communications switches and networks The main advantage of DISC frameworks is that they support and grant efficient in memory data management for large scale applications such as data intensive workflows However the execution of workflows in cloud and DISC environments raise many challenges such as scheduling workflow activities and activations managing produced data collecting provenance data etc Several existing approaches deal with the challenges mentioned earlier This way there is a real need for understanding how to manage these workflows and various big data platforms that have been developed and introduced As such this book can help researchers understand how linking workflow management with Data Intensive Scalable Computing can help in understanding and analyzing scientific big data In this book we aim to identify and distill the body of work on workflow management in clouds and DISC environments We start by discussing the basic principles of data intensive scientific workflows Next we present two workflows that are executed in a single site and multi site clouds taking advantage of provenance Afterward we go towards workflow management in DISC environments and we present in detail solutions that enable the optimized execution of the workflow using frameworks such as Apache Spark and its extensions

Handbook of Cloud Computing Borko Furht, Armando Escalante,2010-09-11 Cloud computing has become a significant technology trend Experts believe cloud computing is currently reshaping information technology and the IT marketplace The

advantages of using cloud computing include cost savings speed to market access to greater computing resources high availability and scalability Handbook of Cloud Computing includes contributions from world experts in the field of cloud computing from academia research laboratories and private industry This book presents the systems tools and services of the leading providers of cloud computing including Google Yahoo Amazon IBM and Microsoft The basic concepts of cloud computing and cloud computing applications are also introduced Current and future technologies applied in cloud computing are also discussed Case studies examples and exercises are provided throughout Handbook of Cloud Computing is intended for advanced level students and researchers in computer science and electrical engineering as a reference book This handbook is also beneficial to computer and system infrastructure designers developers business managers entrepreneurs and investors within the cloud computing related industry

Model-Driven Development and Operation of Multi-Cloud Applications Elisabetta Di Nitto, Peter Matthews, Dana Petcu, Arnor Solberg, 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

Fundamentals Of Cloud Computing Prasant Kumar Pattanaik, In recent times Cloud Computing has emerged as an important topic in the realm of Information Technology Cloud Computing has gained eminence due to the growing usage of the Internet among people This book is especially intended for readers who have no prior knowledge of the subject Some topics in this book are unique and based on published information that is current and timely and is helpful for research scholars as well as specialists working in areas related to cloud computing This book is suitable as an introductory text for one semester course in Cloud Computing for undergraduate and postgraduate science courses in Computer Science and Information Technology

Cloud Computing Patterns Christoph Fehling, Frank Leymann, Ralph Retter, Walter Schupeck, Peter Arbitter, 2014-02-18 The current work provides CIOs software architects project managers developers and cloud strategy initiatives with a set of architectural patterns that offer nuggets of advice on how to achieve common cloud computing related goals The cloud computing patterns capture knowledge and experience in an abstract format that is

independent of concrete vendor products Readers are provided with a toolbox to structure cloud computing strategies and design cloud application architectures By using this book cloud native applications can be implemented and best suited cloud vendors and tooling for individual usage scenarios can be selected The cloud computing patterns offer a unique blend of academic knowledge and practical experience due to the mix of authors Academic knowledge is brought in by Christoph Fehling and Professor Dr Frank Leymann who work on cloud research at the University of Stuttgart Practical experience in building cloud applications selecting cloud vendors and designing enterprise architecture as a cloud customer is brought in by Dr Ralph Retter who works as an IT architect at T Systems Walter Schupeck who works as a Technology Manager in the field of Enterprise Architecture at Daimler AG and Peter Arbitter the former head of T Systems cloud architecture and IT portfolio team and now working for Microsoft Voices on Cloud Computing Patterns Cloud computing is especially beneficial for large companies such as Daimler AG Prerequisite is a thorough analysis of its impact on the existing applications and the IT architectures During our collaborative research with the University of Stuttgart we identified a vendor neutral and structured approach to describe properties of cloud offerings and requirements on cloud environments The resulting Cloud Computing Patterns have profoundly impacted our corporate IT strategy regarding the adoption of cloud computing They help our architects project managers and developers in the refinement of architectural guidelines and communicate requirements to our integration partners and software suppliers Dr Michael Gorris CIO Daimler AG Ever since 2005 T Systems has provided a flexible and reliable cloud platform with its Dynamic Services Today these cloud services cover a huge variety of corporate applications especially enterprise resource planning business intelligence video voice communication collaboration messaging and mobility services The book was written by senior cloud pioneers sharing their technology foresight combining essential information and practical experiences This valuable compilation helps both practitioners and clients to really understand which new types of services are readily available how they really work and importantly how to benefit from the cloud Dr Marcus Hacke Senior Vice President T Systems International GmbH This book provides a conceptual framework and very timely guidance for people and organizations building applications for the cloud Patterns are a proven approach to building robust and sustainable applications and systems The authors adapt and extend it to cloud computing drawing on their own experience and deep contributions to the field Each pattern includes an extensive discussion of the state of the art with implementation considerations and practical examples that the reader can apply to their own projects By capturing our collective knowledge about building good cloud applications and by providing a format to integrate new insights this book provides an important tool not just for individual practitioners and teams but for the cloud computing community at large Kristof Kloeckner General Manager Rational Software IBM Software Group *Dynamic Cloud Collaboration Platform* Mohammad Mehedi Hassan, Eui-Nam Huh, 2012-09-14 Present trends in cloud providers CPs capabilities have given rise to the interest in federating or collaborating clouds thus allowing providers to reveal on an

increased scale and reach more than that is achievable individually Current research efforts in this context mainly focus on building supply chain collaboration SCC models in which CPs leverage cloud services from other CPs for seamless provisioning Nevertheless in the near future we can expect that hundreds of CPs will compete to offer services and thousands of users will also compete to receive the services to run their complex heterogeneous applications on a cloud computing environment In this open federation scenario existing collaboration models i e SCC are not applicable since they are designed for static environments where a priori agreements among the parties are needed to establish the federation To move beyond these shortcomings Dynamic Cloud Collaboration Platform establishes the basis for developing dynamic advanced and efficient collaborative cloud service solutions that are scalable high performance and cost effective We term the technology for inter connection and inter operation of CPs in open cloud federation as Dynamic Cloud Collaboration DCC in which various CPs small medium and large of complementary service requirements will collaborate dynamically to gain economies of scale and enlargements of their capabilities to meet quality of service QoS requirements of consumers In this context this book addresses four key issues when to collaborate triggering circumstances whom to collaborate with suitable partners how to collaborate architectural model and how to demonstrate collaboration applicability simulation study It also provides solutions which are effective in real environments

Advanced Research on Cloud Computing Design and Applications Aljawarneh, Shadi,2015-09-23 Modern society requires a specialized persistent approach to IT service delivery Cloud computing offers the most logical answer through a highly dynamic and virtualized resource made available by an increasing number of service providers Advanced Research on Cloud Computing Design and Applications shares the latest high quality research results on cloud computing and explores the broad applicability and scope of these trends on an international scale venturing into the hot button issue of IT services evolution and what we need to do to be prepared for future developments in cloud computing This book is an essential reference source for researchers and practitioners in the field of cloud computing as well as a guide for students academics or anyone seeking to learn more about advancement in IT services This publication features chapters covering a broad range of relevant topics including cloud computing for e government cloud computing in the public sector security in the cloud hybrid clouds and outsourced data IT service personalization and supply chain in the cloud

The Cloud Computing Journey Divit Gupta,2024-01-05 Elevate your expertise and gain holistic insights into cloud technology with a focus on smoothly transitioning from on premises to the cloud Key Features Analyze cloud architecture in depth including different layers components and design principles Explore various types of cloud services from AWS Microsoft Azure Google Cloud Oracle Cloud Infrastructure and more Implement best practices and understand the use of various cloud deployment tools Purchase of the print or Kindle book includes a free PDF eBook Book DescriptionAs the need for digital transformation and remote work surges so does the demand for cloud computing However the complexity of cloud architecture and the abundance of vendors and tools can be overwhelming for

businesses This book addresses the need for skilled professionals capable of designing building and managing scalable and resilient cloud systems to navigate the complex landscape of cloud computing through practical tips and strategies This comprehensive cloud computing guide offers the expertise and best practices for evaluating different cloud vendors and tools The first part will help you gain a thorough understanding of cloud computing basics before delving deeper into cloud architecture its design and implementation Armed with this expert insight you ll be able to avoid costly mistakes ensure that your cloud systems are secure and compliant and build cloud systems that can adapt and grow with the business By the end of this book you ll be proficient in leveraging different vendors and tools to build robust and secure cloud systems to achieve specific goals and meet business requirements What you will learn Get to grips with the core concepts of cloud architecture and cost optimization Understand the different cloud deployment and service models Explore various cloud related tools and technologies Discover cloud migration strategies and best practices Find out who the major cloud vendors are and what they offer Analyze the impact and future of cloud technology Who this book is for The book is for anyone interested in understanding cloud technology including business leaders and IT professionals seeking insights into the benefits challenges and best practices of cloud computing Those who are just starting to explore cloud technology as well as those who are already using cloud technology and want to deepen their understanding to optimize usage will find this resource especially useful

Architecting Cloud Computing Solutions Kevin L. Jackson, Scott Goessling, 2018-05-30 Accelerating Business and Mission Success with Cloud Computing Key Features A step by step guide that will practically guide you through implementing Cloud computing services effectively and efficiently Learn to choose the most ideal Cloud service model and adopt appropriate Cloud design considerations for your organization Leverage Cloud computing methodologies to successfully develop a cost effective Cloud environment successfully Book Description Cloud adoption is a core component of digital transformation Scaling the IT environment making it resilient and reducing costs are what organizations want Architecting Cloud Computing Solutions presents and explains critical Cloud solution design considerations and technology decisions required to choose and deploy the right Cloud service and deployment models based on your business and technology service requirements This book starts with the fundamentals of cloud computing and its architectural concepts It then walks you through Cloud service models IaaS PaaS and SaaS deployment models public private community and hybrid and implementation options Enterprise MSP and CSP to explain and describe the key considerations and challenges organizations face during cloud migration Later this book delves into how to leverage DevOps Cloud Native and Serverless architectures in your Cloud environment and presents industry best practices for scaling your Cloud environment Finally this book addresses in depth managing essential cloud technology service components such as data storage security controls and disaster recovery By the end of this book you will have mastered all the design considerations and operational trades required to adopt Cloud services no matter which cloud service provider you choose What you will learn Manage changes in

the digital transformation and cloud transition process Design and build architectures that support specific business cases Design modify and aggregate baseline cloud architectures Familiarize yourself with cloud application security and cloud computing security threats Design and architect small medium and large cloud computing solutions Who this book is for If you are an IT Administrator Cloud Architect or a Solution Architect keen to benefit from cloud adoption for your organization then this book is for you Small business owners managers or consultants will also find this book useful No prior knowledge of Cloud computing is needed **Integration of Services into Workflow Applications** Pawel Czarnul,2015-06-10

Describing state of the art solutions in distributed system architectures Integration of Services into Workflow Applications presents a concise approach to the integration of loosely coupled services into workflow applications It discusses key challenges related to the integration of distributed systems and proposes solutions both in terms of th

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