Editorial – Service Computing Architecture Frontiers

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The services computing is a new cross-discipline that covers the science and technology needed to bridge the gap between business services and ITtelecommunication services. The goal of services computing is to develop new computing technology and thereby enable more advanced ITtelecommunication services to support business services more efficiently and effectively. By taking advantage of virtualized resources, cloud computing presents an attractive means to address the challenges while realizing the potential of services computing. Consequently, computational scientists are turning their attention to emerging cloud and service computing architectures as such, it has come to the picture seeking solutions for computing and IT infrastructures to be service level agreement, dynamic intelligence and environmentally friendly.

This special issue is in response to the increasing convergence between emerging services and cloud computing architectures, while different approaches exist, challenges and opportunities are numerous in this context. The research papers selected for this special issue represent recent progresses in the field, including works on heterogeneous computing architectures, dynamic intelligence technologies, elastic management algorithms, virtualization and networking. This special issue includes five extended version of the selected paper originally presented at the 4th IEEE International Conference on Cloud Computing Technology and Science (IEEE CloudCom 2012), held at Taipei, Taiwan. The papers selected for this issue not only contribute valuable insights and results but also have particular relevance to the emerging services and cloud computing architectures. All of them present high quality results for tackling problems arising from the ever-growing cloud computing, heterogeneous computing as well as dynamic intelligence technologies. We believe that this special issue provides novel ideas and state-of-the-art techniques in the field, and stimulates future research in the emerging service and cloud computing community.

1. SERVICES COMPUTING ARCHITECTURES

Cloud Computing transforms the way many organizations work and offers added values for operation management and service computing. Integrating different business activities together into the same environment can improve efficiency, reduce costs and improve collaboration rather than using a number of standalone services. The paper by Victor Chang entitled "Business Integration as a Service: Computational risk analysis for small and medium enterprises adopting SAP" presents Business Integration as a Service (BIaaS) which enables connections between services operating in the Cloud. Its objective is to connect different services from different clouds together into an integrated environment, with the output of one service being used as input to the next bringing business activities together. The combined use of Risk Analysis and Quality Assurance also allows risk control and data quality to be reviewed and monitored which helps management to make precise and informed decisions.

The Cloud infrastructure services landscape advances steadily leaving users in the agony of choice. As a result, Cloud service identification and discovery remains a hard problem due to different service descriptions, non-standardised naming conventions and heterogeneous types and features of Cloud services. The paper by Miranda Zhang, Rajiv Ranjan, Dimitrios Georgakopoulos, Peter Strazdins, Samee U. Khan, Armin Haller entitled "Investigating Techniques for Automating the Selection of Cloud Infrastructure Services" presents analysis of the current research challenges and presents a semi-automated, extensible, and ontology-based approach for infrastructure service discovery and selection. It also defines functional and non-functional concepts, attributes and relations of infrastructure services. The CloudRecommender system, which implements the proposed domain ontology in a relational model is also presented in this paper. The case study demonstrated that the proposed ontology was comprehensive as it can not only

capture static configuration but also dynamic QoS configuration on the IaaS layer.

2. DYNAMIC INTELLIGENCE

Multi-tenancy and virtualization allow Cloud computing solutions to serve multiple customers from a single system instance sharing computational resources between them. Using these techniques, Cloud service providers maximize the utilization of their infrastructure, and therefore increase their return on infrastructure investment, while reducing the costs of servicing each customer. The paper by Steve Strauch, Vasilios Andrikopoulos, Santiago Gomez Saez and Frank Ley-Mann entitled "ESB^{MT}: A Multi-tenant Aware Enterprise Service Bus" discusses the requirements for multi-tenant ESB solutions as fundamental building blocks in the Platform as a Service (PaaS) Cloud delivery model. Addressing these requirements, the authors propose a solution for dealing with multiple tenant contexts on the level of middleware. The analysis shows that the proposed architecture succeeds in increasing the CPU utilization while having a relatively small impact on the memory footprint.

3. ELASTICITY MANAGEMENT

Elasticity, the ability of an application to adjust the infrastructure resources, is a key property of Cloud computing. Resources elasticity can be implemented in several ways in particular via auto-scaling i.e., increase seamlessly the used resources during demand spikes to maintain the Quality of Service (QoS), and decrease automatically during demand lulls to minimize costs. The paper by Yousri Kouki and Thomas Ledoux entitled "RightCapacity: SLA–driven Cross-Layer Cloud Elasticity Management" proposes RightCapacity, an approach driven by Service Level Agreement (SLA) for optimizing the Cloud elasticity management, which considers cross-layer Cloud elasticity. The network queueing theory was used in modeling the SLA and the Cloud economics. The results show that the proposed architecture successfully keeps the best trade-off between SaaS provider profit and end-user satisfaction.

4. SUMMARY

All of the above papers address either energy issues in emerging cloud computing architectures or propose novel application models in the various heterogeneous computing fields. They also trigger further related research and technology improvements in application of sustainable computing. Honorably, this special issue serves as a landmark source for education, information, and reference to professors, researchers and graduate students interested in updating their knowledge about or active in cloud and green computing, resource provisioning and management, and novel application models for services computing systems.

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