Editorial

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1 Introduction

Recent hardware for Grid Computing (De Meo et al., 2015) and related software architectures (Giunta et al., 2015), have evolved from server-centric architectures to today's cloud computing platforms (Messina et al., 2016) with virtual servers and broadband networks. Many computing abstractions have been introduced to deal with the design of complex workflows (Comi et al., 2016) and recent web-centric applications (De Meo et al., 2017a; De Benedetti et al., 2017b; Fotia et al., 2017; De Meo et al., 2017b), as well as the recent development of IoT and Fog/Edge computing (De Benedetti et al., 2017a; Bonomi et al., 2012). One of the major challenges is represented by the workload fluctuation, and the various constraints about business priorities and latency, for which new solutions for resource management were added. However, the appearance of these additional layers introduced some issues related to their own management. For instance, a part of the additional complexity is due to the attempt of solving the issue of multi-tenancy and agility with the introduction of virtualisation (Kivity et al., 2007; Messina et al., 2014a, 2014b), which introduces more complexity related to, e.g., virtual image management and movement. And the introduction of container technologies such as Dockers (Merkel, 2014) has increased the learning curve which leads to even more complex procedures and a higher error probability. As a consequence, intelligent architectures are needed for Big Data management and parallel computing in the Cloud, in order to decouple end-to-end service connection and service component management from underlying resource. The authors of this special issue have provided several contributions in this direction. The contributions are described below in Section 2.

2 Summary of the issue

This issue collects several different contributions that extend five selected works presented at the *6th edition of the Convergence of Distributed Clouds, Grids and their Management (CDCGM'17)*, track of the *26th IEEE International Conference on Enabling Technologies: Infrastructure for Collaborative Enterprises (WETICE'17)*.

These five contributions in this special issue represent several different approaches related to Multi-Cloud Applications, QoS Management, Scheduling and Distributed Algorithms, Cache Replication for Information Centric Networks (ICN), Cloud Markets, Multi-Agent Systems for the Internet of Things (IoT), and Cognitive Workload Management. The contributions are summarised below.

In 'Cognitive workload management on globally interoperable network of clouds' by Mikkilineni et al. (2017) presented a new computing paradigm by using Distributed Intelligent Managed Elements (DIME) and DIME Network Architecture (DNA) is used to demonstrate globally interoperable public and private cloud network deploying cloud agnostic workloads. In the work, the workloads are cognitive and capable to adjust autonomously their structure and maintain desired quality of service. The authors shown that after migration, cloud agnostic inter-cloud and intra-cloud auto-scaling, auto-failover and live migration were demonstrated again, without disrupting the user experience or losing transactions (Mikkilineni et al., 2017).

In 'Towards autonomous creation of service chains on cloud markets' by Pittl et al. (2017) presented a formal description to service chains and different negotiation types to Cloud markets. The recent development of Amazons EC2 spot market shows that dynamic Cloud markets are gaining popularity. Hence, autonomous multi-round bilateral negotiations, also known as Bazaar negotiations, are a promising approach for trading Cloud services on future Cloud markets. The authors implemented a simulation environment and evaluated their approach by executing different market scenarios (Pittl et al., 2017).

In 'Cache replication for information-centric networks through programmable networks' by Nascimento et al. (2017) presented an architecture to provide reliable content, that can be replicated in the network. The ICN network architecture of their proposal stores the information through a logical volume for later accesses and has possibility of connection with remote controllers to store files reliably in cloud environments (Nascimento et al., 2017).

In 'Improving the MXFT scheduling algorithm in a cloud computing context', Moggridge et al. (2017) improved the MXFT algorithm and compared it with a selection of popular algorithms. The improved versions of MXFT were called MMMXFT and CMMMXFT. The key improvement is using the Min-min algorithm for the fast track. Experimentation revealed that despite Min-min's characteristic of prioritising small tasks at the expense of overall makespan, the overall makespan was not adversely affected but the benefits of prioritising small tasks were identified in the MMMXFT algorithm (Moggridge et al., 2017).

The paper 'Model-based deployment of secure multi-cloud applications' by Casola et al. (2017) describes the MUSA Deployer models and tools, which aim at decoupling the multi-cloud application modelling and development from application deployment and cloud services provisioning. With MUSA tools, application designers and developers are able to express easily and to evaluate the security requirements and, successively, to deploy automatically the application, by acquiring cloud services and by installing and configuring software components on them. The MUSA framework enables a DevOps approach to develop multi-cloud applications with desired Security Service Level Agreements (SLAs) (Casola et al., 2017).

3 Conclusion

Authors of this issue have provided many different contributions that extend five selected works presented at the 6th edition of the CDCGM track. These five contributions in this special issue represent several different approaches related to multi-cloud applications, QoS Management, Scheduling and Distributed Algorithms, Cache Replication for Information Centric Networks (ICN), Cloud Markets, Multi-Agent Systems for the IoT, and Cognitive Workload Management.

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