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INTRODUCTION TO THE SPECIAL ISSUE ON CLOUD FOR INTERNET OF THINGS

Dear SCPE readers,

The Internet of Things (IoT) changes the way we interact with the world around us. It aims to represent the physical world through uniquely identifiable and interconnected objects (things). Things have the capacity for sensing, processing or actuating information about entities available from within the real world. Thus, information travels along heterogeneous systems, such as routers, databases, information systems and the Internet, leading in the generation and movement of enormous amounts of data which have to be stored, processed and presented in a seamless, efficient and easily interpretable form.

Cloud computing represents a very flexible technology, able to offer theoretically unlimited computing and storage capabilities, and efficient communication services for transferring terabyte flows between data centres. Both the IoT and Cloud technologies address two important goals for distributed system: high scalability and high availability. All these features make the Cloud Computing a promising choice for supporting IoT services. IoT can appear as a natural extension of Cloud Computing implementations, where the Cloud provides IoT based resources and capabilities, process IoT data, manage IoT environments and deliver on-demand utility for IoT services, such as sensing/actuation as a service.

This special issue aims to gather innovative works on Cloud solutions for integrating monitors and sensors, storage devices, analytics, tools and virtualization platforms, in order to support IoT purposes. It includes extended, thoroughly revised papers presented at the Workshop on CLoud for IoT (CLIoT 2013) and Workshop on CLOUd Storage Optimization (CLOUSO 2013), which have been organized in conjunction with the European Conference on Service-Oriented and Cloud Computing (ESOCC 2013), in Malaga, Spain, on September 11th, 2013.

The papers included in this special issue deal with several issues, which aim to support efficient IoT applications and services. Tomarchio et al. [1] present an OSGi-based middleware, called Sensor Node Plug-in System (SNPS), able to abstract sensors from their proprietary interfaces and to offer their capabilities to third party applications according to an as-a-Service approach. Thus, sensors are no longer low-level devices producing raw measurement data, but can be seen as services to be used and composed over the Internet in a simple and standardized way.

Fazio et al. [2] discuss the design of a Message Oriented Middleware for Cloud, called MOM4C, able to arrange customizable Cloud facilities by means of a flexible federation-enabled communication system. They focus their discussion on the Dangerous Good Transportation (DGT) use case in order to show the applicability of the proposed middleware in IoT scenarios. To this aim, specific MOM4C utilities are combined in order to compose a PaaS for sensed data drawing, storage and processing.

Destefano et al. [3] present the Sensing and Actuation as a Service (SAaaS) architecture for enrolling and aggregating sensing resources into the Cloud. Specifically, they investigate a sensing resource abstraction solution designed for mobile devices, called SAaaS4Mobile. The implementation of SAaaS4Mobile abstraction modules has been tackled for Android mobiles and are based on well-known standards, as the Open Geospatial Consortium (OGC) Sensor Web Enablement (SWE).

Bellavista et al. [4] provide to both IaaS Cloud providers and to SaaS application providers an open source tool that facilitates the composition of heterogeneous resources, such as single Virtual Machines (VMs), DB services and storage, and stand-alone services, in order to make smart objects for the IoT. The tool automates the provisioning of complex SaaS applications over the widely diffused real-world open-source OpenStack IaaS, integrating well-known technologies, such as the standard Business Process Execution Language (BPEL), which simplifies the definition of the deployment, configuration, and monitoring steps.

Veltri et al. [5] propose a constrained version of the Session Initiation Protocol (SIP), named CoSIP, which allows constrained devices to instantiate communication sessions in a lightweight and standard fashion and can be adopted in M2M application scenarios. The proposed CoSIP is a binary protocol which maps to SIP, similarly to CoAP doesto HTTP. CoSIP can be adopted in several application scenarios, such as service discovery and publish/subscribe applications.

To support storage services for IoT, Villari et al. [6] introduce an abstraction layer that works above heterogeneous Cloud storage platforms, able to split data in many chunks spread over different storage providers.

Users do not need to take care about a specific provider for data upload /download and experience a seamless storage service, where storage space is almost the sum of the storage spaces offered by the involved Cloud providers. At the same time, Data Obfuscation is guaranteed. In fact, Cloud providers can not have full access to the stored files, since they store few chunks.

In the context of the VISION Cloud EU-funded project, which aims to design a new scalable and flexible storage Cloud architecture, Buneo et al. [7] investigate a storage Cloud environment, where a distributed file system is built on top of a set of storage nodes composing a cluster, and several clusters constitute a Cloud data center. The authors provide an analytic model based on Stochastic Reward Nets (SRNs) to analyze the reached availability level of a VISION Cloud storage cluster varying both structural and timing system parameters.

With reference to the VISION Cloud project, Villari et al. [8] describe a delegation architecture for on-boarding federation, which allows an enterprise to efficiently migrate data from one storage Cloud provider to another, while providing continuous access and a unified view over the data during the migration. They provide implementation details based on Security Assertion Markup Language (SAML), a protocol designed for delegation issues with strong security features.

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