SUPERCLOUD - User-centric management of security and dependability in clouds of clouds

Newsletter

February 2018 - Issue 7

Message from the Coordinator

The SUPERCLOUD project came to its end, after three years of hard work, in January 2018. In this final stage of the project, the main focus was put on **presenting the SUPERCLOUD demonstrators** and have final discussions during the **last technical and General Assembly meeting**. Besides the technical part, the SUPERCLOUD project partners were focussing on final evaluation and validation of requirements as well as their final periodic reports and financial statements. Those data will be needed in the final review meeting of the European Commission on 15th March 2018.

In this Issue

Last SUPERCLOUD technical and General Assembly meeting

From 23rd to 24th of November 2017, **the last SUPERCLOUD technical and General Assembly** (GA) meeting took place in **Paris at the Orange Gardens**, premises of our technical leader ORANGE.The first day was split up and the first session, the GA meeting, was used to provide an **overview of the technical status** including the presentation of the latest developments as well as to underline the project meeting goals. Also, several administrative issues including the reporting were approached and preparations for the final review meeting were made. After the GA meeting, the technical meeting started accompanied by more technical discussions of work packages 2 to 5. Also worth a discussion was the final business plan as well as the exploitation report, which will be elaborated by the whole consortium.

The second day was dedicated to dissemination, communication, exploitation, standardisation and training activities and included a fruitful discussion on **future cooperation activities** and further plans. In order to grant public access to the project results and developed components, further dissemination activities were discussed and changes on the project website performed. After a coffee break, two of the **SUPERLOUD's demonstrators were presented to the consortium of ORANGE healthcare, which resulted in a valuable feedback.** Unfortunately, it was the last technical meeting of SUPERCLOUD. However, it was a very engaging and effective meeting, with relevant discussions on the final steps in order to successfully conclude the project.

SUPERCLOUD Toolbox

The SUPERCLOUD toolbox is now available on our Project website. The toolbox represents the major developments and outcome within the entire project. The developed components and tools are explained in detail and some of them are available for download.

Publications

GINJA: One-dollar Cloud-based Disaster Recovery for Databases
Joel Alcântara, Tiago Oliveira, Alysson Bessani, Proceedings of the 2017 ACM/IFIP/USENIX Middleware Conference — Middleware'17. Las Vegas, NV, USA. December 2017.

A Byzantine Fault-tolerant Ordering Service for the Hyperledger Fabric Blockchain Platform
João Sousa, Alysson Bessani, Marko Vukolic, SERIAL'17. Las Vegas, USA, December 2017.

The KISS principle in Software-Defined Networking: a framework for secure communications
Diego Kreutz, Jiangshan Yu, Paulo Esteves-Verissimo, Catia Magalhaes, Fernando M. V. Ramos, IEEE Security and Privacy. October 2017.

On the Design of Resilient Multicloud MapReduce
Pedro Costa, Miguel Correia, Fernando Ramos, IEEE Cloud Computing. October 2017.

Enabling Trust Assessment In Clouds-of-Clouds: A Similarity-Based Approach
Reda Yaich, Nora Cuppens and Frédéric Cuppens, ARES 2017 (International Conference on Availability, Reliability and Security). August 2017.

Firewall Policies Provisioning Through SDN in the Cloud
Nora Cuppens, Salaheddine Zerkane, Yanhuang Li, David Espes, Philippe Laparc, Frédéric Cuppens, 31st Annual IFIP WG 11.3 Conference on Data and Applications Security and Privacy (DBSec'17), Philadelphia, USA, July 2017.

Secure Virtual Network Embedding in a Multi-Cloud Environment
Max Alaluna, Luís Ferrolho, Jose Rui Figueira, Nuno Neves, Fernando M. V. Ramos , arXiv.org, March 2017.

Key Data:

Start Date:	1 February 2015
End Date:	31 January 2018
Duration:	36 months
Project Reference:	643964
Project Costs:	€ 6.863.279
Project Funding:	€ 5.398.280

Consortium:	9 partners (6 countries)
Project Coordinator:	Dr. Klaus-Michael Koch coordination@supercloud-project.eu
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SUPER CLOUD

Technical progress and achieved results 2018

Work in **WP1 "Architecture"** was completed by the end of July 2017 with the completion of deliverable D1.4 **"SUPERCLOUD Self-Management of Security Implementation"** documenting the demonstrator implementation of the overall SUPER-CLOUD framework. The demonstrator is based on the architecture specification of SUPERCLOUD covering the overall architecture (documented in D1.1 "SUPERCLOUD Architecture Specification") and the security self-management framework (documented in D1.2 "SUPERCLOUD Self-Management of Security Specification"). Individual components of the architecture and their integration points were worked out and documented in D1.3 "SUPERCLOUD Architecture Implementation".

WP2 "Security Management and Infrastructure for Computation" activity focused on releasing the **final version of the computation infrastructure with self-managed protection** (D2.4 "Consolidated Security Management and Infrastructure for Computation Results and Technology"). For **virtualization**, the multi-cloud MANTUS orchestration framework was extended to enable trade-offs between non-functional extensibility, dynamic adaptability to provider features, and interoperability. Intel SGX technology was also applied for strong protection of attribute-based encryption keys, or of sensitive execution environments against side-channel attacks with the release of the **Path ORAM for SGX Enclaves library** . A generic trusted execution environment called **LaStGT** to process very large scale data sets was also proposed. Final experimental results of the **Cloud FPGA** framework are also available. For **self-management**, the security service orchestrator was extended to manage configuration and deployment of firewall policies over SDN networks. The solution was implemented into an existing SDN firewall solution and published at the **DBSEC 2017** conference. For security monitoring, an external REST API for cross-layer and multiple provider detection and reaction was defined, also including provider-level monitoring information. The SLA management framework was extended to capture confidentiality and privacy concerns during the negotiation of SSLAs. Finally, results on the software trust management service were published in the **ARES 2017 conference**.

In the scope of **WP3 "Data Management"** , **Hyperledger Fabric system description was accepted to Eurosys 2018** led by IBM. In collaboration of SUPERCLOUD partners, IBM and University of Lisbon, the first **Bycantine Fault-Tolerant (BFT) ordering service was implemented** based on BFT-SMaRt consensus library from University of Lisbon. This ordering service now incorporates **WHEAT**, a novel BFT consensus protocol developed in scope of SUPERCLOUD, which was integrated first in BFT-SMaRt and then in Hyperledger Fabric. The joint IBM/University of Lisbon paper was submitted for publication.

Within **WP4 "Resilient Network Virtualization and Provisioning"** the multi-cloud network virtualization platform, **Sirius** ,has been developed. Recently we have developed a new component, the orchestrator, which complements the functionally of the network hypervisor by managing the substrate infrastructure. As a central module of our solution, we have designed novel solutions for the virtual network embedding (VNE) problem, used to map the virtual network requests into physical network elements. In particular, we have proposed **scalable algorithms for the secure VNE problem, in a multi-cloud environment, and solutions that allow virtual networks to scale up and down.** To improve the security of the underlying Software-Defined Networking (SDN) infrastructure, we have proposed an SDN control plane communications architecture that includes innovative solutions in the context of key distribution and secure channel support. A paper on this work was accepted for the IEEE Security and Privacy magazine.
With respect to integration with other SUPERCLOUD Work Packages, we have evaluated the integration of the network virtualization platform with the Maxdata and Philips applications from WP5, with Janus storage from WP3, and with the authentication service from WP2.

Partners involved in **WP5 "Use-case and testbed"** were busy enhancing demonstrators' design and implementation. Under this task, the main **demonstrators produced in WP5 are based on two real-world products: a medical imaging platform (from Philips Healthcare) and a healthcare laboratory information system (from Maxdata).** Those demonstrators were further integrated with the SUPERCLOUD platform components on the testbed in close collaboration with other project partners. Currently WP5 is concentrated on the final evaluation and validation of the requirements (as presented in deliverable D5.1 "Use-case requirements, specification and evaluation plan") in the context of the SUPERCLOUD components and demonstrators.

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