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

Newsletter

August 2017 - Issue 6

Message from the Coordinator

As another few months have passed since the last issue, the SUPERCLOUD project has lots of results to share. Many papers have been accepted at various conferences and results are very promising. Notably, the demonstration of the CLINIdATA® Application, developed by Maxdata has been successfully with SUPERCLOUD Data Protection and Network Management. Furthermore, a prototype of the network virtualization solution has been built.

In this Issue

SUPERCLOUD Technical/General Assembly Meeting , 26th-27th of June, 2017

The first day was dedicated to the General Assembly (GA) meeting, providing an overview of the technical status and the latest developments since the last meeting in March, as well as some administrative issues, such as GA votes. Afterwards, the first three work packages presented and discussed the current status of their deliverables, as well as the future outlook and upcoming tasks. A roadmap for the further progress was developed collaboratively. After a short wrap-up and review the consortium had the chance to go on an exciting excursion across the beautiful landscape of São Miguel island in the Azores. On the second day, the remaining work packages presented their latest work progress and current status and discussed the upcoming tasks. Afterwards, further discussions regarding the requirements and especially the final review meeting took place. Summing up, it was a very successful and engaging meeting, providing many inputs that can be used for further research and developments within the SUPERCLOUD project. The path for the upcoming final months of the project has been well defined and planned.

Publications

Secure Tera-scale Data Crunching with a Small TCB
B. Valava, N. Neves, P. Steenkiste, Proceedings of the International Conference on Dependable Systems and Networks, Denver/USA, June 2017.

Mantus: Putting Aspects to Work for Flexible Multi-Cloud Deployment
A. Palesandro, M. Lacoste, N. Bennani, C. G. Guegan, D. Bourge, 10th IEEE International Conference on Cloud Computing, Hawaii/USA, June 2017.

Chrysaor: Fine-Grained, Fault-Tolerant Cloud-of-Clouds MapReduce
P. Costa, F. Ramos, M. Correia, IEEE/ACM International Symposium on Cluster, Cloud and Grid Computing (CCGrid), Madrid/Spain, May 2017.

Secure and Dependable Multi-Cloud Network Virtualization
M. Alaluna, E. Vial, N. Neves, F. Ramos, EuroSys 1st International Workshop on Security and Dependability of Multi-Domain Infrastructures (XDOMo), Belgrade/Serbia, April 2017.

SDN-based Dynamic and Adaptive Policy Management System to Mitigate DDoS Attacks
R. Sahay, G. Blanc, Z. Zhang, K. Toumi, H. Debar, EuroSys 1st International Workshop on Security and Dependability of Multi-Domain Infrastructures (XDOMo), Belgrade/Serbia, April 2017.

Somewhat/Fully Homomorphic Encryption: implementation progress and challenges
G. Bonnoron, C. Fontaine, G. Gogniat, V. Herbert, V. Lapôtre, V. Migliore, A. Roux-Langlois, 2nd International Conference in honor of Professor Claude Carlet, Rabat/Morocco, April 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)
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SUPER CLOUD

Technical progress and achieved results 2017

Work in **WP1 "Architecture"** has focused on the **implementation** and **integration of the components** of the SUPERCLOUD architecture. The architecture implementation defines core components of the three architectural planes realizing frameworks for **secure computation**, **data protection** and **network security** and provides necessary interconnections between these. The frameworks are supported by an orthogonal system for security self-management for providing fine-grained user-defined control over security and privacy settings. The architecture implementation is described in D1.3 and D1.4, where D1.3 focuses on the overall architecture and D1.4 highlights details of the security self-management system. The components of the SUPERCLOUD architecture implementation will also be made available in a common **SUPERCLOUD code repository**.

In **WP2 "Security Management and Infrastructure for Computation"**, the focus was put on finalizing the **SUPERCLOUD security computing framework**, released in **D2.3**, with new results regarding virtualization and self-management. For virtualization, an Infrastructure-as-Code multi-cloud builder called **Mantus** was proposed to inject flexibly non-functional services in infrastructure elements specified as TOSCA templates. This approach presented at the IEEE CLOUD 2017 conference is based on a new aspect specification language called TML (TOSCA manipulation language) and on its corresponding aspect weaver. The **Intel SGX-based execution environment** was also released to perform secure and trusted computations within enclaves thanks to a secure Python interpreter to run arbitrary scripts. New results around trusted computing included the LASTGT system for integrity and verifiability of execution for very large-scale data sets using trusted hardware, with a paper published at the DSN 2017 conference. Ongoing work investigates how to use Intel SGX: to secure cryptographic key management operations for attribute-based encryption; or to guarantee integrity of chaining of system-level services inserted in the micro-hypervisor to provide cross-layer U-Cloud security. Another key activity was the **security self-management infrastructure**, reflected in D1.4. A proposition of orchestration of self-management of security services was made based on Docker containers to facilitate integration of self-management within the different SUPERCLOUD architecture planes and with applications. Such examples include integration of the **authorization service** with the PHHC healthcare application, of the **Security SLA management service** with the network plane for policy-based DDoS attack mitigation, with a paper presented at the DBSEC 2017 conference. New results are also available regarding **software-level trust management**, to provide guidance in the choice of a cloud provider based on past experiences, with a paper presented at the ARES 2017 conference.

The main focus of **WP3 "Data Management"** was put on the first release of the implementations of the SUPERCLOUD data handling functions. Work was dedicated towards the description of the software components, namely a file storage service build on top of existing public cloud storage services, a framework for developing decentralised blockchain applications on top of state-of-the-art Byzantine consensus algorithms, and tools and libraries for integrating advanced privacy-preserving features on cloud applications.

WP4 "Resilient Network Virtualization and Provisioning" has been developing the communication infrastructure that will allow the **interconnection of multiple clouds**, while supporting the embedding of virtual networks specified by various tenants. The current **prototype** already **runs over the Amazon EC2** and two private clouds, one in Portugal and another in France. Successful tests were carried out with the main use case applications, letting multiple containers run over different clouds. A paper describing the architecture of our virtualization solution, called Sirius, was presented recently at the XDOM017 workshop in April 2017.

Partners involved in **WP5 "Use-case and testbed"** were busy with the **demonstration design**. 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**) were integrated with some SUPERCLOUD platform components on the testbed in a preliminary version. WP5 submitted a report D5.2, with an overview of the related product for each demonstrator, how it was integrated with the SUPERCLOUD platform components, and a set of demonstration procedures that show in practice the implementation of the use-cases described in D5.1. Next step is to evaluate and validate the requirements described in D5.1 by running the final version of the demonstrators on the SUPERCLOUD testbed.

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