Lehrstuhl für Sicherheit in der Informatik
Prof. Dr. Claudia Eckert

Offer in cooperation with Fraunhofer AISEC, Garching

Master's Thesis: Predictive Cloud Compliance

Certification of cloud services aims at increasing the trust of customers and providing comparability between cloud services. A cloud service's attributes may change over time where the changes are hard to detect by a customer. Thus it is necessary to *continuously*, i.e. automatically and repeatedly check if a cloud service satisfies a set of customer requirements.[1] If the cloud service satisfies the requirements, then a report called *certificate* is produced, stating *compliance*. At Fraunhofer AISEC, we develop test-based certification techniques which support continuous validation of requirements related to security, availability, and reliability.[2]

Yet current approaches to cloud compliance are limited to statements about the past, e.g. the TLS configuration of a cloud service was correctly configured during the last month. The goal of this Master Thesis is to use the test results produced by our tooling to make predictions about the compliance of the cloud service in the future. To that end, properties of results produced by test-based certification techniques have to be investigated to identify, adapt and apply suitable data analysis methods, e.g. applying machine learning methods in the context of discrete sequences.

Focal points of this Master's Thesis include, but are not limited to:

- identification and analysis of cloud compliance prediction scenarios, e.g. predict the probability of the next test to fail, estimate the duration of non-compliance if a test failed etc.

- analysis (and possibly extension) of data structures of results produced by continuous test-based certification techniques

- development of prediction methods using existing methods of data analysis and machine learning, e.g. based on Hidden Markov model

- experimental evaluation of proposed approaches and discussion of boundaries

Prerequisites

- (required) good general programming skills (python, shell scripts etc.), in particular in Java

- (required) familiarity with data analysis and machine learning methods

- (appreciated) initial experience with machine learning frameworks, e.g. scikit-learn, Weka etc.

Contact

Philipp Stephanow
Fraunhofer AISEC
E-Mail: philipp.stephanow@aisec.fraunhofer.de
Telefon: +49 89 322-9986-125

Published: 5. Dezember 2016

---

[1] M. Anisetti, C. Ardagna, F. Gaudenzi, and E. Damiani, "A certification framework for cloud-based services," in Proceedings of the 31st Annual ACM Symposium on Applied Computing (SAC 2016).

[2] Philipp Stephanow, Gaurav Srivastava, and Julian Schütte. "Test-based cloud service certification of opportunistic providers". In: The 8th IEEE International Conference on Cloud Computing (CLOUD 2016).