

Title: Towards a MicroServices Architecture for Clouds

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Challenge:

There is currently a big communication and understanding gap between business management and ICT, although business operations necessarily depend today on ICT applications. Enterprises are slowly moving to the cloud, currently taking a SaaSfirst approach, i.e., if there is no SaaSlevel solution, select a PaaSlevel one, if none exists, select an IaaSlevel one, and build the missing functionality. Assuming that in 10 years time everybody has migrated to the cloud and has successfully implemented this strategy, a business would have to rely on the unique capabilities of a SaaS provider to produce an unique digital proposition. Ironically, SaaS providers are taking a commodity approach to functionality in order to lower their operational cost and the users' costs, while PaaS would not suit a truly unique digital proposition, due to potential PaaS provider lockin.

An answer to this problem might be the use of a microservices architecture [1] where the application is defined and built using a finegrained architecture of extremely specialized services [2] and may use multiple PaaS, SaaS and IaaS providers to create a differentiating, fully flexible, vendor unlocked offering. However, many companies have (extremely) large monolithic, coarsegrained applications which may be (extremely) difficult to convert to the finegrained level of a microservices architecture [3]. Also, as microservices may run on any (virtual) infrastructure, deciding quickly on the right combination of computational resources for each microservice under various loads could become unfeasible. The main research questions are:

- 1. How portable are applications to microservices? How well do stateoftheart methods lend themselves to this problem?*
- 2. How can the performance of microservices be evaluated? Are standardized benchmark suites reusable in this context? How can the performance evaluation methodology be extended to include business impact metrics?*

We welcome a multidisciplinary team, e.g., technical management of businesses, business administration, software engineering, cloud computing, performance analysis, formal verification (i.e., to verify that before and after functionalities are still equivalent). A oneweek scenario is starting from an existing application (something that Greenclouds could provide, for example, a concrete and representative SAPbased application) and conduct an analysis of the business and technical case, leading to a generic refactoring process, evaluation methods and guidelines for benchmark suites (reflecting not only performance metrics, but also businessside metrics, such as business value, business agility and operational agility). The team can apply this generic refactoring to the application provided by Greenclouds, and analyze the impact on business of refactoring, relative to the initial application. The analysis will be materialized in a report, in notes taken during joint discussion, and in a plan for joint application for funding KIEM/STW project after the workshop.