

OPTIMIS – towards holistic cloud management

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Abstract. Despite significant attention and substantial efforts both in industry and academia, cloud computing has not yet reached its full potential. Commonly stated obstacles for cloud adoption include confusion about terminology with multiple delivery models (SaaS, PaaS, IaaS) and deployment scenarios (public clouds, private clouds, etc.). Other frequent concerns relate to risk of outsourcing, data legislation issues, inability to assess trust in external providers, etc. In addition to these obstacles to cloud computing as a concept, there are also technological thresholds in today's cloud offerings, making service provisioning a tedious process. We summarize our analysis of cloud computing obstacles in five high-level research challenges:

1. Service life cycle optimization for improved construction, deployment, and operation of cloud services.
2. Adaptive self-preservation with increased autonomy in resource management, enabling fewer administrators to handle increasingly larger systems.
3. Cloud and service self-management based on non-functional management criteria, extending beyond typical cost-performance trade-offs to also incorporate aspects of trust, risk, and eco-efficiency in decision making.
4. Support for service deployment and operation in multiple cloud architectures such as (bursting) private clouds, cloud federation, cross-cloud service provisioning, and resource mediation by third-party cloud brokers.
5. Market and legislative issues including identification of new market roles and business models for clouds, as well as investigation of legal aspects related to the acquisition, transfer, and storage of service data.

Our main research objective is to make significant progress in these five areas and to incorporate our results into the OPTIMIS Toolkit. The OPTIMIS Toolkit is a set of software components aimed to simplify and optimize construction, deployment, and operation of services (SaaS and PaaS level) as well as operation of the virtualized infrastructure (IaaS) required to deliver these services. The toolkit is not a turn-key solution but rather the software components can be selected and composed for use in a variety of cloud deployment scenarios, as well as be customized through policies to meet different business level objectives.