



1 Motivation

The usage of cloud-based computational resources to enact business processes as so-called *elastic processes* has gained much attention by the research community [1, 3]. Until now, a number of frameworks to realize elastic processes as well as a number of different optimization models have been proposed. Usually, optimization models aim at cost efficiency under given Quality of Service (QoS) constraints. So far, these models are based on deterministic QoS parameters, i.e., it is expected that the non-functional behavior of single process tasks can be predicted in a reliable manner, which is not necessarily true in real-world settings [2].

Therefore, the goal of this Master thesis is the extension of an already existing optimization model by the integration of stochastic QoS parameters. The optimization model needs to be implemented and solved using a solver like IBM CPLEX. In addition, the student is expected to conceptualize and implement a heuristic solving the optimization model.

2 Work Description

- Literature work on stochastic QoS behavior and elastic processes.
- Extension of an already existing optimization model by stochastic QoS parameters.
- Implementation of the optimization model extension and of a heuristic.
- Qualitative and quantitative evaluation of the optimization model and the heuristic.

3 Further Information

Start: Immediately (might also be later)

Basic Requirements: Very good implementation skills; knowledge about optimization problems is a prerequisite

Contact: Stefan Schulte, s.schulte@infosys.tuwien.ac.at, Philipp Waibel, p.waibel@infosys.tuwien.ac.at

References

- [1] Philipp Hoenisch, Dieter Schuller, Stefan Schulte, Christoph Hochreiner, and Schahram Dustdar. Optimization of Complex Elastic Processes. *IEEE Transactions on Services Comp.*, 9(5):700–713, 2016.
- [2] Dieter Schuller, Ulrich Lampe, Julian Eckert, Ralf Steinmetz, and Stefan Schulte. Cost-Driven Optimization of Complex Service-Based Workflows for Stochastic QoS Parameters. In *IEEE 19th Int. Conf. on Web Services*, pages 66–73, 2012.
- [3] Stefan Schulte, Christian Janiesch, Srikumar Venugopal, Ingo Weber, and Philipp Hoenisch. Elastic Business Process Management: State of the Art and Open Challenges for BPM in the Cloud. *Future Generation Comp. Systems*, 46:36–50, 2015.

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Conceptual (Analytical)

-3 -2 -1 0 1 2 3
Empirical (Simulation)

-3 -2 -1 0 1 2 3
Practical (Implementation)

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Literature Work