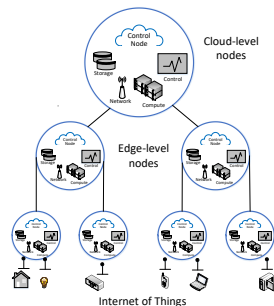


Combining Software-defined Networking and Fog Computing

Master thesis



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1 Motivation

Fog computing combines processing at the edge of the network (e.g., at Internet of Things (IoT) devices) with cloud-based computational resources [1]. One particular use case for fog computing is the utilization of fog nodes to (pre-)process data streams on-site instead or before sending data to the cloud [3]. While a number of approaches to this have already been proposed, they usually are based on the notion of fixed network structures, e.g., [2]. However, based on the concept of Software-defined Networking (SDN), it is possible to adapt the shape of the network in order to optimize stream processing in the fog.

It is the goal of this thesis to lay the foundations for combining SDN and fog computing with the purpose of processing data streams. For this, the student needs to conceptualize an according framework and implement some basic optimization algorithms.

2 Work Description

- Literature work on stream processing, fog computing, and SDN.
- Conceptualization and implementation of a framework which combines SDN and fog computing.
- Implementation of some basic optimization algorithms for network arrangement and operator placement.
- Quantitative evaluation.

3 Further Information

Start: Immediately (might also be later)

Basic Requirements: Very good implementation skills; knowledge about the IoT and networking is helpful

References

- [1] F. Bonomi, R. Milito, P. Natarajan, and J. Zhu. Fog Computing: A Platform for Internet of Things and Analytics. In *Big Data and Internet of Things: A Roadmap for Smart Environments*, volume 546 of *Studies in Computational Intelligence*, pages 169–186. Springer, 2014.
- [2] V. Cardellini, F. Lo Presti, M. Nardelli, and G. Russo Russo. Decentralized self-adaptation for elastic Data Stream Processing. *Future Generation Computer Systems*, 87:171–185, 2018.
- [3] M. D. de Assunção, A. da Silva Veith, and R. Buyya. Distributed Data Stream Processing and Edge Computing: A Survey on Resource Elasticity and Future Directions. *Journal of Network and Computer Applications*, 103:1–17, 2018.
- [4] M. Grandjean. La connaissance est un réseau. *Les Cahiers du Numérique*, 10(3):37–54.

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Conceptual (Analytical)

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Empirical (Simulation)

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Practical (Implementation)

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Literature Work