UNIVERSITÄT PADERBORN

SICP Software Innovation Campus Paderborn

TOPIC FOR A MASTER'S THESIS

RESOURCE PLANNING FOR THE INDUSTRIAL ENVIRONMENT

PROF. DR. GREGOR ENGELS, SOFTWARE INNOVATION CAMPUS (SICP)

Motivation

Today, data communication and processing in industrial plants usually assume well-known applications and carefully planned resources (processing, storage, network). This ensures quality of service (QoS), but limits flexibility. In the future, rapidly changing application scenarios can also be expected in the industrial environment, for example through the introduction of data analytics applications and the integration of sophisticated human-machine interfaces (such as augmented reality glasses for technicians).

To the best of our knowledge there is no software so far that support long-term resource planning and investment decisions (e.g., to identify situations in a future where QoS requirements are not met). This includes extrapolation of load data, estimation of server configurations which maximize capacity and minimize costs, or consideration of different tradeoffs (e.g., to rent/buy infrastructure.

Task description (Development of a long-term planning suite)

- Definition of a software architecture that allows flexible deployment of different algorithms
- Implementation of extrapolation algorithms (from related work) for cloud-like resource consumptions based on historical data, app descriptors, and other kind of data
- Implementation of optimization algorithms (from related work) for choosing server configurations based on historical data, app descriptors, and other kind of data
- Implementation of a tradeoff mechanism: Overprovisioning costs vs probability of unscheduled tasks
- Definition of data that is required to implement to identified algorithms
- Validation and verification of all algorithms
- Visualization of trends and possible configurations (for servers) using a dashboard (web dash)

Prerequisites

- Basic understanding of cloud computing concepts (or willing to learn)
- Good knowledge of optimization problems (or willing to learn)
- Knowledge and experience in Docker (or willing to learn)
- Good knowledge in Python

Contact	Email	Phone | Room.	Date
Marvin Illian	marvin.illian@upb.de	60-1756 | ZM2.01.10	11 2021
Tobias Hardes	tobias.hardes@upb.de	60-6492 | ZM2.01.10	11 2021