Thesis Proposal (MA, ev. BA)

## Gaining new Insights by Modeling Workflows and Dependencies in Smart Spaces

Outline

Smart Spaces are spaces with computing hardware that interfaces between the Cyber and the Physical World. Examples for such devices are remote controllable building control entities such as shutters, lighting, air conditioning, heating, ventilation, multimedia equipment, etc.

For the past years we developed the Distributed Smart Space Orchestration System (DS2OS). It is a middleware framework that manages service Apps within Smart Spaces. The core of DS2OS is the Virtual State Layer (VSL) middleware.

In the image you see a graphical illustration of a program run that was shown by Sir Tony Hoare in autumn 2016. The VSL allows to draw similar graphs and to get insights about the workflows within Smart Spaces. This is relevant for different purposes including providing safety and optimizing the allocation of services to computing nodes.

The goal of this work is to analyze different techniques that allow representing processes and their dependencies within smart spaces. Tools that create models and allow reasoning about them will be created. Tools that visualize the models are created. The results are used to get new insights about Smart Space Orchestration (S2O).
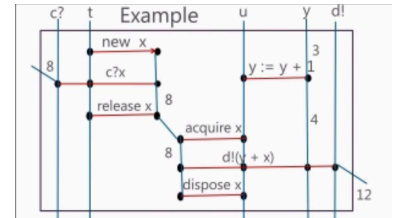
Possible Structure

- Analysis
    - o Analyze the problem domain.
    - o Identify relevant research questions that you will work on.
    - o Present relevant technology.
- Related work
    - o What do other projects do that answer your questions?
- Design
    - o Which components do you need?
    - o Which are options for the design? Why are your choices good?
- Implementation
    - o Relevant details such as frameworks used.
- Evaluation
    - o How well does it work?
        - ▪ Metrics!

Requirements

Curiosity, Joy to work in a team, Knowledge in Java.
Ability to write good code (including unit tests and documentation).

Contact

If you are interested, please send an email briefly explaining why you think to be the right person for this thesis to:
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Image sources: Heidelberg Laureate Forum 2016, Sir Tony Hoare

Distributed Smart 2pace Orchestration System

ds2os.org/