**Master Thesis Proposal**

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| **Technical University of Munich** |  |
| **Faculty of Informatics** |  |
| **Software Engineering For Business Information System** | **Date: 09 Sep 2015** |

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**Proposed Topic:**

Guidelines for designing a system using microservices.

**Abstract:**

Microservice Architecture is evolved from Service Oriented Architecture (SOA) in order to improve reusability, autonomy and many others. Microservices are achieved while breaking down a system along business domains following the Single Responsibility Principle. Although, this is an accepted definition by literature, there are still lots of information, which are topic of discussion. To list only few of them would be how to exactly map microservices to business context and how small the size of a microservice should be. I would like to research on the process to design a system using microservices. I will focus on the method used in hybris as well as the procedure defined in the literature. Instead of comparison between literature and practice, my motive would be to use the real case study to act as a central document, which will provide basic guidelines to follow microservices architecture.

**Research Questions:**

1. How are the boundaries and size of microservices defined?
2. What are the challenges in the microservice architecture?
3. What are the best practices for defining microservice architecture?

**Methodology:**

In the beginning, I will study about the core concepts regarding microservices architecture as well as the process of defining microservices following the scientific literature. The focus will be to achieve basic understanding regarding microservices architecture and the mapping of business context to microservices.

The next step will concentrate on the methodology followed in hybris. I will understand the process followed by hybris to identify the individual microservices for fulfilling business requirements. It will also be interesting to identify the assumptions made during the process and new challenges faced by incorporating microservices architecture including the workaround. In order to achieve the goals, I will study the available documents from hybris and do questionnaires with the domain experts when necessary.

Having looked in detail with the perspective of company, I will look into the general challenges and limitation of microservices using scientific documents. Moreover, I will also research about the way of defining boundaries and communication between microservices.

Then, with all gathered knowledge from case study and scientific literature, I will try to define guidelines for the process of designing microservice architecture. I will focus on the various criteria to consider as well as the recommendation for best solution depending upon scenario. The guidelines will try to simplify what should be used and what should be avoided.

Finally, I will include the critical analysis made by domain experts regarding the guidelines produced. This will try to clarify usability scenario of the guidelines to the business use cases.

In order to answer the research questions, I will implement mixed (or pragmatic) research methodology. I will follow qualitative approach when I need a deeper understanding of a useful topic. And if there is a necessity to decide upon a probable solution, when there are more possible options available, I will try to employ quantitative approach. I believe the unbiased use of the methodologies will provide a good advantage to my research.

**Outline:**

1. Motivation
2. Problem Definition
3. Literature Review
   1. Microservice Architecture
   2. Domain Driven Design
4. Hybris Case study
   1. Business requirements and assumptions
   2. Microservices as the solution
   3. limitation and problems of microservices
5. Challenges in microservice architecture in general
   1. Boundaries definition
   2. Communication between microservices
   3. Interface definition
6. Guidelines for designing microservice architecture
   1. Boundary
   2. Size
   3. Communication between microservices
   4. An Ideal use case scenario
7. Verification and Critical Analysis
   1. Critics by experts using questionnaires
8. Future Improvement
9. Summary
10. List of Figures
11. List of Tables
12. Appendix

**References/ Bibliography:**

Newman, S. (2015): Building Microservices Designing Fine –Grained Systems. *O’REILLY*

Woolf, B. & Hohpe, G. (2003): Enterprise Integration Patterns: Designing, Building, and Deploying Messaging Solutions*. The Addition Wesley Signature Series*

Vernon, V. (2013): Implementing Domain-Driven Design. *DDD Community*

Webber, J. & Parastatidis, S. & Robinson, I. (2010): REST in Practice Hypermedia and Systems Architecture. *O’REILLY*