Group Report Template

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***Abstract*—**
***Index Terms*—Keyword1, Keyword2, Keyword3, Keyword4, Keyword5**

I. Introduction and Motivation

The structure of the paper is as follows. Section II outlines the research question and the research approach. Section III describes similar work in the field and how our contribution fits the field. Section IV-A presents a production reconfiguration use case. The use case serves as input to specify a reconfigurability QA requirement in Section IV-B. Section V introduces the proposed reconfigurable middleware software architecture design. Section VI evaluates the proposed middleware on realistic equipment in the I4.0 lab and analyzes the results against the stated QA requirement.

II. Problem and Approach

Problem. In livestock farming, the production process is highly dependent on the environment and the health of the animals. To address this the system that has been developed in this project aims to look into how different architectural approaches can bridge different services and servers in a way that the production process can be reconfigured to adapt to the changes in the environment and the health of the animals. The problem of catching decese ealy and also trying to automating asspetcts of the farming production line could lead to more optimized environment both for the livestock but also for the farmer. It is belived that by devloping such a interoperable system it would lead to better healf for the animals and more time for the farmer to focus on other things where needed.To approach this problem the following research questions are formulated:

Research questions:

1) How can different architectures support the stated production system requirements?
2) Which architectural tradeoffs must be taken due to the technology choices?

Approach. The following steps are taken to answer this paper's research questions:

1) Develop the overall architecture of the system.
   a) Identify the services and servers that are needed to support the production system.
   b) Identify the usecases that the system should support.
   c) Identify the Quality Attributes that the system should support and how they are prioritized.
   d) Identify the non-functional requirements that the system should support.
2) Research the technologies that could be used to support the system and the tradeoffs that are made by using them.
3) Develop a prototype of the system.
4) Evaluate the prototype based on the Quality Attributes that are identified in step 1.
5) Analyze the results and answer the research questions.

III. Related work

This Section addresses existing contributions by examining xxx in the I4.0 domain. In total, x papers are investigated.

In [1], experiences are elaborated on a three-layer architecture of a reconfigurable smart factory for drug packing in healthcare I4.0.

The paper [2] proposes an ontology agent-based architecture for inferring new configurations to adapt to changes in manufacturing requirements and/or environment.

In [3], [4] an architecture for a reconfigurable production system is specified. Two objectives for reconfiguration and how they can be reached are described.

Several papers [5]–[7] describe reconfigurable manufacturing systems that are cost-effective and responsive to market changes.

All contributions provide valuable knowledge about reconfiguration but lack a study of the software architecture perspective that specifies a quantifiable reconfigurability architectural requirement, a software architecture that adopts the architectural requirements, and evaluates the architectural requirement.

IV. Use Case and Quality Attribute Scenario

This Section introduces the use case and the specified x QASes. The QASes are developed based on the use case.

A. Use case

B. Quality attribute scenarios

V. The solution

This section will describe a proposed design of that aims to achieve the stated QASes stated in the previous section.

VI. Evaluation

This Section describes the evaluation of the proposed design. Section VI-A introduces the design of the experiment to evaluate the system. Section VI-B identifies the measurements in the system for the experiment. Section VI-C describes the pilot test used to compute the number of replication in the actual evaluation. Section VI-D presents the analysis of the results from the experiment.

A. Experiment design

B. Measurements

C. Pilot test

D. Analysis

VII. Future work

VIII. Conclusion

References

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