**Customer Requirements Specification**

**(Lastenheft)**

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Project: OPC UA Server Farm

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# Goal

The goal of this project is to develop a Server farm which supports the testing of OPC UA Clients. The Server farm should provide multiple virtual OPC UA Server via Network. These virtual OPC UA Server profiles should be parameterizable via an AutomationML configuration file (in CAEX 3.0). In conclusion, the software should simulate multiple OPC UA Servers on one computer for testing OPC UA Clients. The target group are developer and tester of applications with OPC UA Client-Interface. The documentation of the software as well as the documentation of the development and project is also part of the goal.

# Product Environment

OPC UA (Open Platform Communications United) is a standardized and safe exchange of data and information for industry automation between machines, devices, computers and services from different industry sectors. Therefore, it is independent of programming languages, operating systems and system suppliers [1].

The main parts of an OPC UA Environment are an OPC Server and Client. The Server is the foundation of the OPC communication, it implemented the OPC interfaces. The Client is the logical counterpart to the Server and can get data from the OPC Server. An OPC Test Client is a special Client that can test the function and configuration of a OPC Server [2]. In the context of this project, OPC UA Client-Expert [3] will be used as Test Client.

With CAEX 3.0 in AutomationML (AML) an OPC Server can be configured. AML is short for Automation MarkUp Language and it is the connecting element for the seamless automation planning. For that AML describes automation plans as objects and use various standards to describes them. The relevant standard in the context of this project is CAEX 3.0. It is used as to describe hierarchical structures and links. It is also XML based, a meta data format and it is standardized in IEC 62424.

This OPC UA Server Backend will be implemented via open62541-Stack. It is an open source implementation of OPC UA in the programming languages C99 and C++98, it´s platform independent. For that open62541 provides tools to implement OPC UA clients and servers [4].

The server farm will be running via one system. That means that all Server profiles will be simulated via one device. And this Server farm will be tested via the already mentioned Test Client.

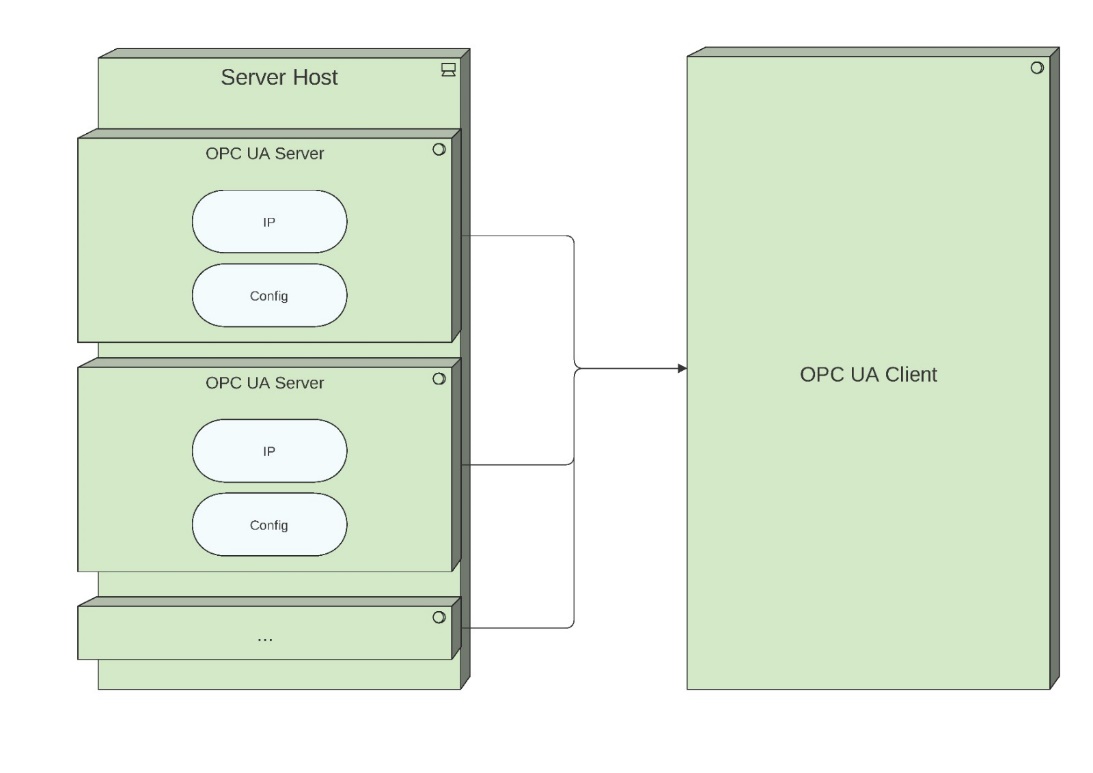


Figure 1 Product Environment

# Product Usage

The main purpose of the software will be the simulation and testing of multiple virtual OPC UA Servers which are simulated on one system. Each Server can be configured via sperate profiles and will start after finishing the configuration. From a user perspective, the main use case of this software is testing clients with the simulated servers.

The following business processes use cases and features shall be supported by the software.

## Business Processes

This section will handle the starting of the Server Farm, respectively of one Server.

### <BP.001>: Server interaction kein Business Process -> Simplified Testing of OPC UA Clients

|  |  |
| --- | --- |
| Triggering Event: | User want to start the OPC UA Server farm, respectively one Server with a profile.  Anders formulieren: User starts serverfarm to starts testing |
| Result: | The Sever starts with the profile. |
| Involved Roles: | User and OPC UA Server. |

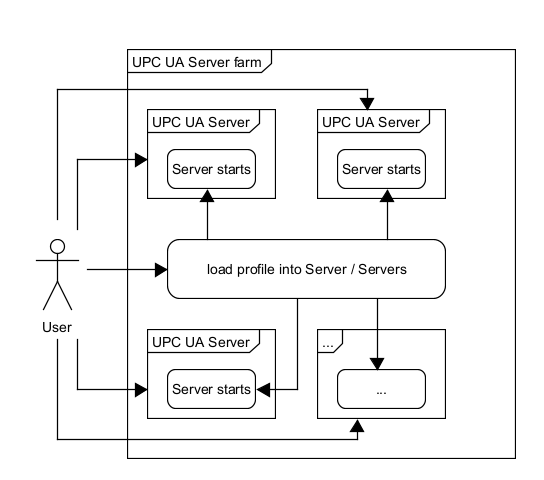


Figure 2: <BP.001> Server interaction

## Use Cases

This Project will implement a OPC UA Server farm, which runs on one device. The virtual OPC UA Servers will be parameterizable with the Server profiles. Each virtual Server will be able to be tested via OPC UA Client UA-Expert from the user.

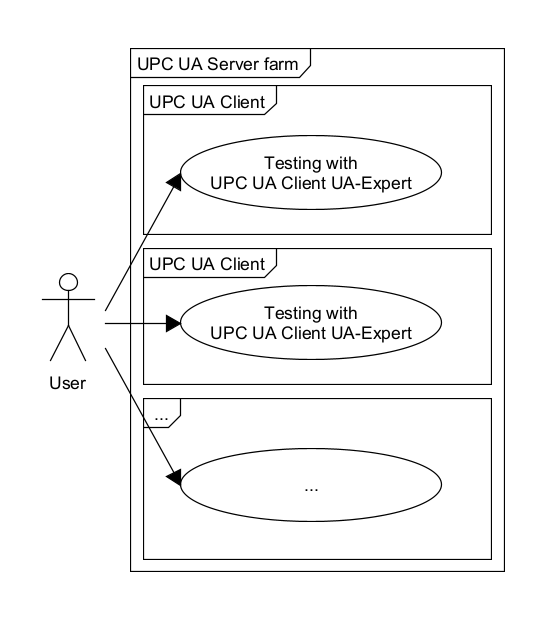
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Figure 3: Use Case Overview Diagram

1. Profile für Server festlegen
2. Usecase Serverfarm starten

### <UC.001> Testing OPC UA Client(s)

|  |  |
| --- | --- |
| **Related Business Process:** | <BP.001>: Server interaction |
| **Use Cases Objective:** | User wants to test multiple OPC UA Clients. |
| **System Boundary:** | The Server farm is the system boundary. |
| **Precondition:** | * OPC UA Servers must be started with the fitting profiles * Installation of Test Client |
| **Postcondition on success:** | The Servers must run without errors |
| **Involved roles:** | User, Test Client and OPC UA Servers (Server farm) |
| **Triggering Event:** | Start of the testing with the Test Client. And starting the server(s) with the fitting profile(s). |

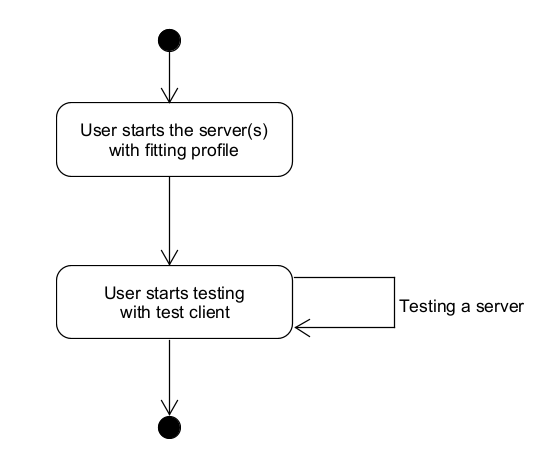
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Figure 4:<UC.001> Testing OPC UA Client(s)

## Features

### /LF10/Encoding

The program shall be able to encode in UA-TCP OPC UA Binary.

### /LF20/Encryption

The system should be able to encrypt in Basic128Rsa15, Basic256, Basic256Sha256 or none.

### /LF30/Authentication

The application should be able to be used anonymous or with a login (username and password).

# Product Data

In diesem Abschnitt werden die Hauptdaten und Datenschnittstellen beschrieben, mit denen das Softwareprodukt arbeiten soll und die bereits identifizierbar sind (siehe Abb. 1). Im Allgemeinen werden diese Hauptdaten eines Programms auch nonvolatil gespeichert.

Rest in 5

## /LD10/Open62541-Stack -

The system shall be implementing the OPC-UA-Backend with open62541-Stack.

Passt nicht rein kategorisierung

## /LD20/Configuration File in CAEX 3.0 nur das past hier so richtig

The system, respectively the multiple virtual servers shall be able to be configured via an AutomationML-configuration file in CAEX 3.0

## /LD30/OPC UA server profiles nur das past hier so richtig

The software should provide 10 meaningful and high bandwidth OPC UA server profiles.

## /LD40/System with CAEX 3.0 Parser

….

## /LD50/OPC UA Client UA-Expert

The software should support the OPC UA Client UA-Expert as Test Client.

## /LD60/Command Line Interface

The software shall support at least a command line interface.

# Other Product Characteristics

This section describes the already known non-functional requirements for the product.

Die Aufgabe dieses Abschnittes ist die Beschreibung der nicht-funktionalen Anforderungen. Dabei handelt es sich um Charakteristiken oder Qualitäten, die das Produkt attraktiv machen und es von vergleichbaren Produkten unterscheiden.

In diesem Abschnitt werden die wesentlichen Eigenschaften des zu entwickelnden Produktes beschrieben, die nicht direkt die zu leistende Funktionalität betreffen.

In diesem Abschnitt sollen diese bereits definierbaren Anforderungen in „Balzert-Notation“ aufgelistet werden und nach den Regeln der Anforderungsschablone ([*https://www.sophist.de/fileadmin/SOPHIST/Puplikationen/Broschueren/SOPHIST\_Broschuere\_MASTeR.pdf*](https://www.sophist.de/fileadmin/SOPHIST/Puplikationen/Broschueren/SOPHIST_Broschuere_MASTeR.pdf)) ausformuliert werden.

Hier License

## /NF10/ …..

The software/system shall support …

## /NF20/ …..

….

## System Environment

This section describes the system environment required to operate the product.

…

Hier sollten alle wesentlichen und notwendigen Parameter der Systemumgebung (Hardware, Software) beschrieben werden, soweit diese bereits festlegbar ist.

# References

[1]ihttps://www.industry-of-things.de/was-ist-opc-ua-definition-architektur-und-anwendung-a-727188/

[2] <https://www.opc-router.de/was-ist-opc-ua/#OPC-Foundation-Video>

[3] https://www.unified-automation.com/products/development-tools/uaexpert.html)

[4] <https://open62541.org/doc/open62541-current.pdf>