HMMI

Harmonisierung der Mensch-Maschine-Interaktion in der Produktion

Stand: 22.10.2018

<Design and Implementation of a Web-Based Software for OPC UA Protocol Integrated to Semantic Question Answering System>

Assoziierte Partner

Continental

MONKEYWORKS

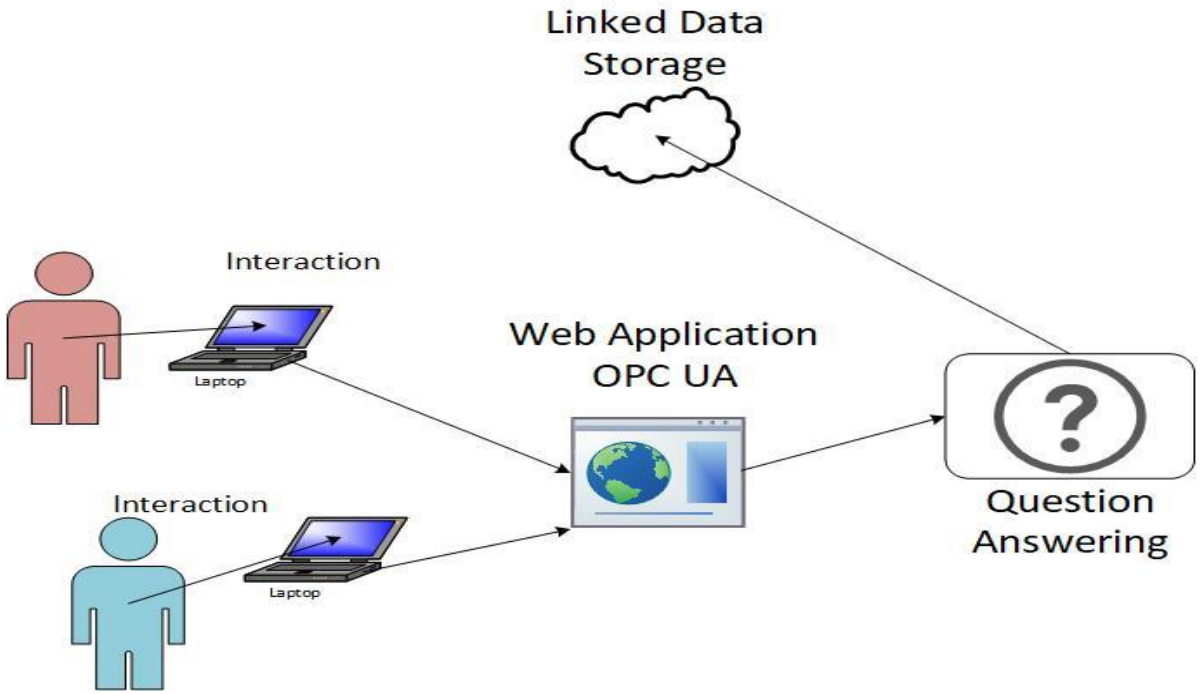
FuE-Verbundprojektförderung

Europäische Union

Europa fördert Sachsen.
EFRE
Europäischer Fonds für regionale Entwicklung

SAB
Sächsische AufbauBank

DESIGN AND IMPLEMENTATION OF A WEB-BASED SOFTWARE FOR OPC UA PROTOCOL INTEGRATED TO SEMANTIC QUESTION ANSWERING SYSTEM



- Web Application OPC UA
- Semantic Question Answering
- Linked Data Storage
- Data Sets Creation for Question Answering

CONTENTS

- OPC UA Web Service The Big Picture
- OPC UA Services Overview
- Attempt mapping from OPC UA XML into RDF
- Time-series Data Research
- Question Answering
- Question Answering The Big Picture
- Sample Questions Screenshots
- Architectural Flow Charts
- Rest API Definitions
- Evaluation and Conclusion

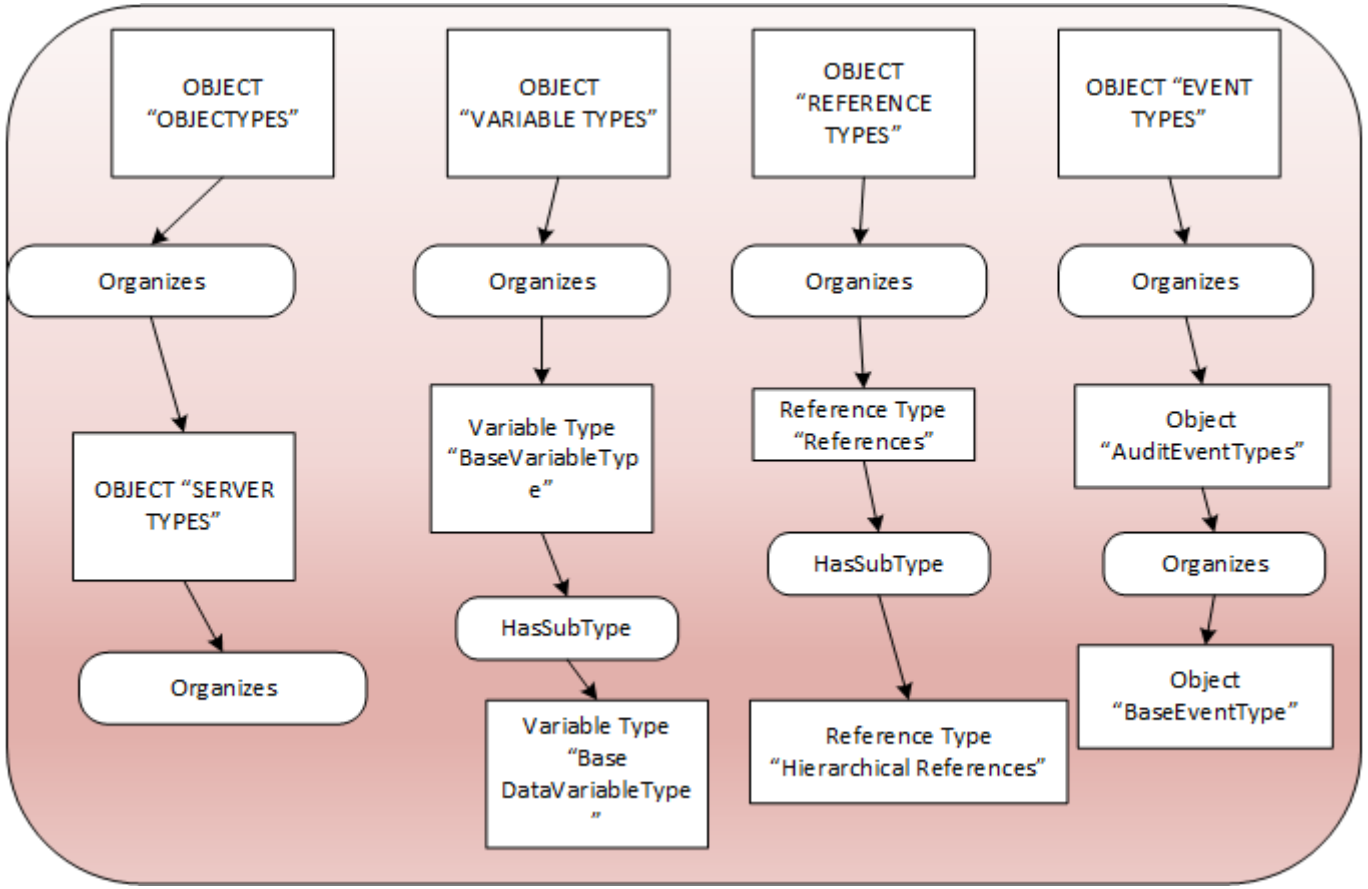
INTRODUCTION

- OPC UA History – OPC – OPC DA – OPC UA
- OPC UA Services
- Address Space Representation (Serialization)

RESEARCH QUESTIONS

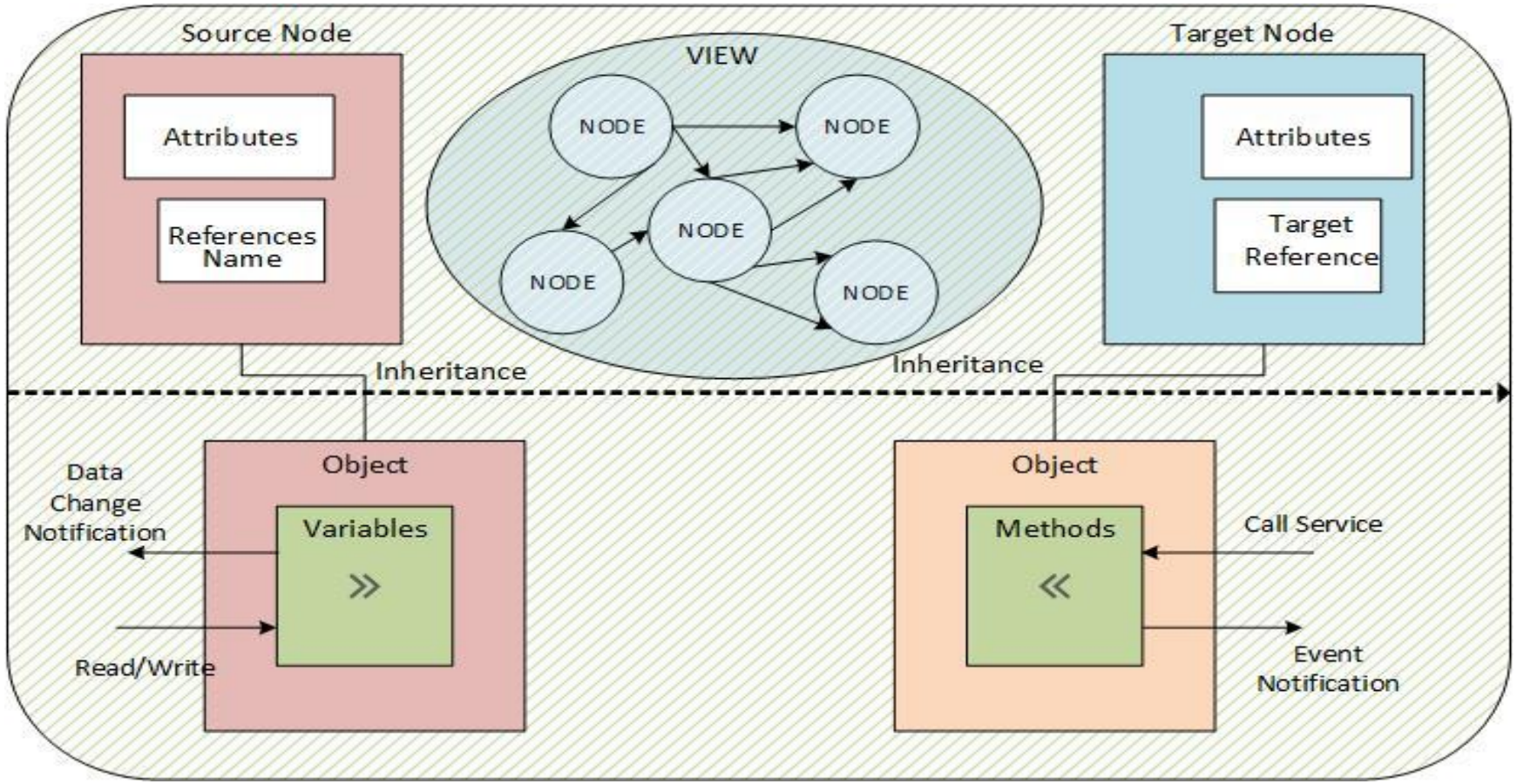
- What are the benefits of Web-Based Software of OPC UA Integrated to Semantic Question Answering System to the industry and Fraunhofer IWU?
- What are the main drawbacks of OPC UA Web-Based Software ?
- How can we implement a web-based software and which pattern do we need to follow?
- Which technologies should I use and why these technologies have been used?
- Why do we need a Semantic Question Answering System?
- How can I assess the Web-Based Software in terms of OPC UA and Semantic Question Answering System?
- How can I serialize OPC UA Protocol and is it a suitable semantic data set for Semantic Question Answering?
- How can we use real-time data with Semantic Question Answering and why real-time or time-series data are important for HMI system in the context of Question Answering?
- How can we evaluate overall web-based software?

INFORMATION MODEL



- Information Model

ADDRESS SPACE MODEL



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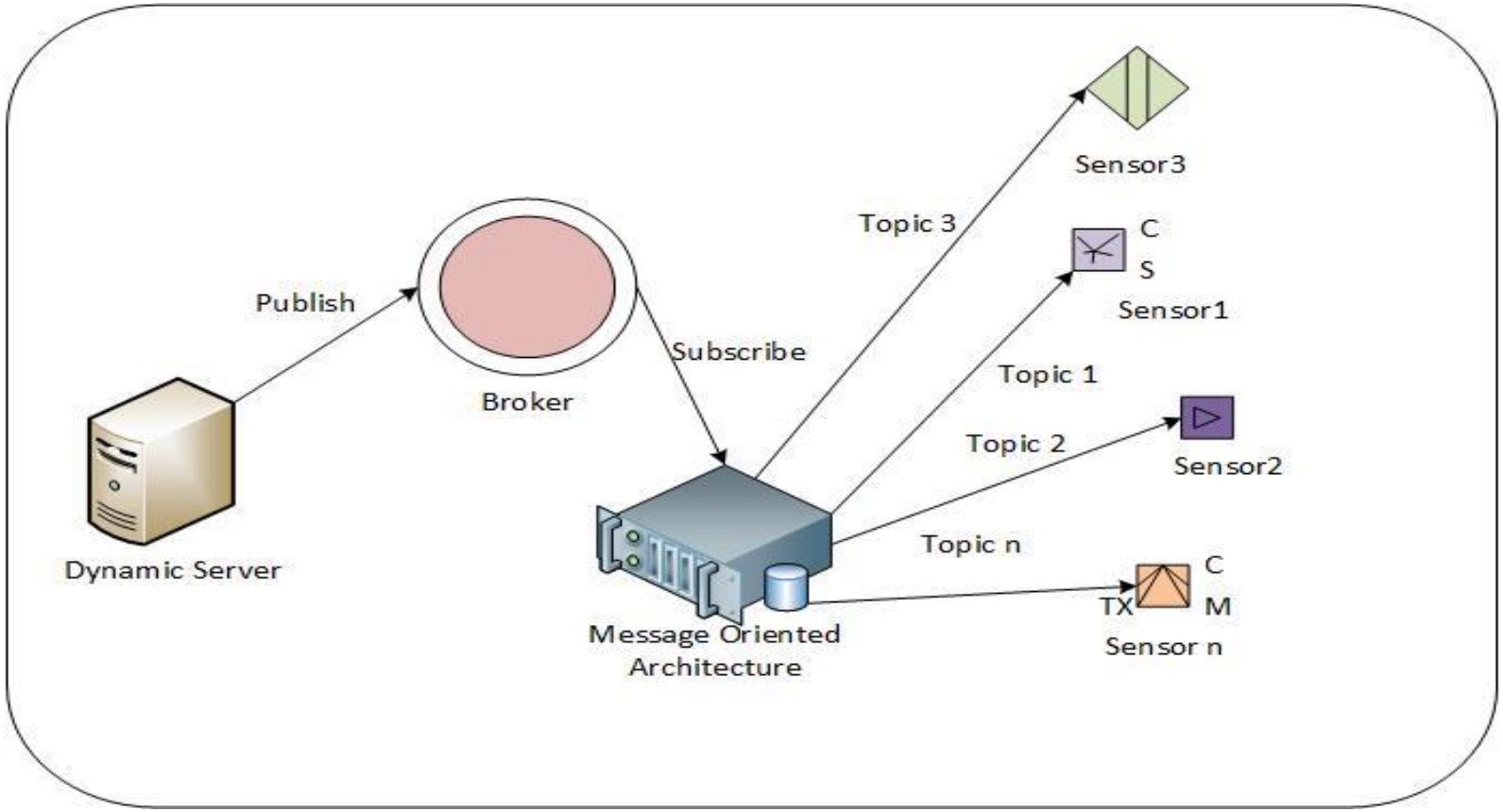
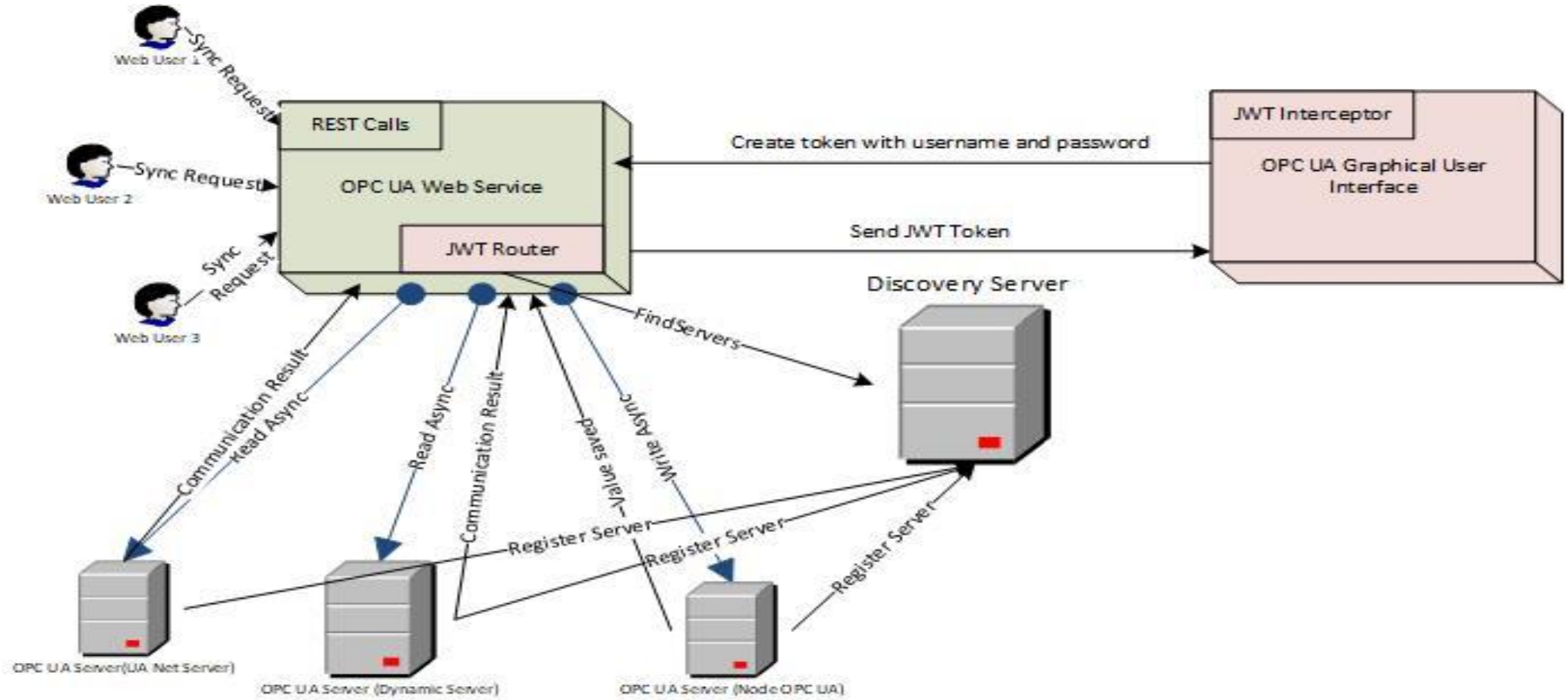
ADDRESS SPACE MODEL

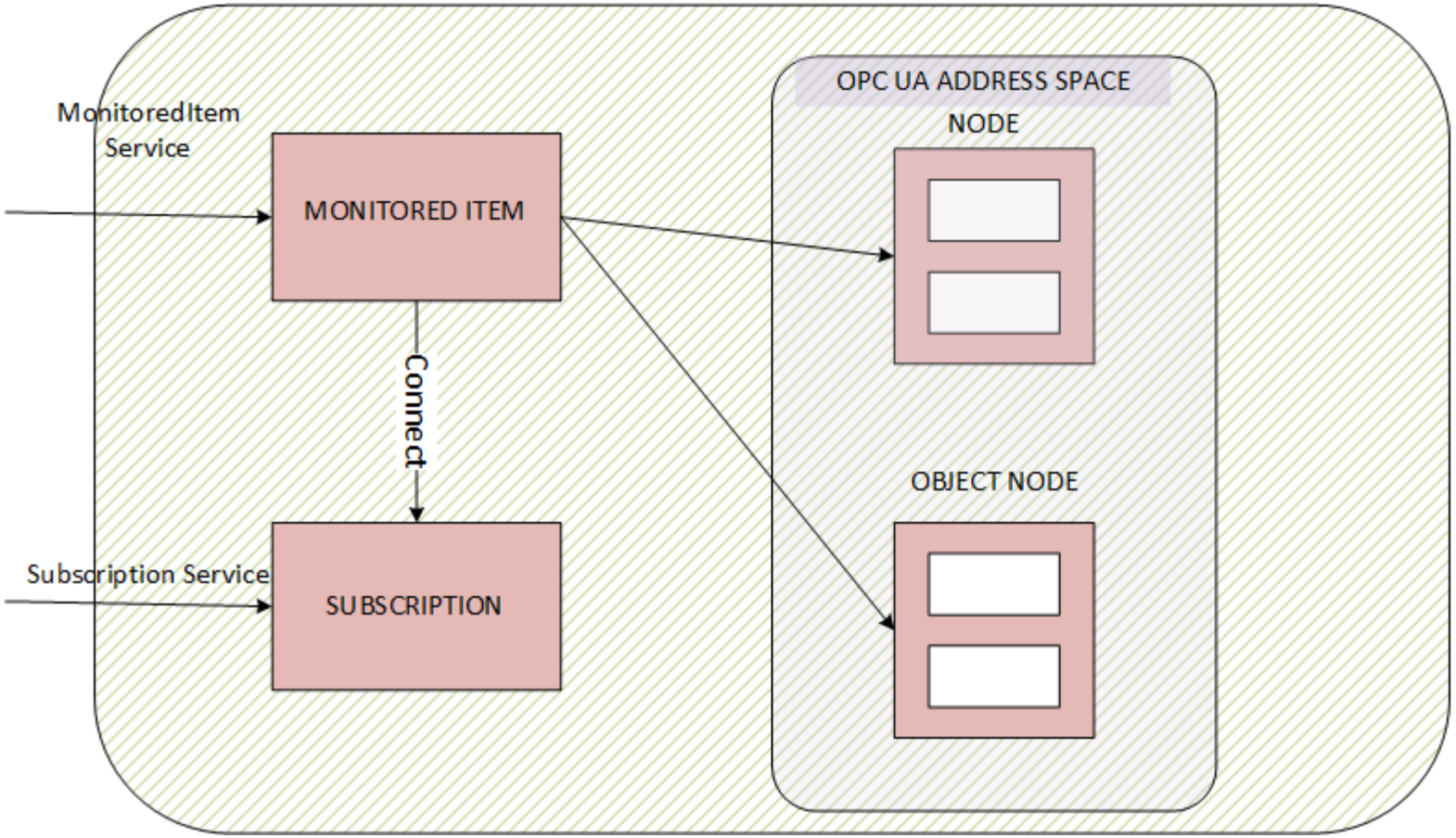


- Pub/Sub Explanation

DISCOVERY SERVICE

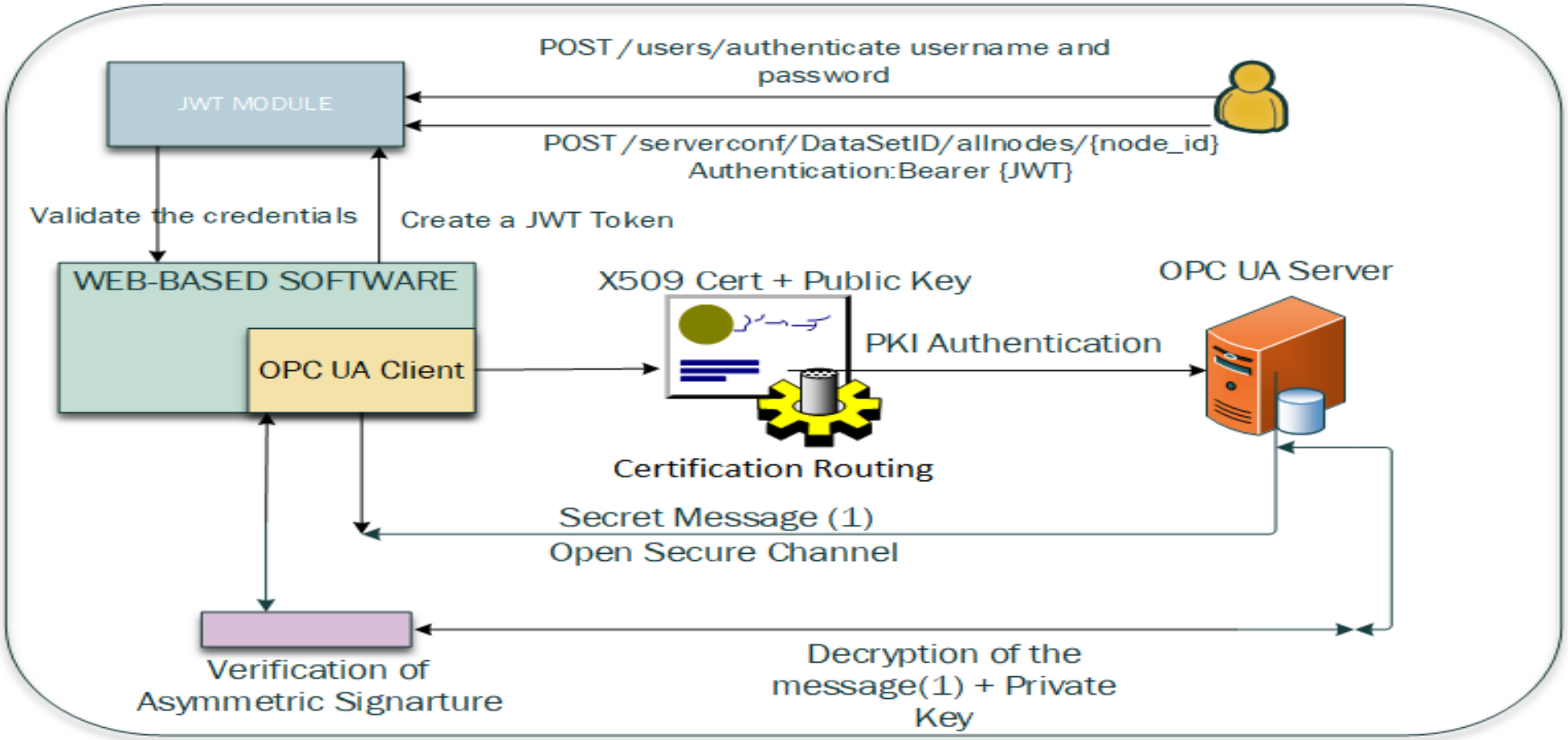


SUBSCRIPTION SERVICE

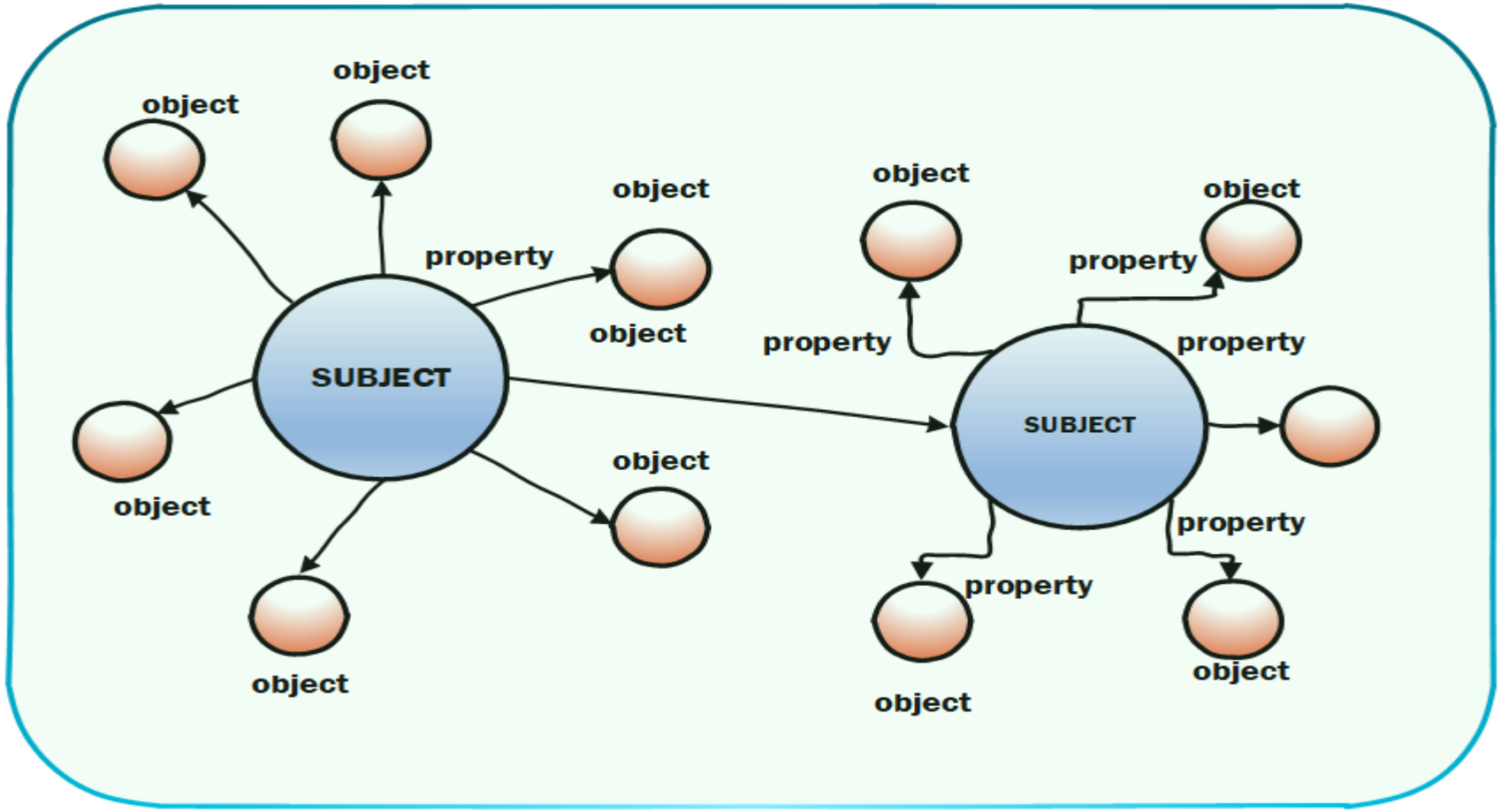


- Subscription Explanation

AUTHENTICATION AUTHORIZATION



LINKED DATA CONCEPT



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LINKED DATA SOURCE OF FRAUNHOFER IWU

- Semantic Question Answering Technical Details
- Sample Questions Screenshots
- Architectural Flow Charts
- Rest API Definitions

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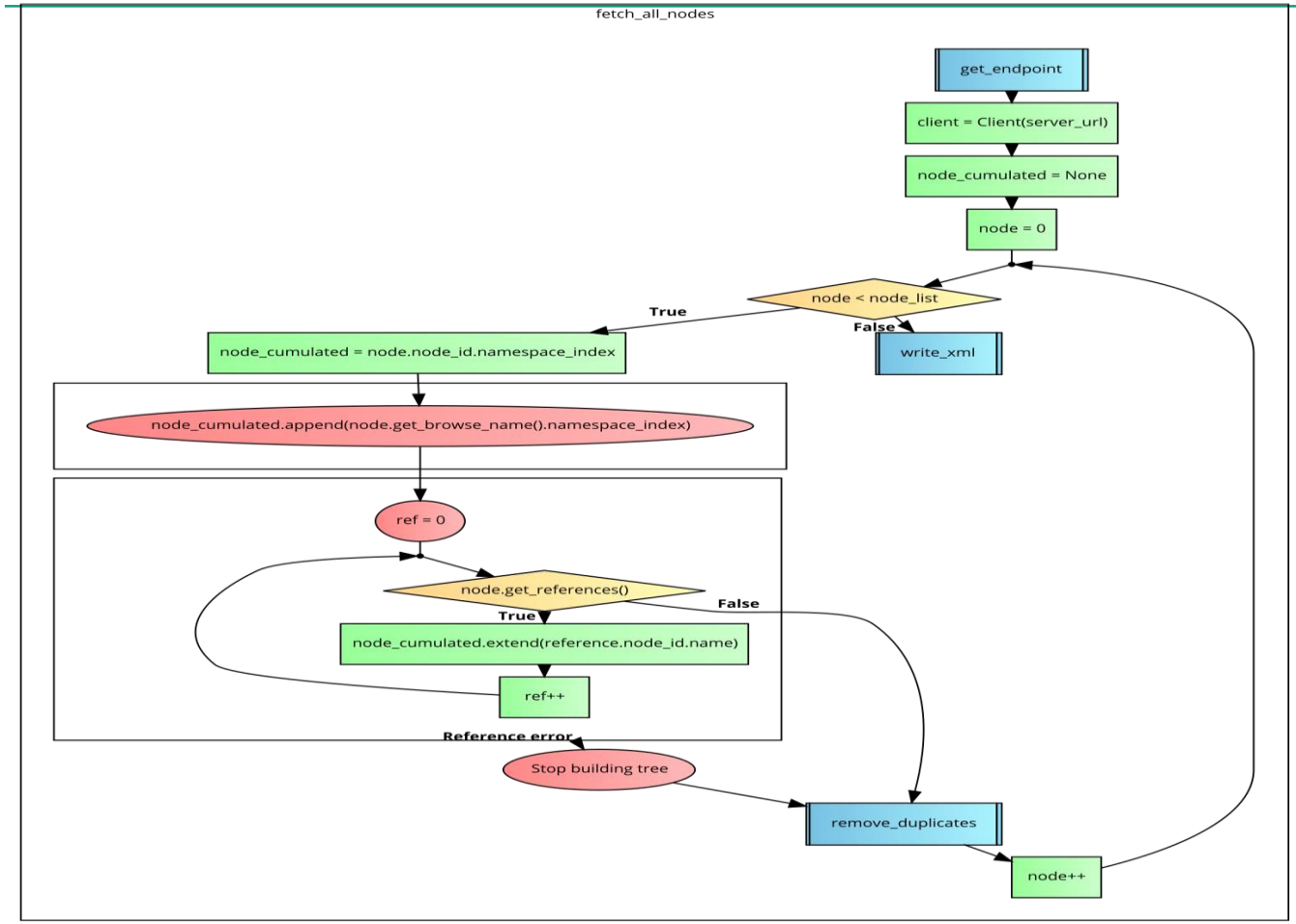
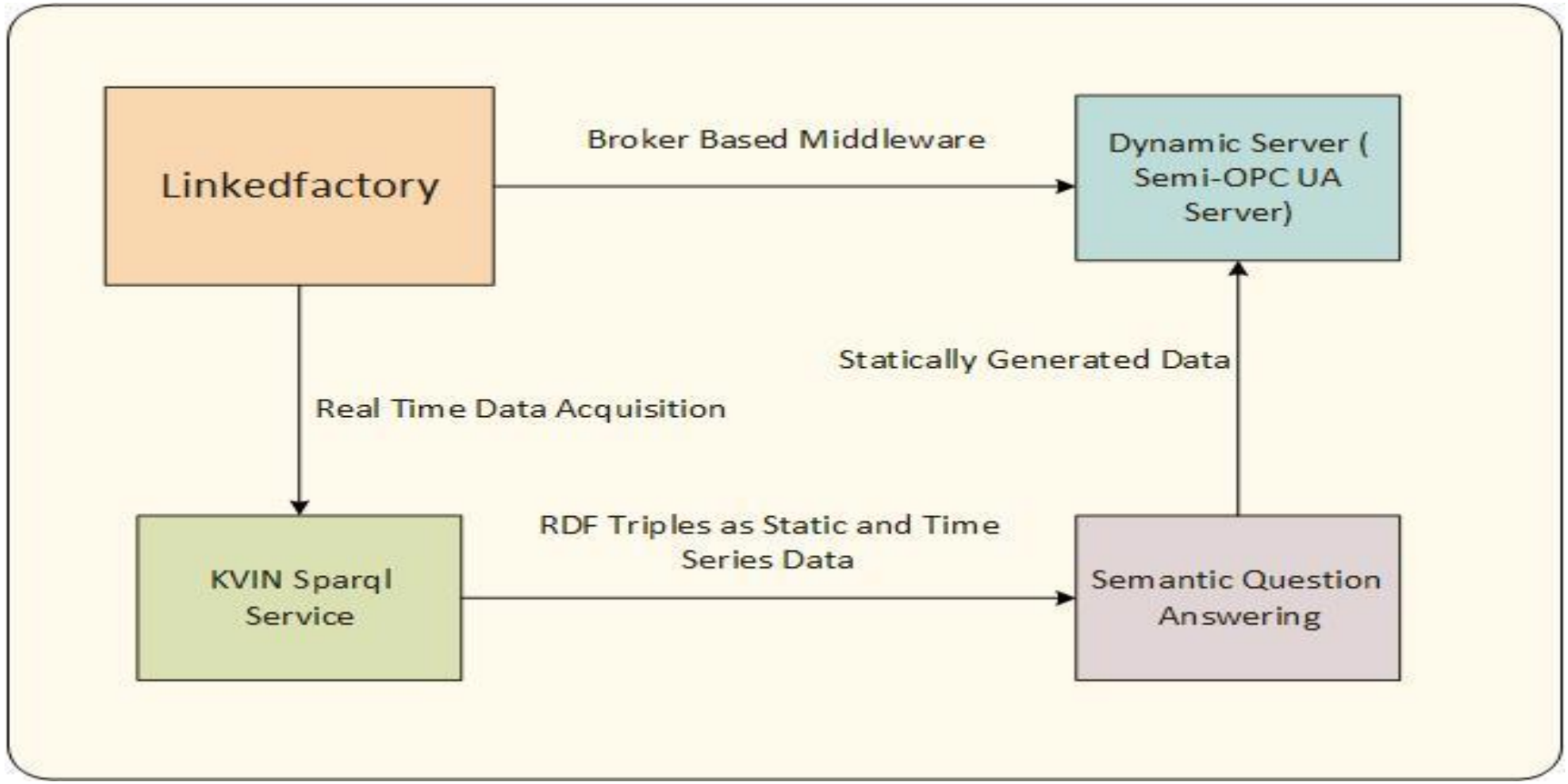
STATIC MAPPING



- XML Conversion algorithm

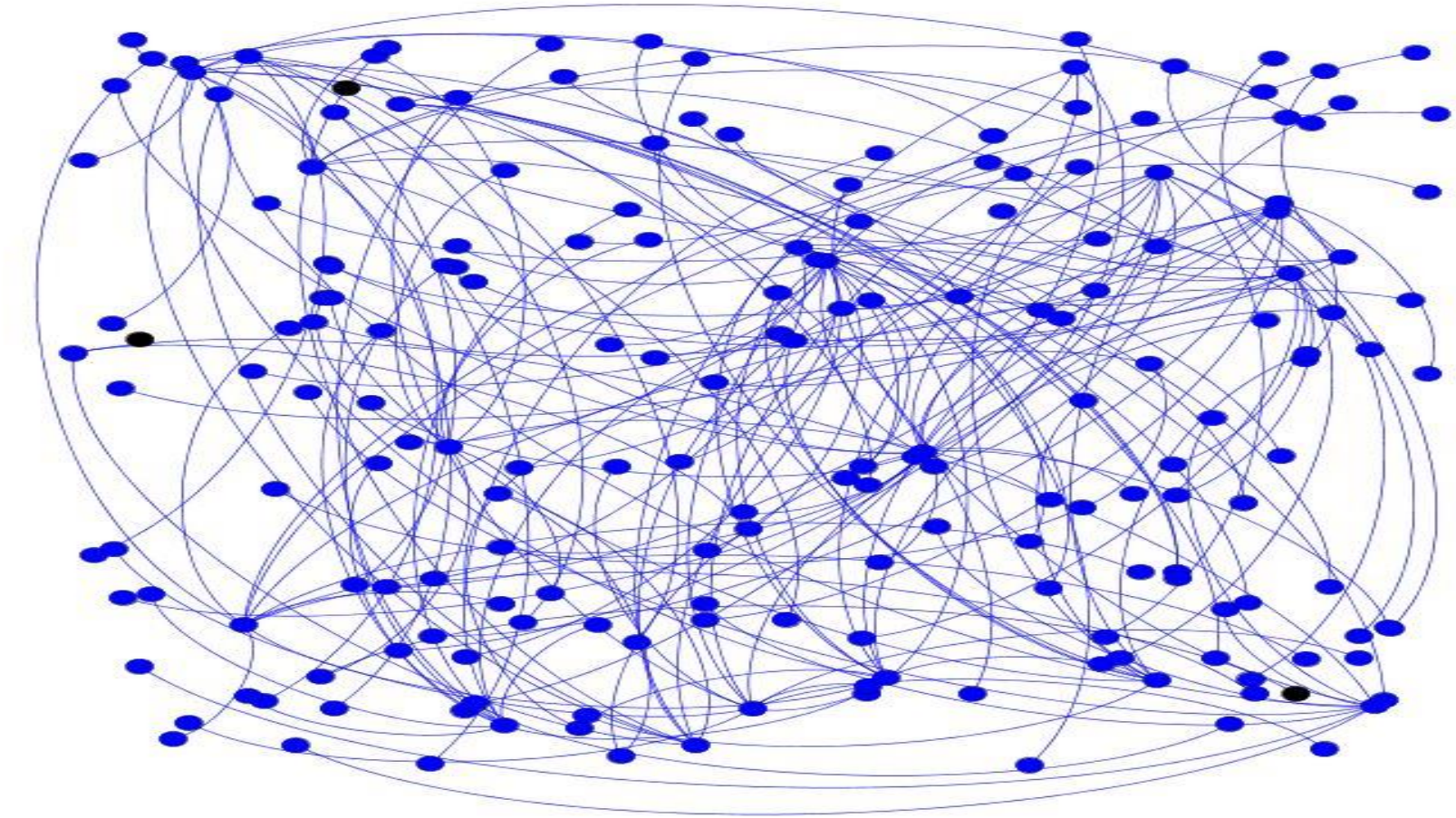
DYNAMIC MAPPING



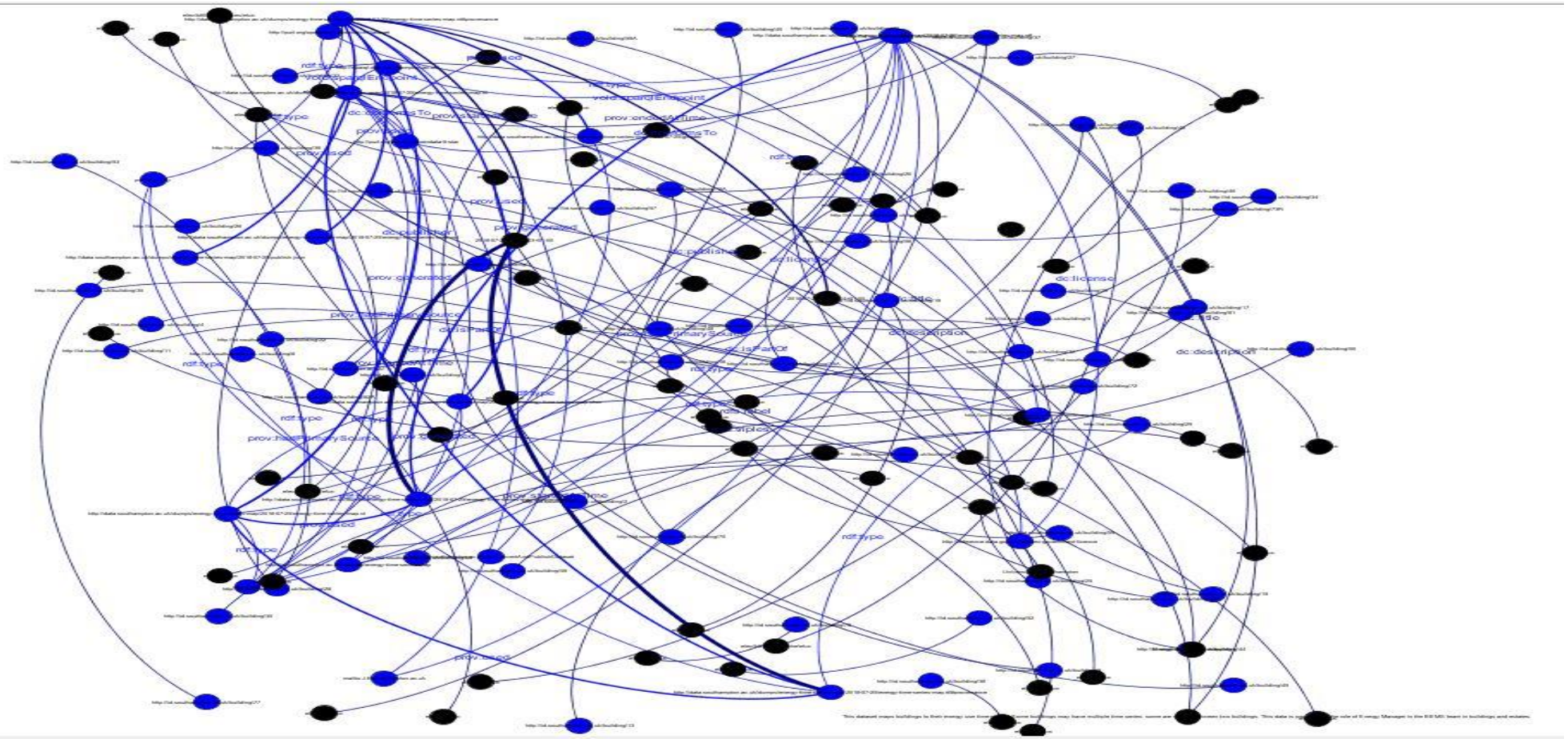
RESEARCH ON DYNAMIC MAPPING

- Continuous SPARQL (C-SPARQL)
- Instant Semantic Source Creation

LINKED FACTORY STATIC RDF NODES



SAMPLE ENERGY DATA



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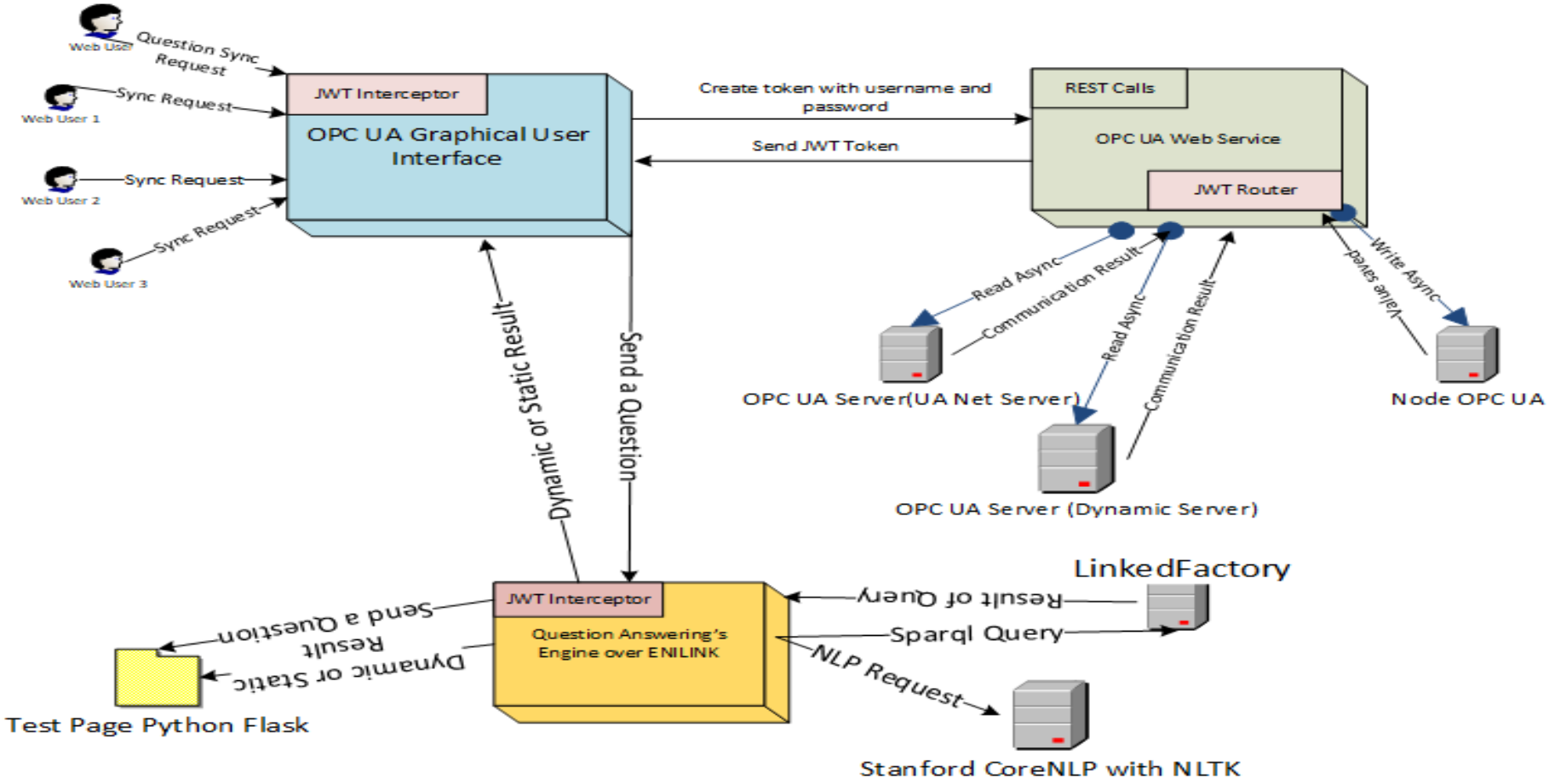
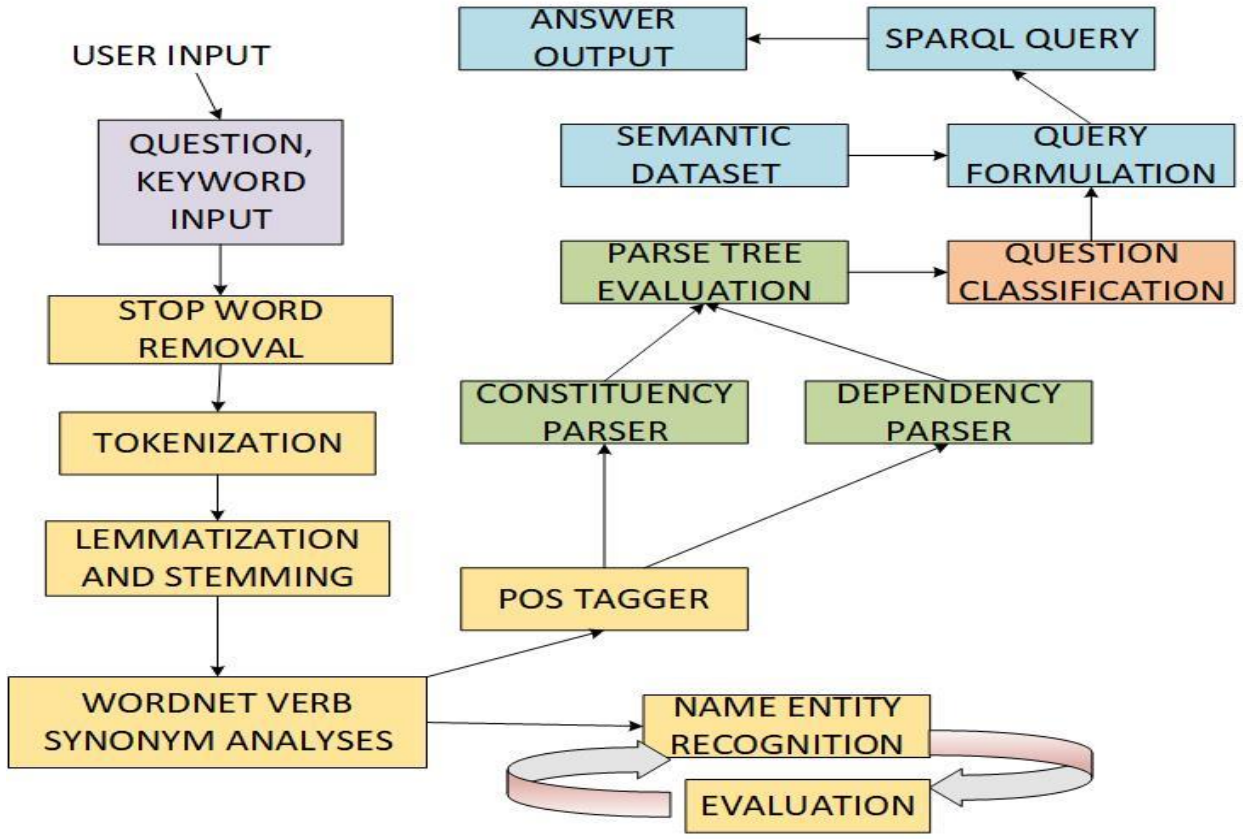
SEMANTIC QUESTION ANSWERING



STEPS OF QUESTION ANSWERING



- QUESTION ANSWERING
- Green: Syntactic Parsing
- Blue: Data Set Insertion and Semantic Mapping
- Orange: Initial Tokenization

REST API Definitions

- GET /users/authenticate; No Authentication Bearer : This http get call used for authenticating predefined users in order to obtain a Json Web Token.
- GET /api/serverconf; Authentication Bearer {JWT}: This http get call used for configuring a OPC UA server endpoint and name
- GET /api/serverconf/{DataSet:int}/allnodes/node_id:regex(“”); Authentication Bearer {JWT}: This http get call used for obtaining OPC UA methods, variables, objects and references by means of namespaces and IDs.
- POST /api/serverconf/{DataSet:int/allnodes/{node_id:regex(“”) value {“”}; Authentication Bearer {JWT}: This http post call used for updating or inserting a new value which resides in any node.

MAIN FEATURES OF NATURAL LANGUAGE PROCESSING

- **Tokenization** : Each sentence must tokenize with Natural Language Processing algorithms. So we can implement further algorithms on combine tokens. For instance;
- Friends, Romans, Countrymen, lend me your ears – Tokenization – “Friends”, “Romans”, “Countrymen”, “lend”, “me”, “your”, “ears”
- **Stemming and Lemmatizing** : Word stemming means removing affixes from words and returning the root word (which may not be a real word). Lemmatizing is similar to stemming, but the difference is that the result of lemmatizing is a real word.
- **Part of Speech Tagger (POS Tagger)**: This is a piece of software that reads text in some language and assigns parts of speech to each word (and other token), such as noun, verb, adjective, etc.
- **Name-Entity Recognition (NER Tagger):** This is a piece of software that reads noun, verb, adjective etc. to convert subject – predicate (verb) – object formats.
- **Parser Tree:** This is a program that works out the grammatical structure of sentences, for instance, which groups of words go together (as “phrases”) and which words are the **subject** or **object** of a verb.

Q&A

Thank you!

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