

VISUALISATION OF OPC UA INFORMATION MODEL

Keywords: *Information Modelling, Graph Visualisation, Industrial Automation, OPC UA*

Current Situation

Currently, the information modeling tools available in the market utilize a tree-like structure to visualise information models. However, this tree-like representation obscures a substantial amount of critical information, thereby rendering it difficult to comprehend, particularly for individuals lacking the knowledge of OPC UA. Consequently, the objective is to develop a tool that accurately represents OPC UA information models, specifically as a set of interconnected graphs. These graphs can be manipulated in real-time to generate insight regarding the production system.

Supervisor



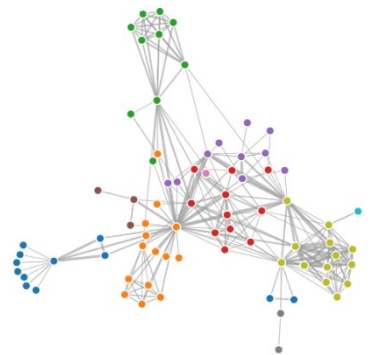
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Background

OPC UA is an industrial automation standard and is considered an important technology for Industry 4.0. OPC UA defines an **information modelling** scheme that allows for the graphical representation of information regarding an industrial production system, similar to **RDF** of the semantic web. A graphical visualisation of OPC UA information models will be helpful for users to understand the overall functionalities of the production system. Additionally, it will enable users to search for different types of devices and machines in the production system, their functionalities, and generated data items.

Content of the Thesis

The goal of this thesis is to develop a tool that takes an OPC UA information model file as input and renders graph(s) consisting of nodes and edges. The nodes should vary in shape and colour based on their type and be appropriately labelled so that they can be easily identified by users. The edges should display the relationships among nodes. The tool should have the capability to render multiple information models simultaneously. Additionally, the tool should provide information such as the number of different types and instance nodes contained within a particular information model. A time slider should be included to illustrate the evolution of information models over time. Upon completion, the source code for the tool should be made available on GitHub.



Requirements

- Knowledge of data and software modelling (e.g., **OOM**, **MDSE**)
- Familiarity with modelling languages such as **UML**
- Knowledge of graph visualization libraries (e.g., **D3.js**) would be beneficial
- Proficiency in programming
- Fluent communication skills in English

Learning Outcomes

- Gain foundational knowledge of industrial communication and OPC UA
- Learn the principles of software modelling
- Develop skills in visualizing information
- Brush up programming skill
- Be proficient in conducting scientific research