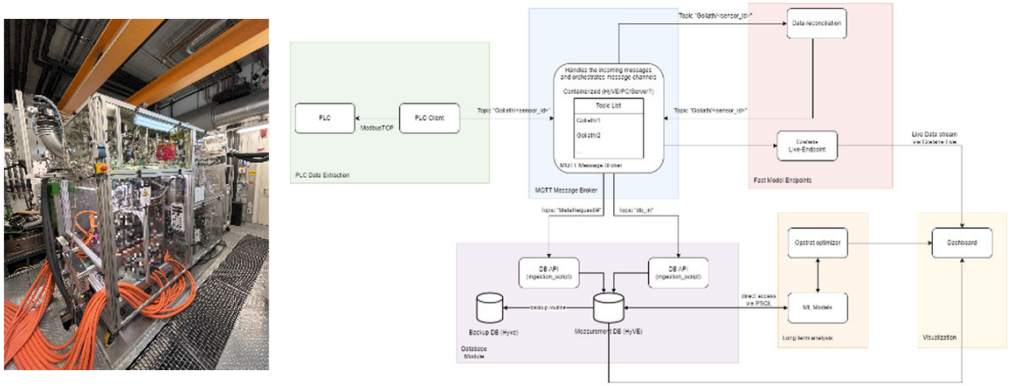
User-Friendly Unified Namespace for a Digital Twin

Task description

As part of a project focused on optimizing the operational strategy of a hydrogen production plant, a **digital twin of a PEM water electrolysis** (PEMWE) system is being developed. As initial step, a digital twin of one of our local PEMWE stack testbeds is currently under construction. The underlying digital architecture, including the **unified namespace**, is already largely established using **Docker**. The monitoring infrastructure is operating using **Grafana**. The architecture is centered around an **MQTT broker**, which serves as the communication backbone connecting the **PLC** of the testbed, a **PostgreSQL database**, and a **live Grafana** dashboard. In the future, additional model-based applications will be integrated, each requiring dedicated **pooling layers** to be developed. The goal of this thesis is to i) develop a UI to our unified namespace infrastructure's **control plane**, as well as ii) developing an **orchestration layer** to manage currently running infrastructure modules. The result of this bachelor thesis will support the serviceability and usability of this infrastructure for scientific (non-IT) staff.



unified namespace for a digital twin of an electrolysis stack testbed

Assignments

- get familiar with current IoT structure (2 weeks)
- create dev plan (2 weeks)
- implement dev plan (5 weeks)
- Results presentation and thesis report writing (3 weeks)

Start: as of now

Duration: ca. 3 months

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