

WP3 Dissemination Workshop

08 Apr 2022, Dat4.Zero tutorials

Stefano Borgia
WP3 leader



DAT4.Zero has received funding from the European Union's Horizon 2020 Research and Innovation programme under Grant Agreement No. **958363**

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WP3 Tools

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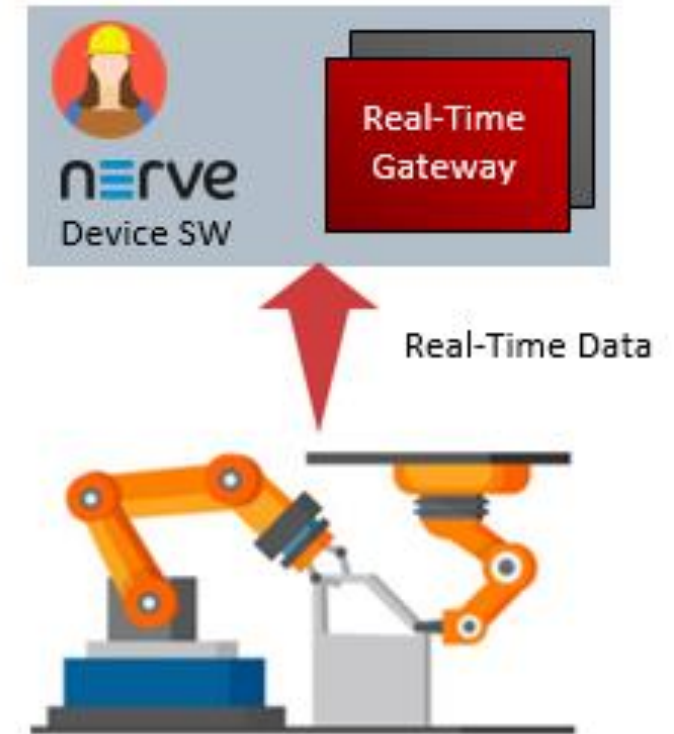


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WP3 Tool – TTTECH Edge platform, T3.2

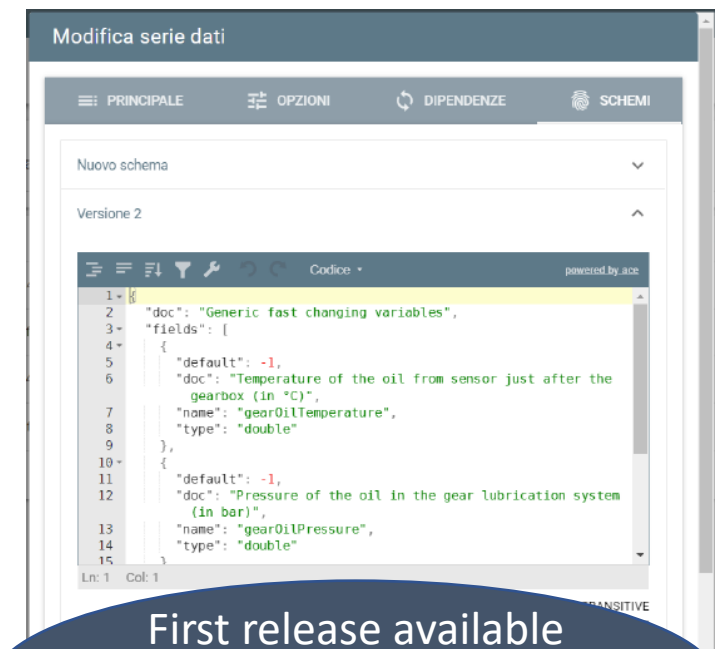
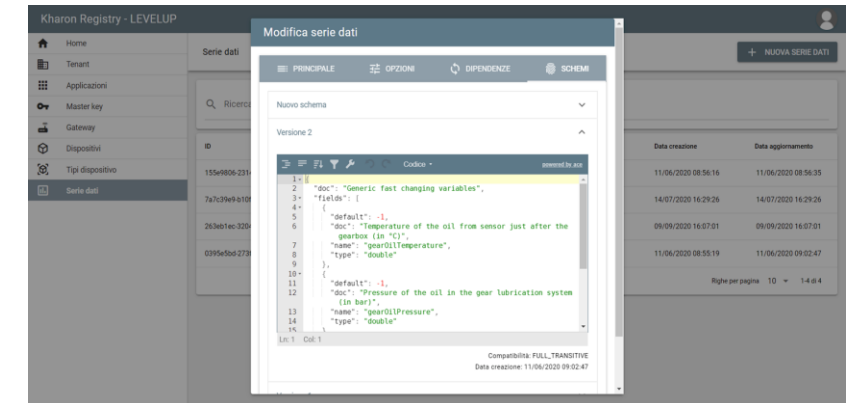
- Edge computing software platform for remote connection, software management and data access – **in principle, for all pilot DQM instances**
- Services
 - Managing software on assets both locally and remotely. Software located on customers' plants or machines can be patched, updated, rolled out, monitored and logged.
 - Offering remote connectivity to software and devices at the edge.
 - Creating virtual connections to check status.
 - Data Handling: collects, stores and analyzes machine data, access to real-time data from PLCs, sensors and actuators via fieldbuses. The data path allows to manipulate (standardize, normalize and pre-process) and visualize the data at the device at the edge, on-premises and/or in the cloud.
- Technologies / data exchange formats
 - Input: MQTT subscriber, OPC UA PubSub (MQTT, UDP), OPC UA Client, Modbus server, S7 server, data from Ethernet fieldbus (PROFINET, EtherCAT, etc.) via CODESYS
 - Output: MQTT publisher, OPC UA PubSub (MQTT, UDP), OPC UA Client, ZEROMQ publisher, Timescale DB, Influx DB
- Expected deployment / artefact type: edge node to be deployed on premises. Management of the edge node(s) from cloud or on premise.
- Constraints: HW has to be certified by TTTech.



First release available
since 30/09/2021 (m12)

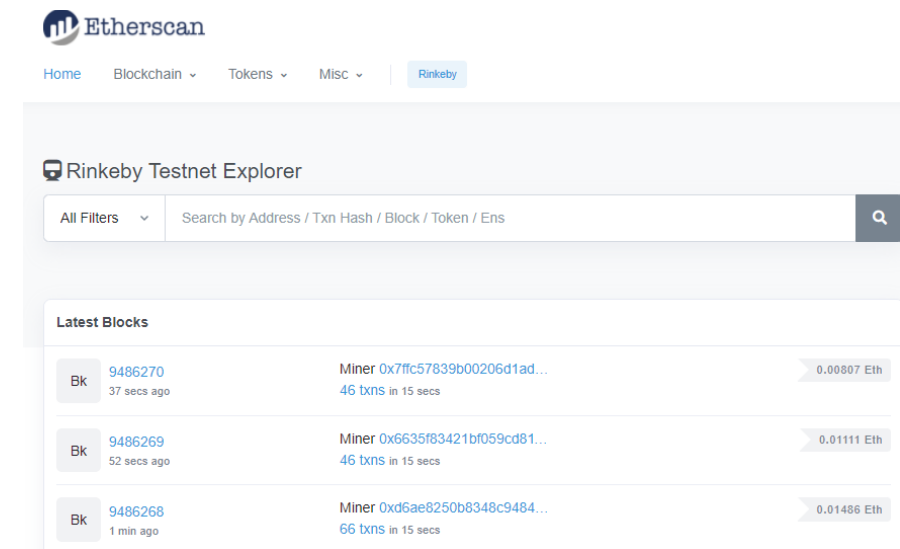
WP3 Tool – HX Data Management System, T3.3

- Industrial IoT software module for communication between different IT modules, big-data management, monitoring of machinery and industrial assets – **in principle, for all pilot DQM instances**
- Services
 - Lay foundations of SOA/micro-services based architecture
 - Provide a data collection layer toward the field
 - Provide edge based processing facilities
 - Provide long term time-based data storage
 - Provide a data streaming platform to support reactive data processing and application integration.
 - Ensure internal security, addressing auth. & authorization
 - Enable data interoperability + annotation of data
- Technologies / data exchange formats
 - Node.JS, Kafka, AMQP, HTML5, ES6, Cassandra, Docker (Swarm), Kubernetes, OAuth
 - REST API, AMQP, Kafka, MQTT
- Expected deployment / artefact type: service / tool installed on Kubernetes
- Constraints: Requires Keycloak for security and user SSO



WP3 Tool – ITA Blockchain, T3.4

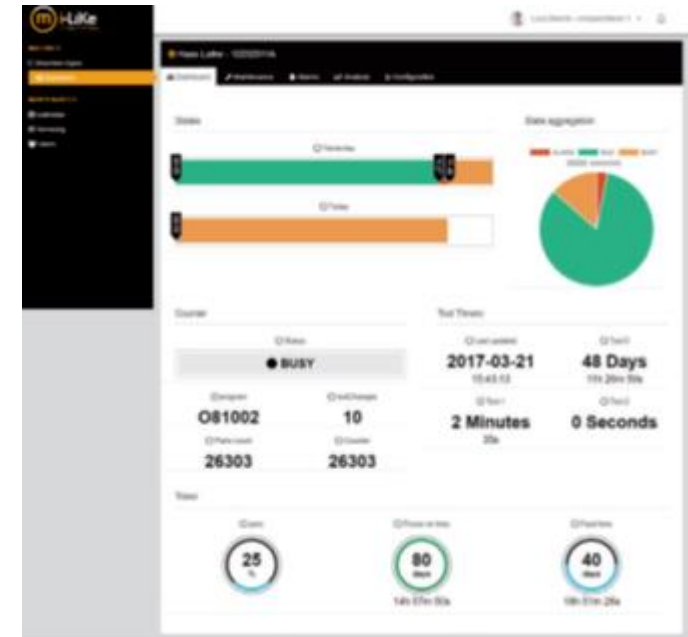
- Software module for submitting transactions to the Ethereum Rinkeby testnet (<https://rinkeby.etherscan.io/>) with the purpose of storing the hash of the machines and processes data. This ensures the existence of proof for data protection – **in principle, for all pilot DQM instances**
- Services
 - Hash generation
 - Interaction with Ethereum Smart Contract
 - Data capture from DQM
 - Submission of the transactions to the blockchain with timestamp.
 - Data dynamic visualization (GUI).
- Technologies / data exchange formats
 - Javascript, Node.js, Solidity,
 - REST API, MySQL
- Expected deployment / artefact type: service
- Constraints: access to DQM Platform



First release available
for testing purpose at
Oct 2021 (M12)

WP3 Tool – HX User interfaces (visualization, T3.5)

- Industrial IoT software module for streamed and stored data dynamic visualization, providing feature enabling the users to interact – **in principle, for all pilot DQM instances**
- Services
 - Data dynamic visualization (GUI)
 - User interaction
 - Enables knowledge extraction, Analytics, visualization
- Technologies / data exchange formats
 - Java 8, HTML5, ES6, Docker, Kubernetes, OAuth
 - REST API, AMQP, Kafka
- Expected deployment / artefact type: service / tool installed on Kubernetes
- Constraints: Requires Keycloak for security and user SSO
- Status: on-going, analysis of pilot & sw/hw requirements

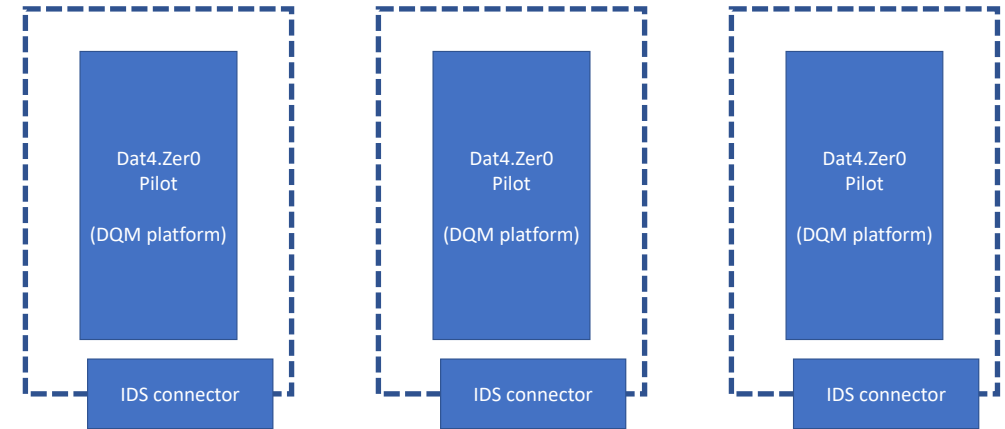


First release will be available within T3.5

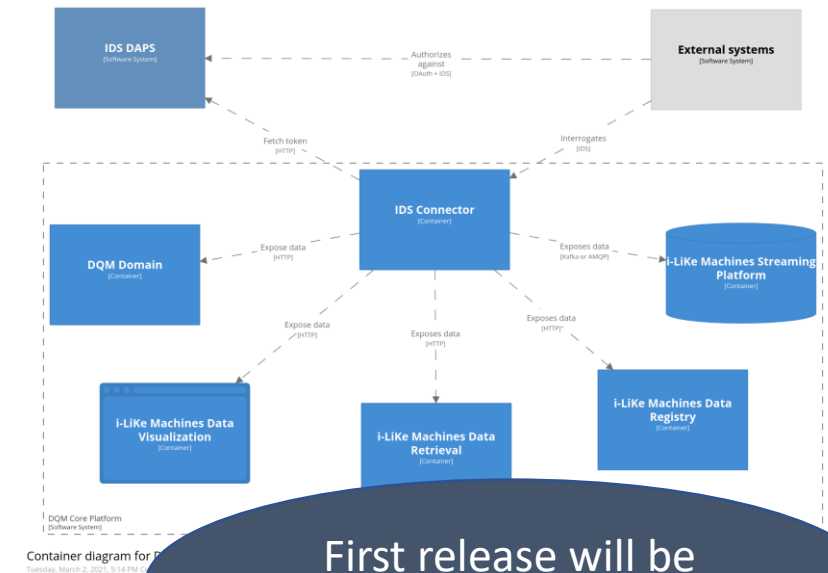
WP3 Tool – IDS Connectors, T3.6 (IDSA/HX)

- In Dat4.Zero, connectors to expose DQM data outside the pilot – **for pilot DQM instances requiring external access**
- Services
 - Lay foundation on available open-source IDS implementations (Testbed release is expected)
 - Data access and use control based on deploy/management of IDS components (CA & DAPS, issuing digital certificates), to be checked according to end user constraints
 - Proposal: **IDS Wrapper of DQM Core interfaces** towards external players
- Technologies / data exchange formats
 - (Currently not defined)
- Expected deployment / artefact type: service / tool compliant with Docker/Kubernetes technologies
- Constraints: external internet connection, (other?)

IDSA data space boundaries



DQM & IDS – C4 Containers



Container diagram for
Tuesday, March 2, 2021, 5:14 PM C

First release will be
available within T3.6

Nerve – Mgt System

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Edge Platform Overview

nerve

Node
Software

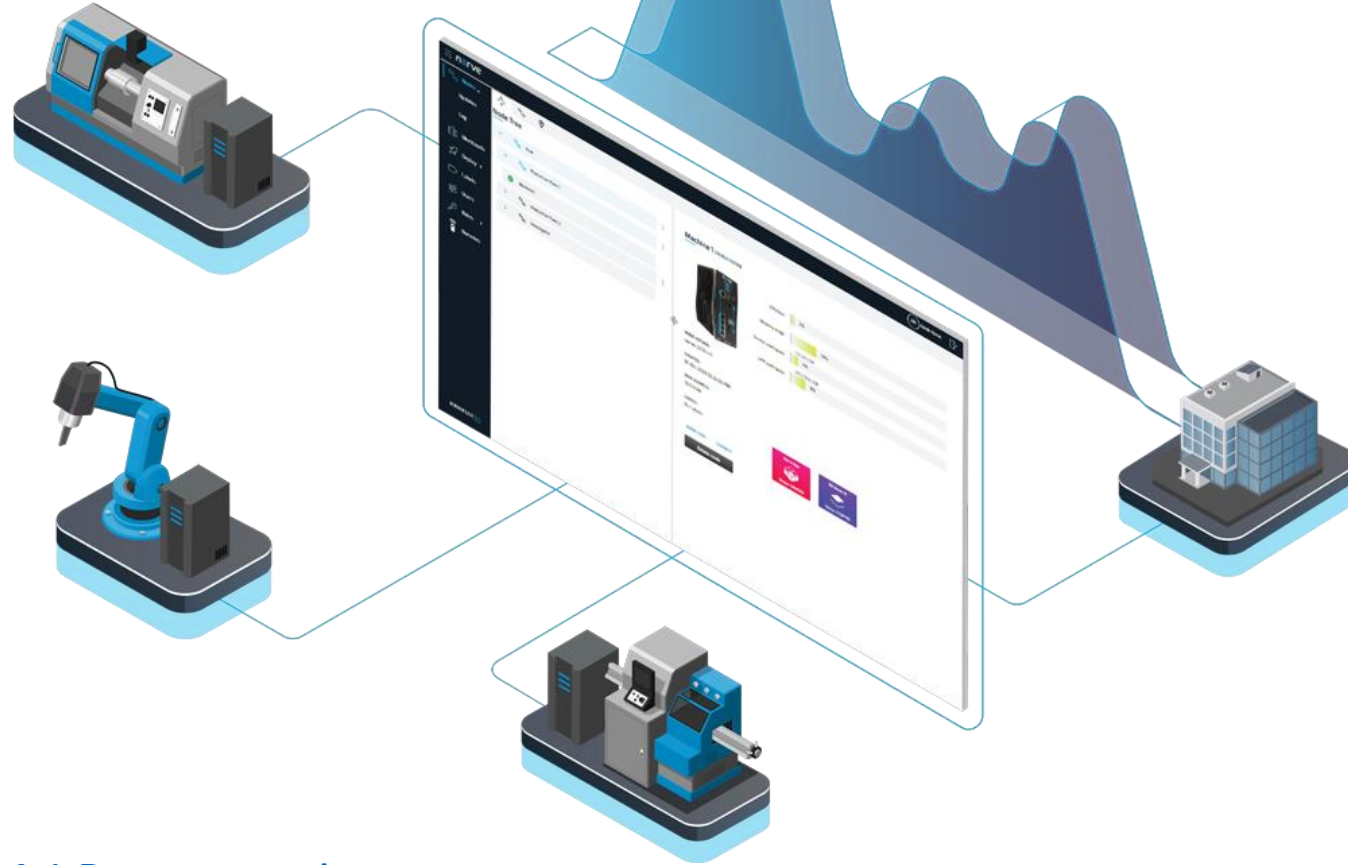
Edge Hosting

Data Services

Remote Services

Soft PLC

Any Hardware



nerve

Management
System

Data Services

Remote Services

Workload Management

On-prem or Cloud

[Data Gateway - Nerve 2.4.1 Documentation](#)

[Introduction - Nerve 2.4.1 Documentation](#)



The Management System

- Manage Edge Node in arbitrary many premises
- Define and configure workloads
- Deploy workloads to zero or more connected Edge Nodes

DMS live demo

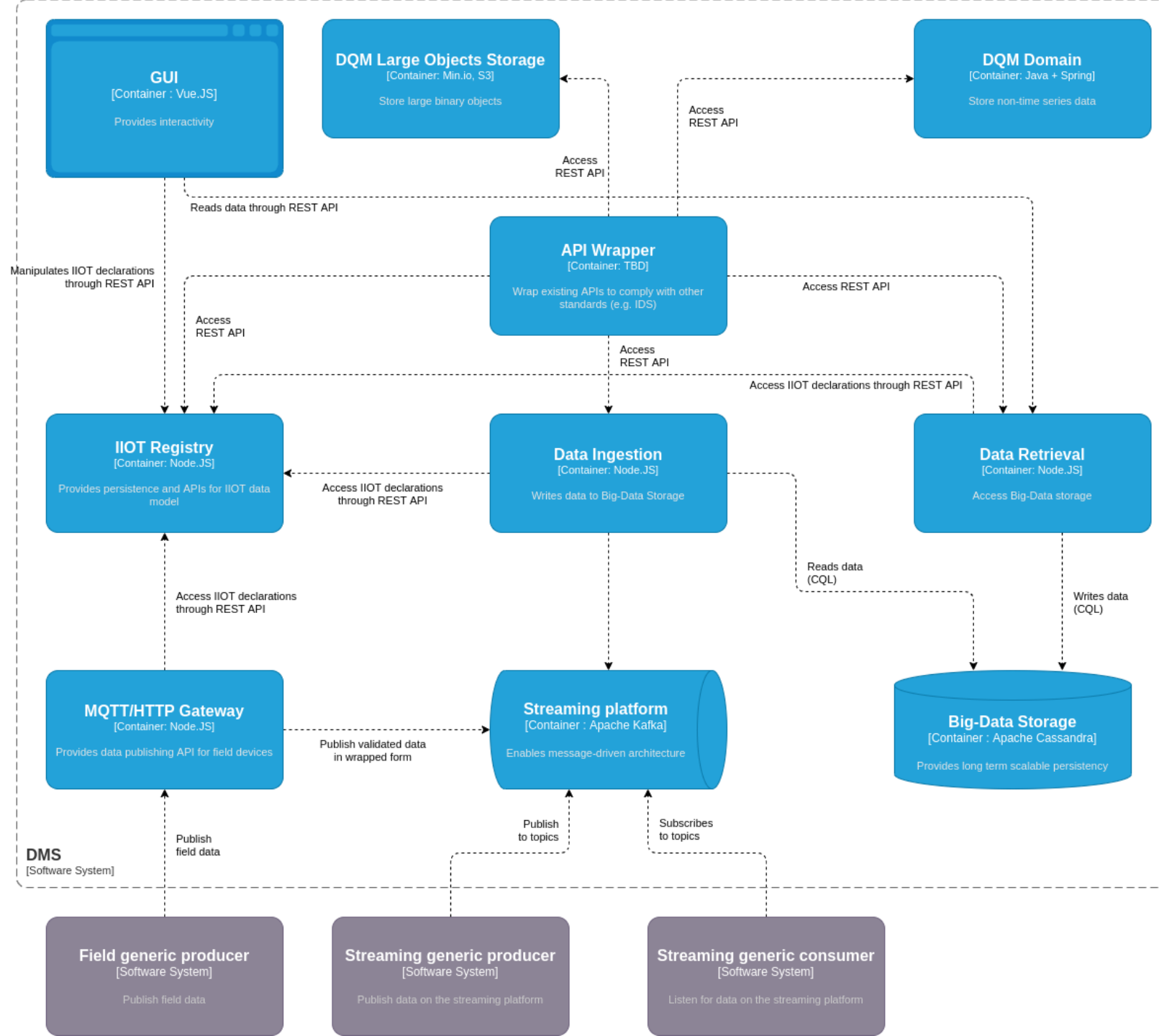
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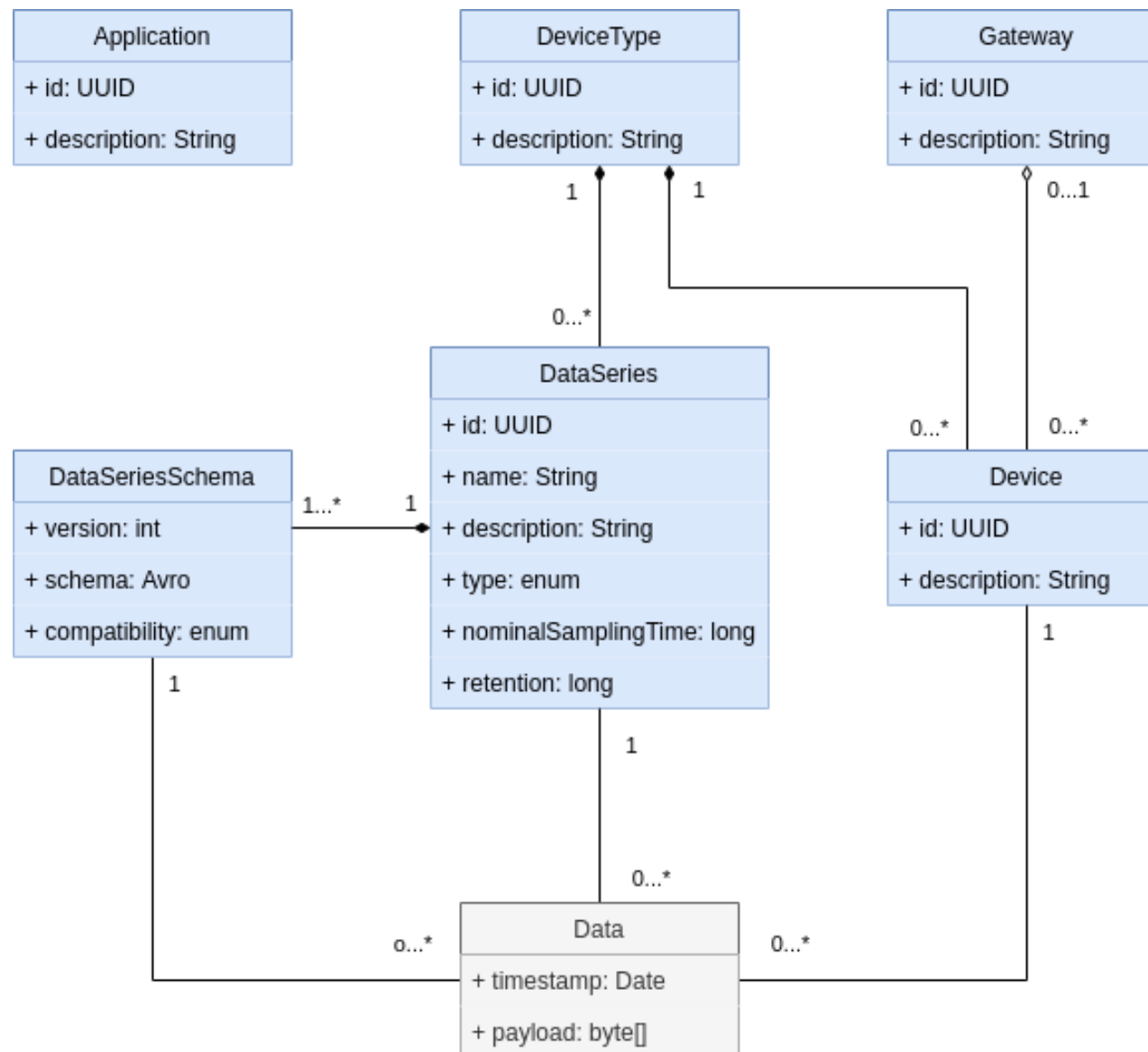
Stefano Borgia
(HX)



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HX DMS live demo (technical tutorial)

- DMS front-end accessible at <https://dat4zer0k8s-gui.holonix.biz/home>

Q & A, discussion

- ...

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