ACUTUS IOT SOLUTIONS 2022

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IoT Introduction

A massive amount of data is not organized or collected in many modern production environment with varying automation levels. The sensors producing data are indispensable parts used in different applications like chemical production, energy production, safety, situational awareness, life support systems, transport, etc. Al sensors expose their measurement data via field control units such as PLC used for automated process control over various protocols. If collected, organized, and contextualized, the data will enable different organization departments to have unprecedented insight and optimization possibilities. Data collection and management are not necessarily limited to the cases mentioned in this document.

IoT Benefits

- Maximize return on investment.
- Predictive maintenance and prevent down-time.
- Base decisions on facts and not on assumptions.
- Automate and maximize report precision by eliminating human error.
- Incident investigation and ease the process of identifying sequence of events.
- Effective collaboration with partners by sharing relevant data.
- Contextualize data based on OPC UA information modeling.
- Less energy consupmtion: less pollution and lower running costs.
- Maximize performance by identifying potential waste of capacity and material.

Use Cases

Predictive Maintenance

Predictive maintenance related to any critical or noncritical machinery where data collected about operated/elapsed time, amount fuel used concerning output, etc. Predict issues that can occur based on a calculation done on values read from various sensors where the data can be used to identify potential inefficient operations related to service intervals/- or in general. This allows to correct the cause of inefficiency- avoiding potentially significant setbacks or damages. Which in turn will save costs on maintenance.

Pumps and Compressors

Prolong compressor and pump lifetime, due to preventive measures suggestions based on data collected from plant, maintenance can be done when needed, and not by fixed service intervals. Provision stores (freezer and cooling rooms) compressors can be calibrated to run on optimal temperatures and automatic defrosting, making energy savings easier. Pumps to be run at optimum speeds to deliver needed capacity, saving energy and water based on data collected. Running compressors with the most efficient parameters with suggestions on how to achieve optimal running conditions. Environmental pollution reduction due to preventive measures concerning leak detection (Refrigerant leak) and power savings. Compressors tend to consume more energy when running outside design parameters.

Efficiency

Imagine a diesel generator that could be anywhere like a vessel, oil rig, onshore powering a generator, or directly involved in a propulsion application. Big diesel engines consume a considerable amount of fuel, and much fuel can go to waste if not operated according to need and practical capacity relation. Diesel engines are configured with a efficiency capacity range based on machine running hours; indicating calibration values where the engine is most efficient. The optimal capacity range should be used whenever possible. Data collected from consumer system's in combination with capacity in use, which gives the operator a good foundation to adjust the capacity-need ratio, to optimal range; or if multiple engines are serving consumers in parallel, dividing capacity on engines in the most efficient way. Another useful scenario is related to engine running hours. The more running hours Diesel engines have on their belt, the more their performance will decrease and optimal capacity range will shift from ex. 60-75Kwh to 70-80Kwh. This case can be easier to identify when measurement data is available.

HVAC Systems

Running ventilation at the most efficient parameters with suggestions on how to achieve optimal running conditions. Environmental pollution reduction due to preventive measures regarding leak detection (air leak) and power savings. Ventilation tends to consume more energy when running outside design parameters.

Prolong ventilation lifetime, due to preventive measures suggestions based on data collected from plant, maintenance can be done when needed, and not by fixed service intervals. The air quality can be improved with the correct flow of air, temperature, and humidity control based on data collected.

One app for different purposes

Reports manually made by personnel can be automated based on data fetched from control systems- freeing up time to focus on more critical tasks and eliminating human error occurring in reports, with possibilities of scheduling reports. Dashboards: Create dashboards, access them from anywhere for monitoring purposes, and have calculations done on the fly. Enable different parts of the organization: to be updated on operational data, inform operators on active systems anywhere. Historical data is crucial when conducting incident and insight investigation to a sequence of events in cases where clarification is needed. E.g., define responsibility in case of equipment failure or prevent similar failures in the future. Collaboration with partners: makes data sharing easy: over standards such as OPC UA, over a secured connection, encrypted with certificates and authentication, and uploading data to cloud.

Contextualized data OPC UA information model

Organize and filter out meaningful data by using a hierarchical information model to eliminate the need for technical domain knowledge to consume the data. A hierarchical and organized information model paves the way for automated applications acting on context. E.g., Dashboards are created to visualize a set of data related to a process/equipment. The dashboard is made one time as a template and can visualize data from all similar processes/types of equipment based on the user's preferred contextualization of interest. Reports are then displayed/exported/printed dynamically based on the preferred context.

Figure 1

Figure 1. on next page, shows how information modelling kan provide i.e., a data structure fitting more than one vessel - enabling efficient deployment across platforms. The figure also shows data harmonizing across vessles and facilities.

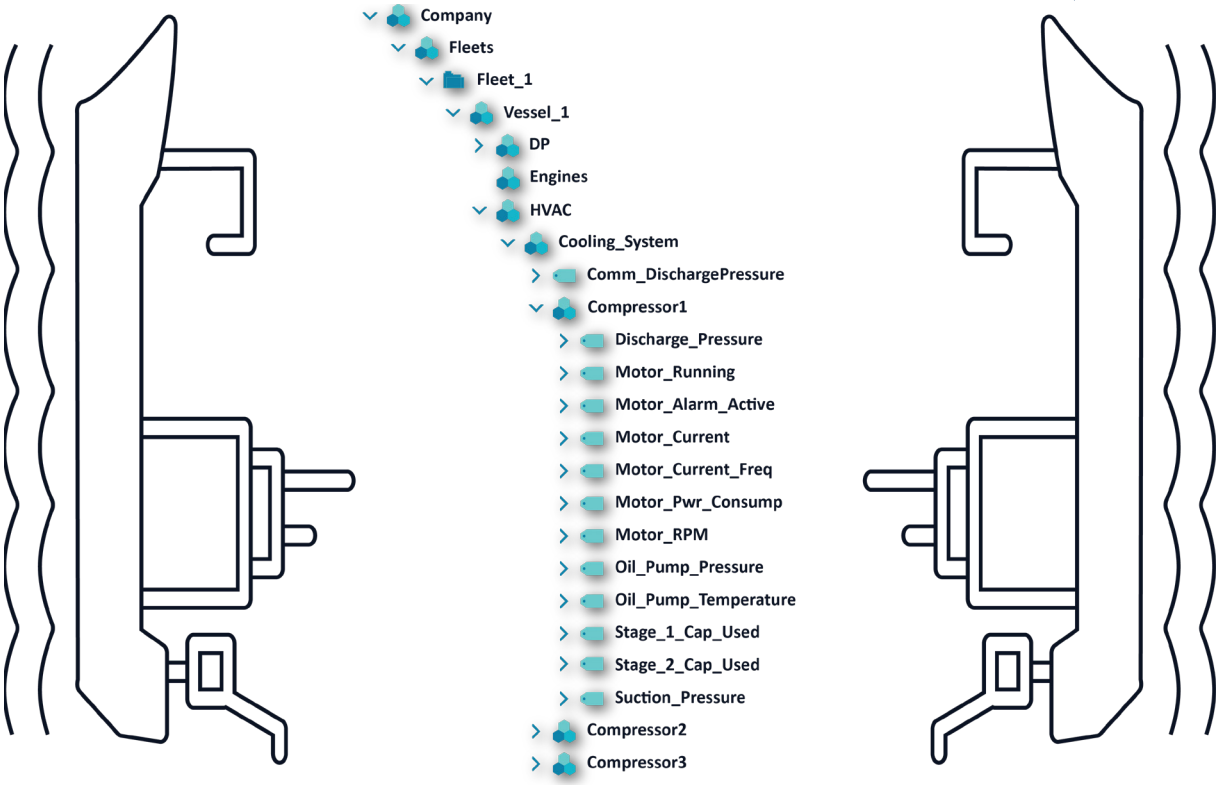
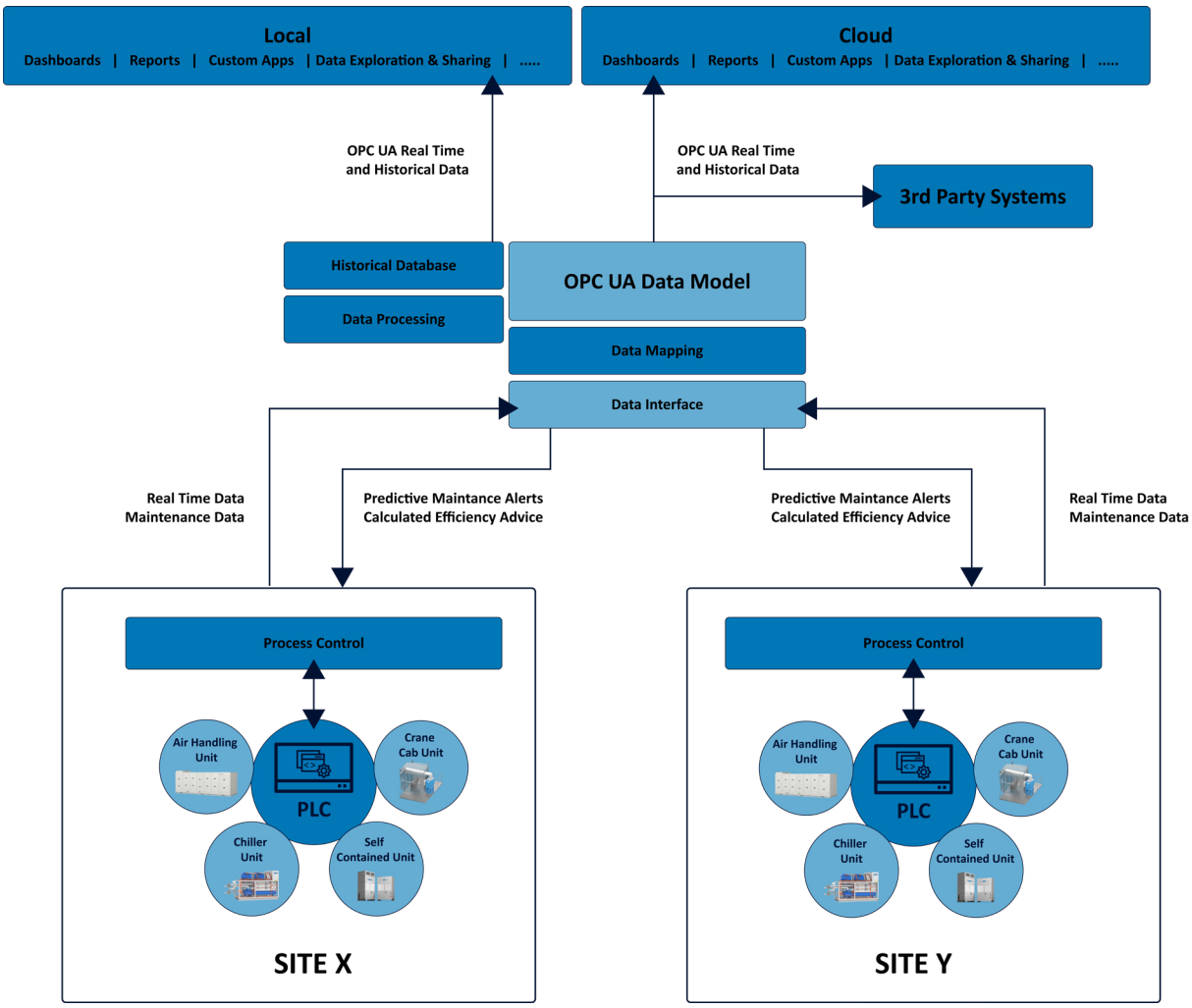

Company
Fleets
Fleet_1
Vessel_1
DP
Engines
HVAC
Cooling_System
Comm_DischargePressure
Compressor1
Discharge_Pressure
Motor_Running
Motor_Alarm_Active
Motor_Current
Motor_Current_Freq
Motor_Pwr_Consump
Motor_RPM
Oil_Pump_Pressure
Oil_Pump_Temperature
Stage_1_Cap_Used
Stage_2_Cap_Used
Suction_Pressure
Compressor2
Compressor3

Figure 2

Figure 2. below shows an illustration of data equsition and visualization. Acutus provides for now only functions for data collection, historical database, visualization, and on the fly data processing in dashboard.



"A vision to be successful in our ventures rests heavily on our goal to help our clients achieve their success."

-Acutus

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