Factory Line , Surface Treatment HTTP/JSON

System-of-Systems Description

Abstract
This document describes the Factory Line demo system, the concept, and how it's supposed to work. This is the lower version of the system (rated for a grade of 3).

Contents

This is a demo project, for a University course at LTU, the goal here is to get a system that implements and uses the main core systems and functionalities of the Arrowhead framework.

1 Overview

The project goal is implementing a system that simulates a surface treatment process of a product (it can be anything) on an industrial factory line.

The process can be described as the following sequences : Unprocessed product will arrive from an input source (a conveyor belt), then a mechanical arm will load the product into a tray. The tray can move up and down and dive into the treatment liquid (this part will be called “the tray” from now on). The bath regulated its temperature via a temperature sensor and a resistive heater (we assume that we want a hot liquid and not a cold liquid). When enough time has passed, the tray will move up out of the liquid and the mechanical arm will unload the processed products from the tray to an output (another conveyor belt). Additionally, two sensors (detectors) will detect if there is any product at the end of the input conveyor, or at the beginning of the output conveyor, this way the arm will know when to load/unload.

This document will explain how the system globally works, and have all the documentation details of the SoS structure.

The reader is encouraged to also read all the SysD documents to better understand how the system works. Service Registry, Authorization and Orchestration systems will not be explained here.

2 System structure

2.1 System global concept

The system simulated on this project, can be represented on the following low detail diagram :

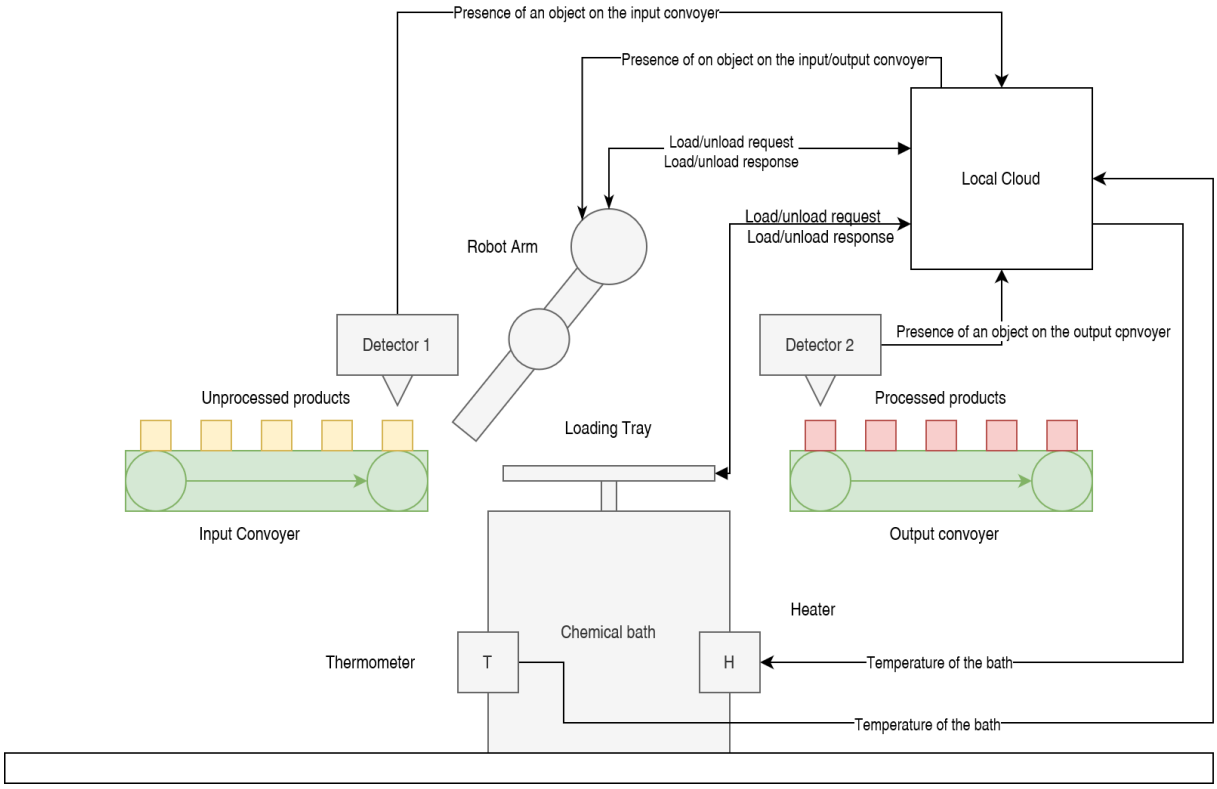

Figure 1: System concept

2.2 Local Cloud Diagram

The following represent the local cloud of this system, with 4 providers and 3 consumers.

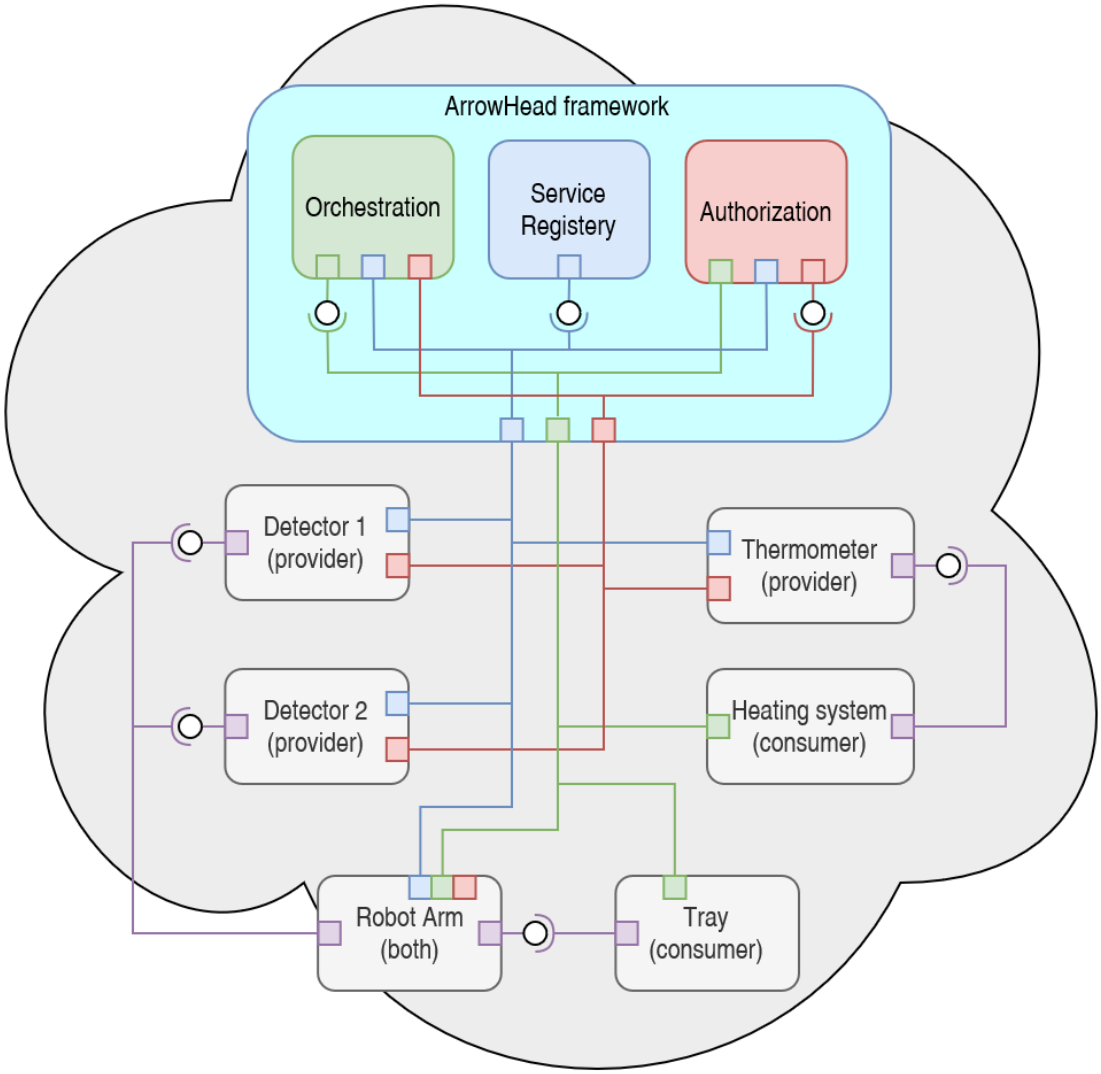

Figure 2: Local Cloud

2.3 Data and service summary

System	Type	Service/Data	Action
Thermometer	Provider	Temperature of the process bath	N/A
Detector 1	Provider	Presence of a product on the input conveyor	N/A
Detector 2	Provider	Presence of a product on the input conveyor	N/A
Robotic Arm	Provider	Loading/Unloading, with response (Success/failure)	Move products
Robotic Arm	Consumer	Data of the Detectors	N/A
Tray	Consumer	Response of the Robotic Arm	Move up and Down to the bath
Heater	Consumer	Temperature of the process bath	Adjust the bath temperature.

3 Subsystems

Note that the two subsystems work in parallel at the same time, and are independent from each other (in the meaning that no data is exchanged between the subsystems).

3.1 Moving product

The following diagram shows the data-flow of a typical sequence of the subsystem responsible for moving the product. This includes the two detectors, the robotic arm, the tray.

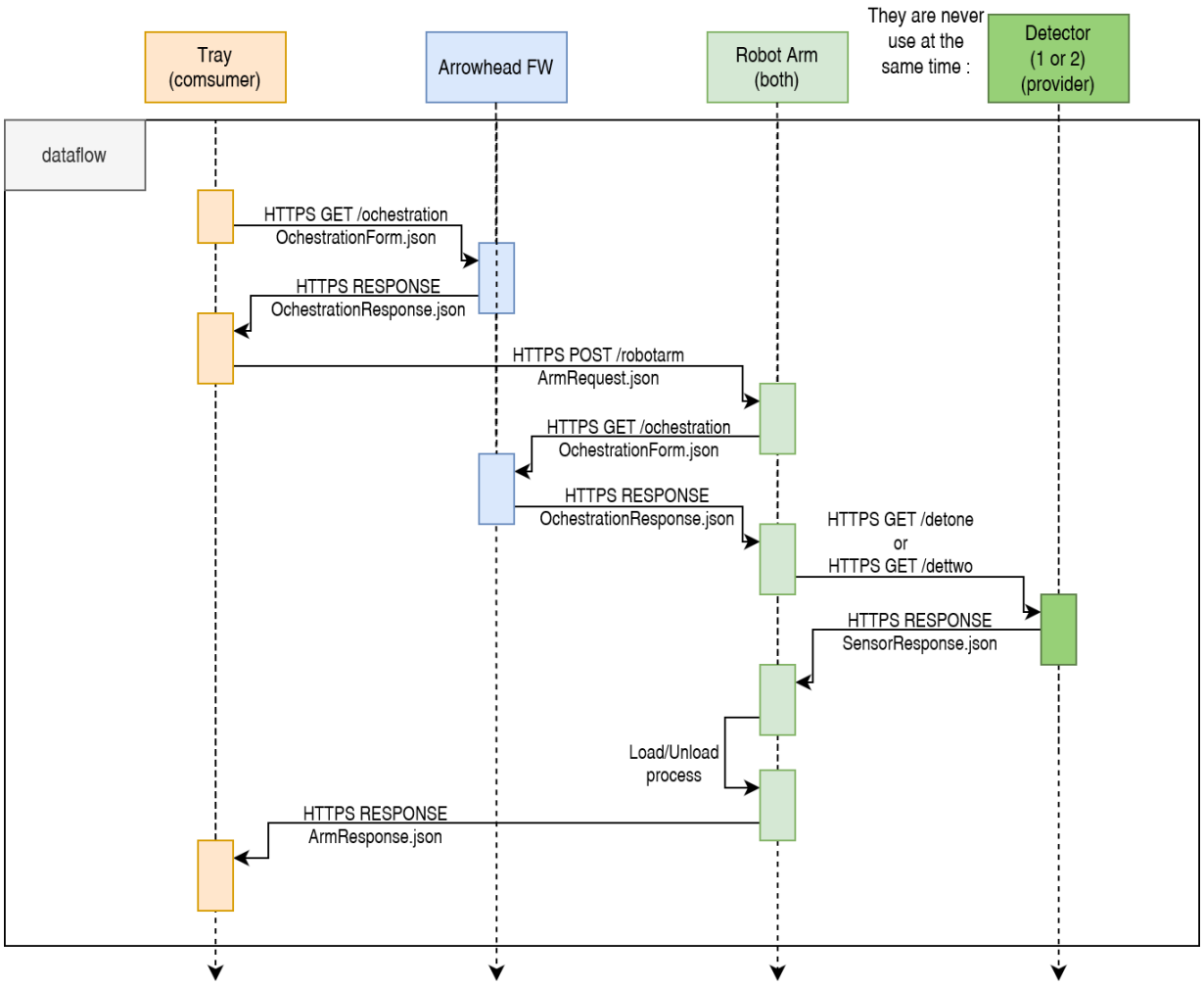

Figure 3: Data flow of the first sub-system

3.2 Temperature Control

The following diagram shows the data-flow of a typical sequence the subsystem responsible for controlling the temperature. It assumes that the load/unload sequence is so fast that we don't have to cut the control between two bath processes. It also assumes that the flow of new chemicals and used chemicals is managed by another system.

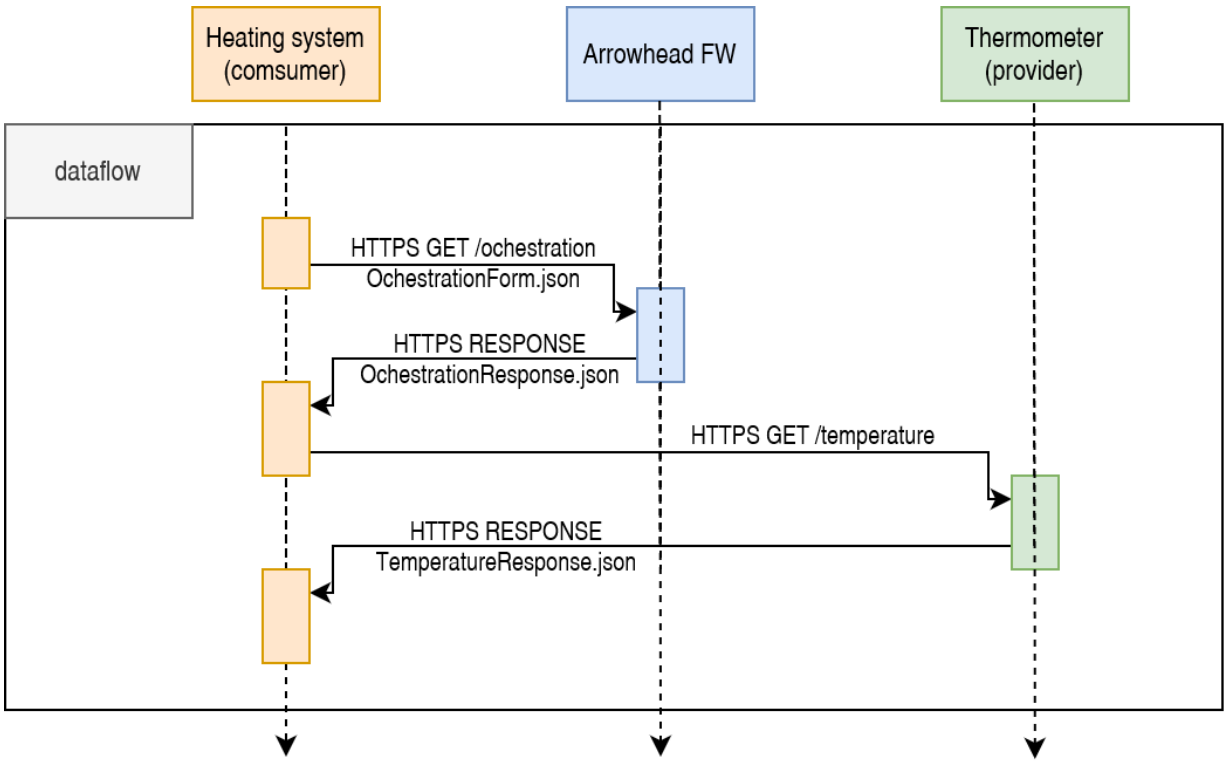

Figure 4: Data flow for the second sub- system

4 References

This document alongside any other document linked to this project are based on template documents, that are the description of ”Intercloud Contract Negotiation and Automation” system, by Emanuel Palm [emanuel.palm@ltu.se]. I just adapted the template to my system.

5 Revision History

5.1 Amendments

No.	Date	Version	Subject of Amendments	Author
1				

5.2 Quality Assurance

No.	Date	Version	Approved by
1			