IoT project

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Data Manage: Alberto Gonzalez, Seungah Lee

AI: Brian Franklin, Mohamed Eltablawy, Adrien Mencik

GUI: Gabriella Catalan, Aizar Berlanga

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Introduction

Project name : Factory of the future

Project goals : Deploy a system to monitor and control a finite set of factories remotely.

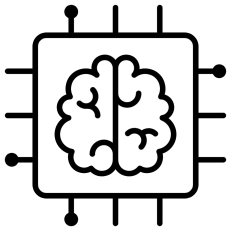
Description: This project will consider two different factories. Factory ‘Le Monde’ and ‘Chocolatine’. Both factories will be monitored thanks to a redundant system of three environmental sensors. After merging the data of the sensors using a clustering algorithm, it is sent to a server which is in charge of storing the information and send it back to a remote display and to a prediction block. The server also sends data back to the factories regarding the state of two actuators: a fan and a LED.

Introduction

IoT

Bernardo Sata

Gonçalo Fontes Neves



AI

Brian Franklin

Mohamed Eltablawy

Adrien Mencik

Data Management

Alberto Gonzalez

Seungah Lee

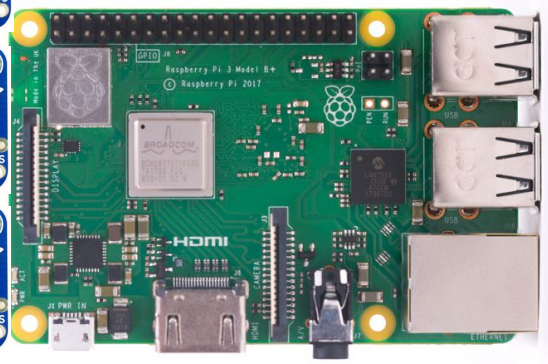
GUI

Gabriella Catalan

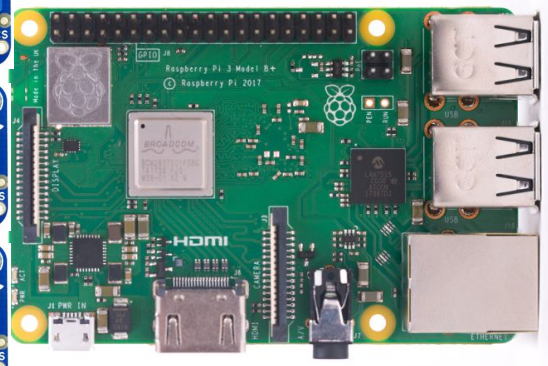
Aizar Berlanga

System Configuration

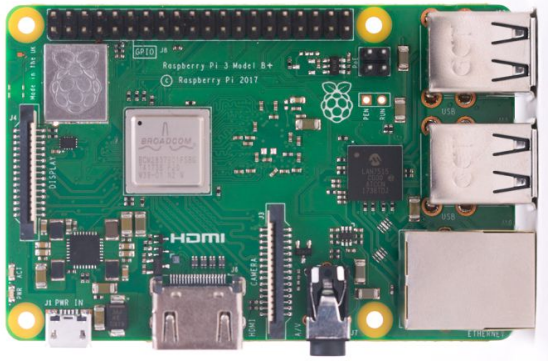
Factory Le Monde

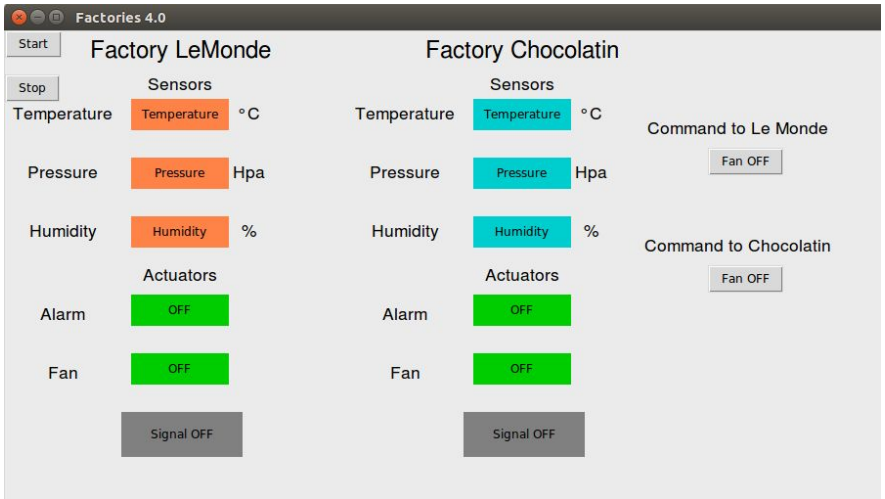


Factory Chocolatine

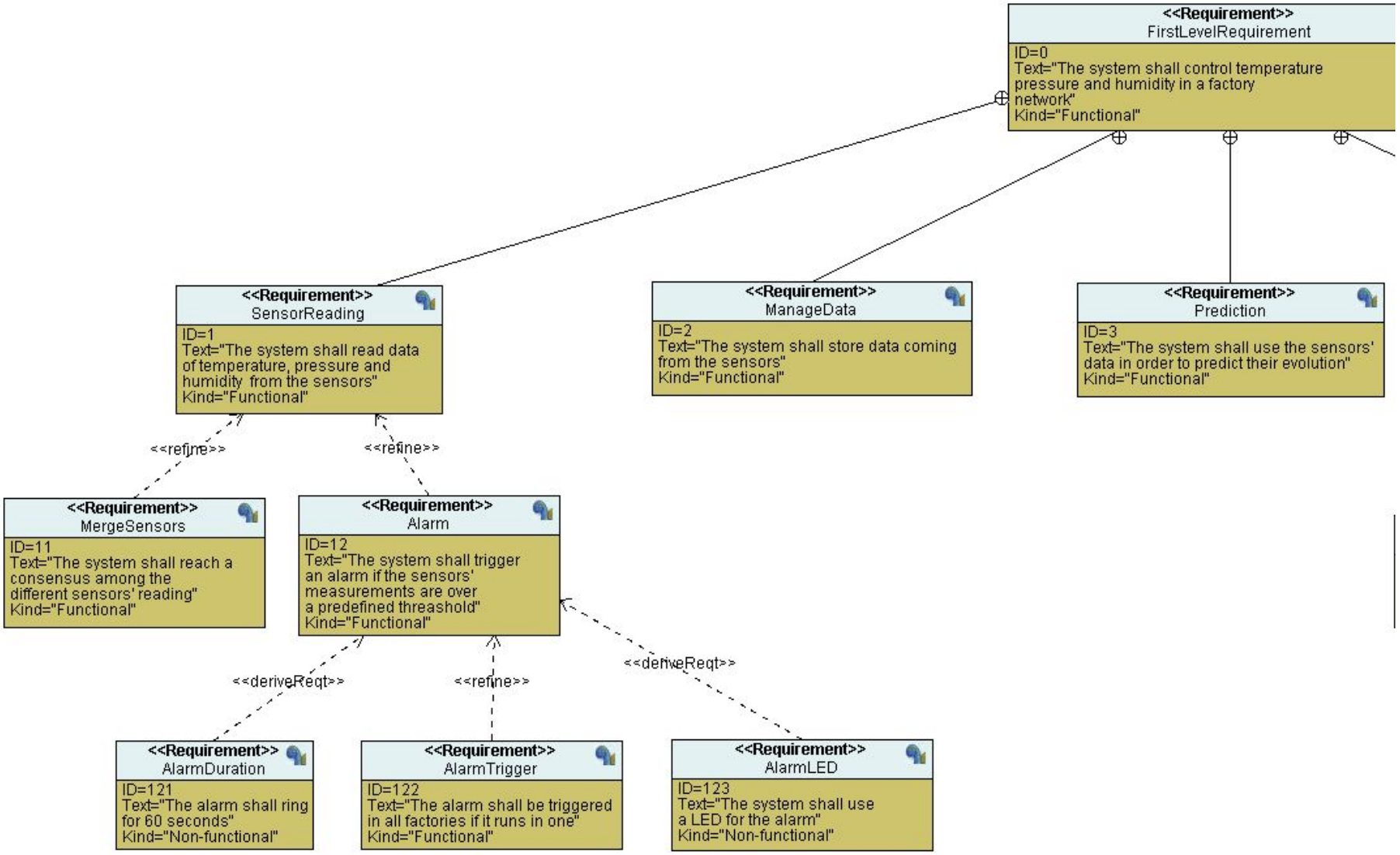


Server

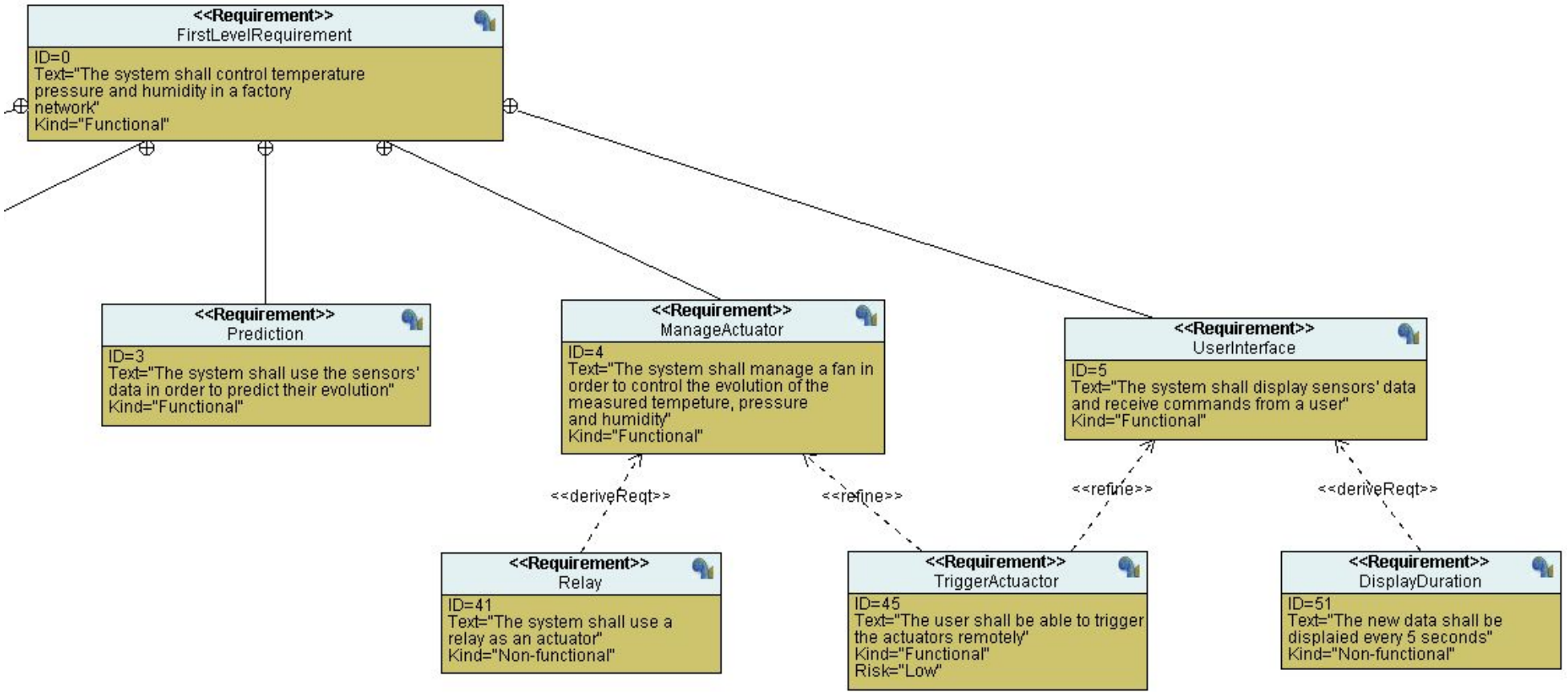




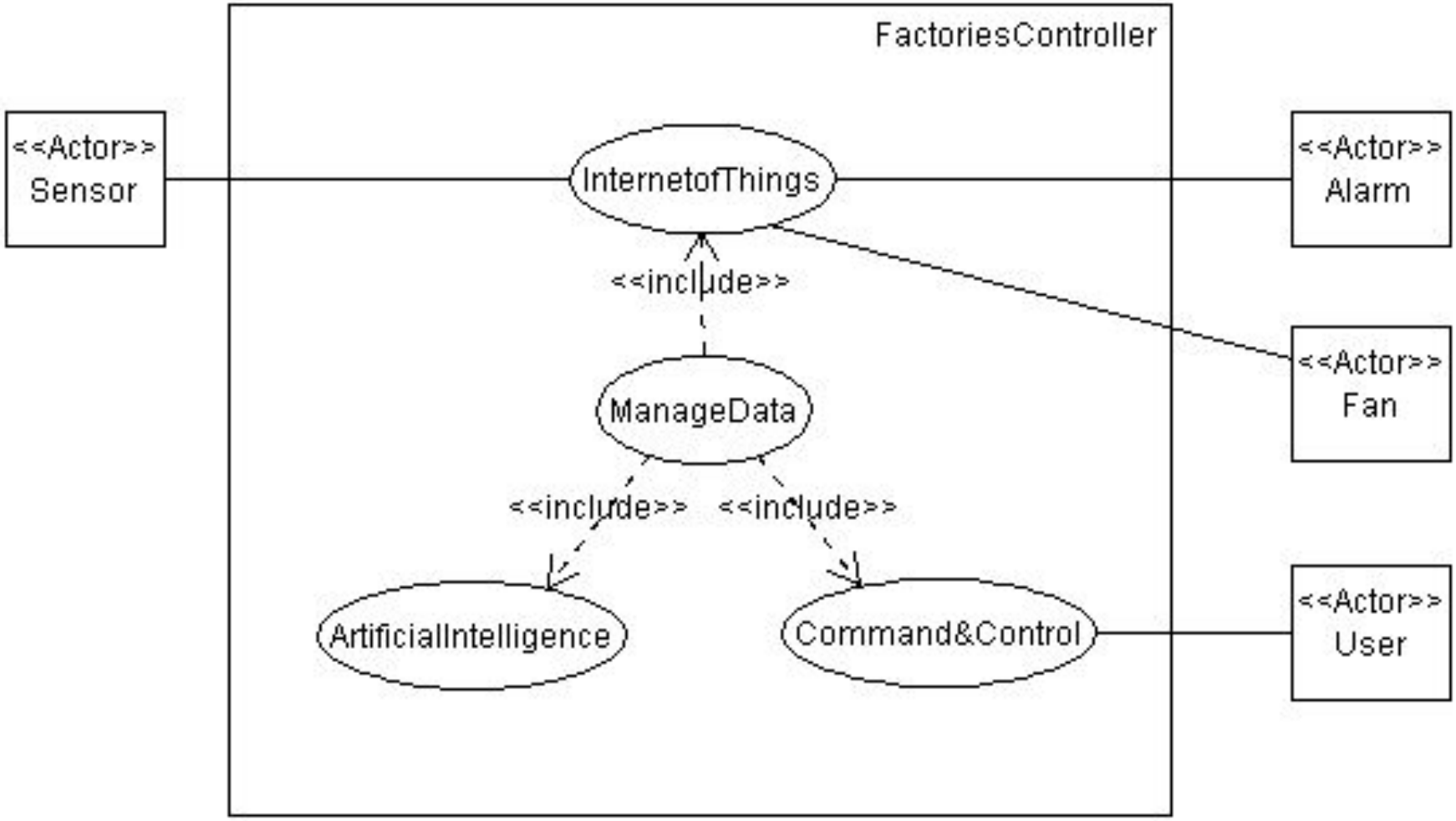
Conceptual Analysis: Requirement Diagram



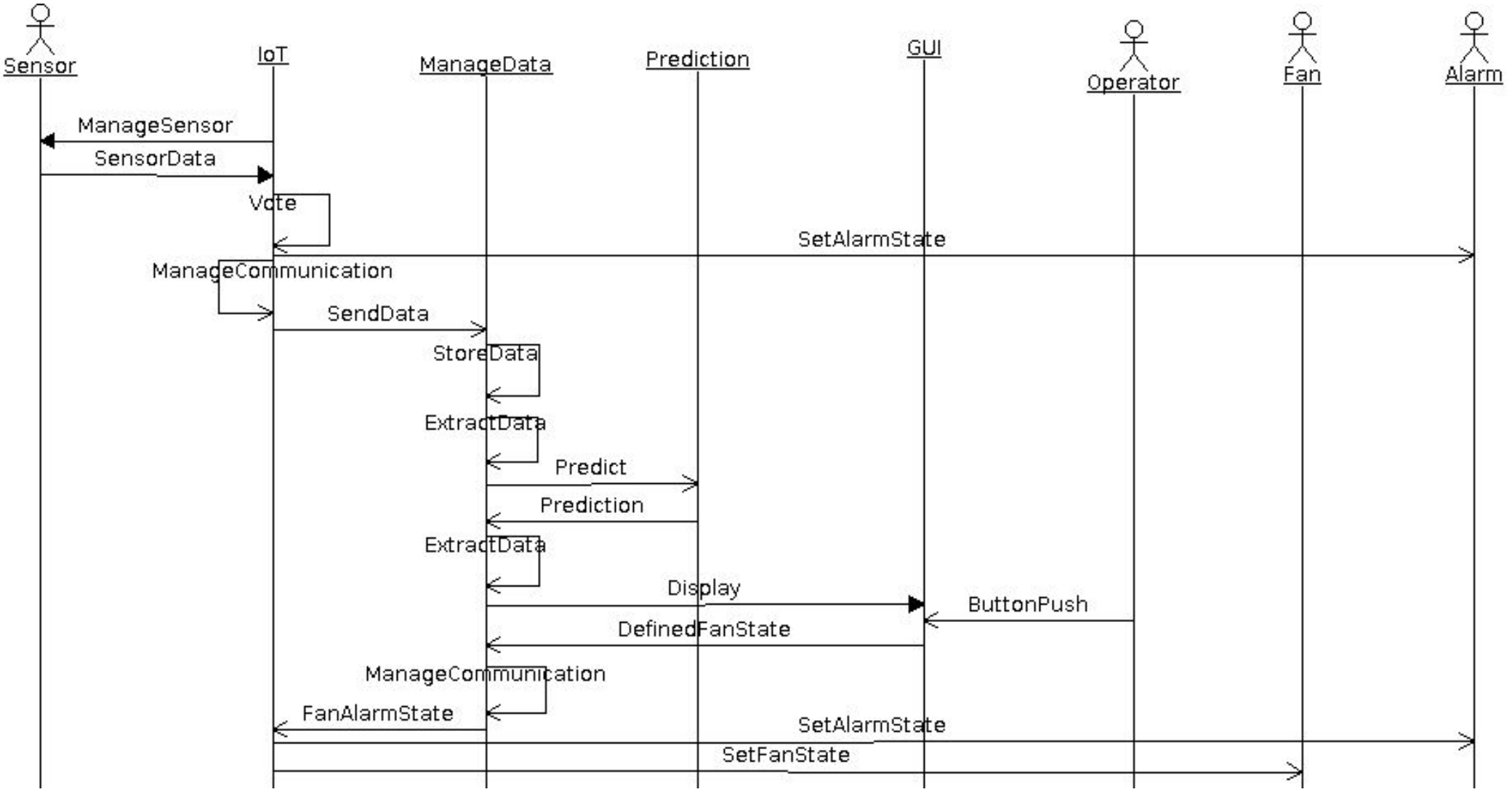
Conceptual Analysis: Requirement Diagram



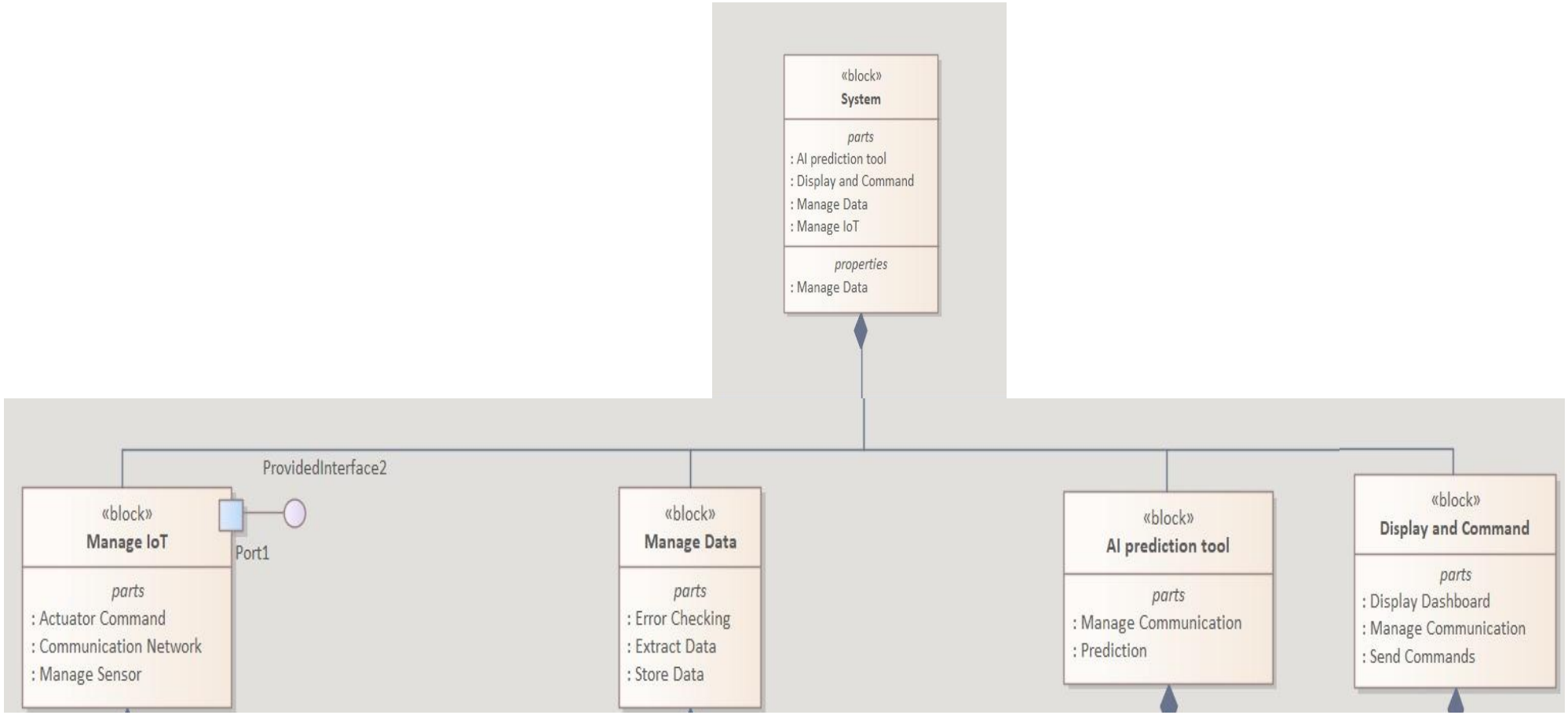
Functional Analysis: Use Case Diagram



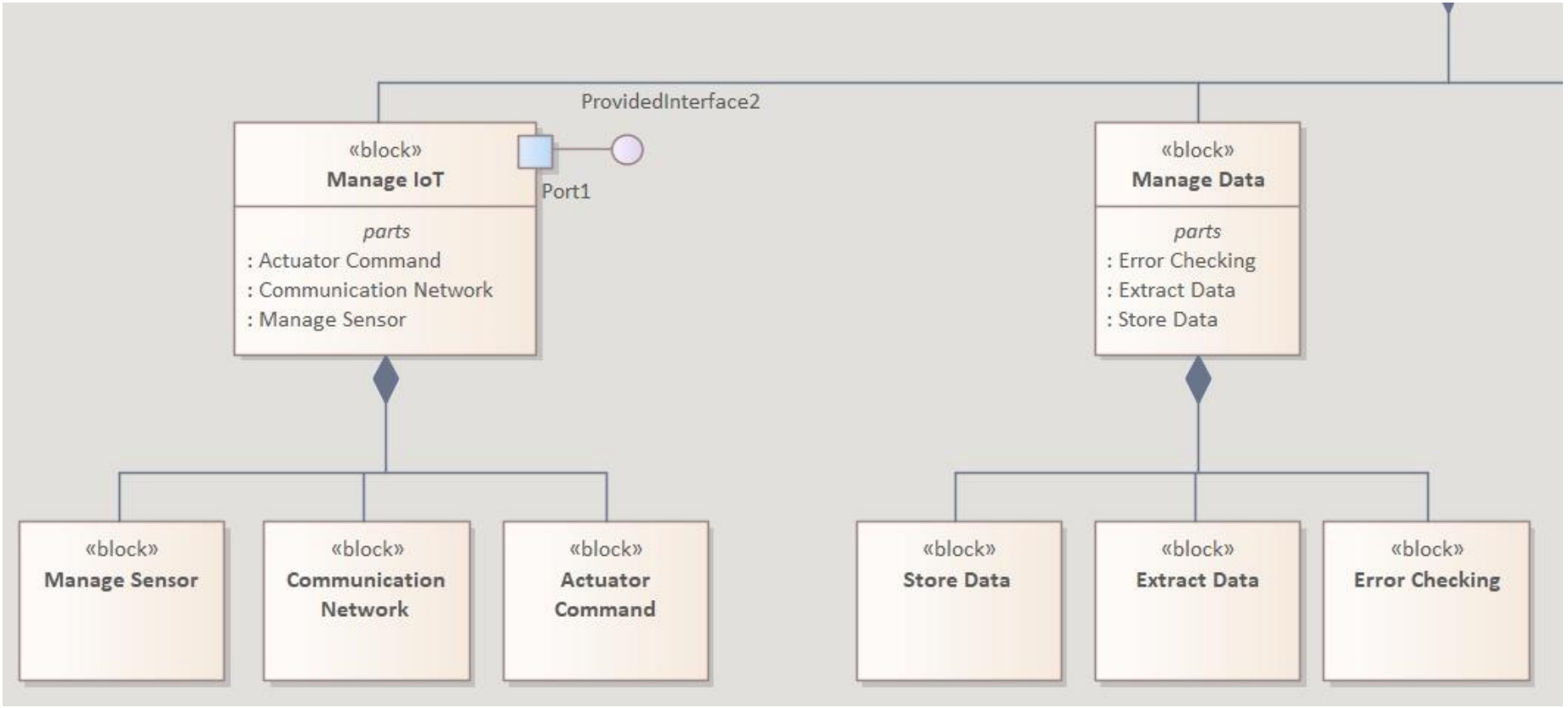
Functional Analysis: Sequence Diagram



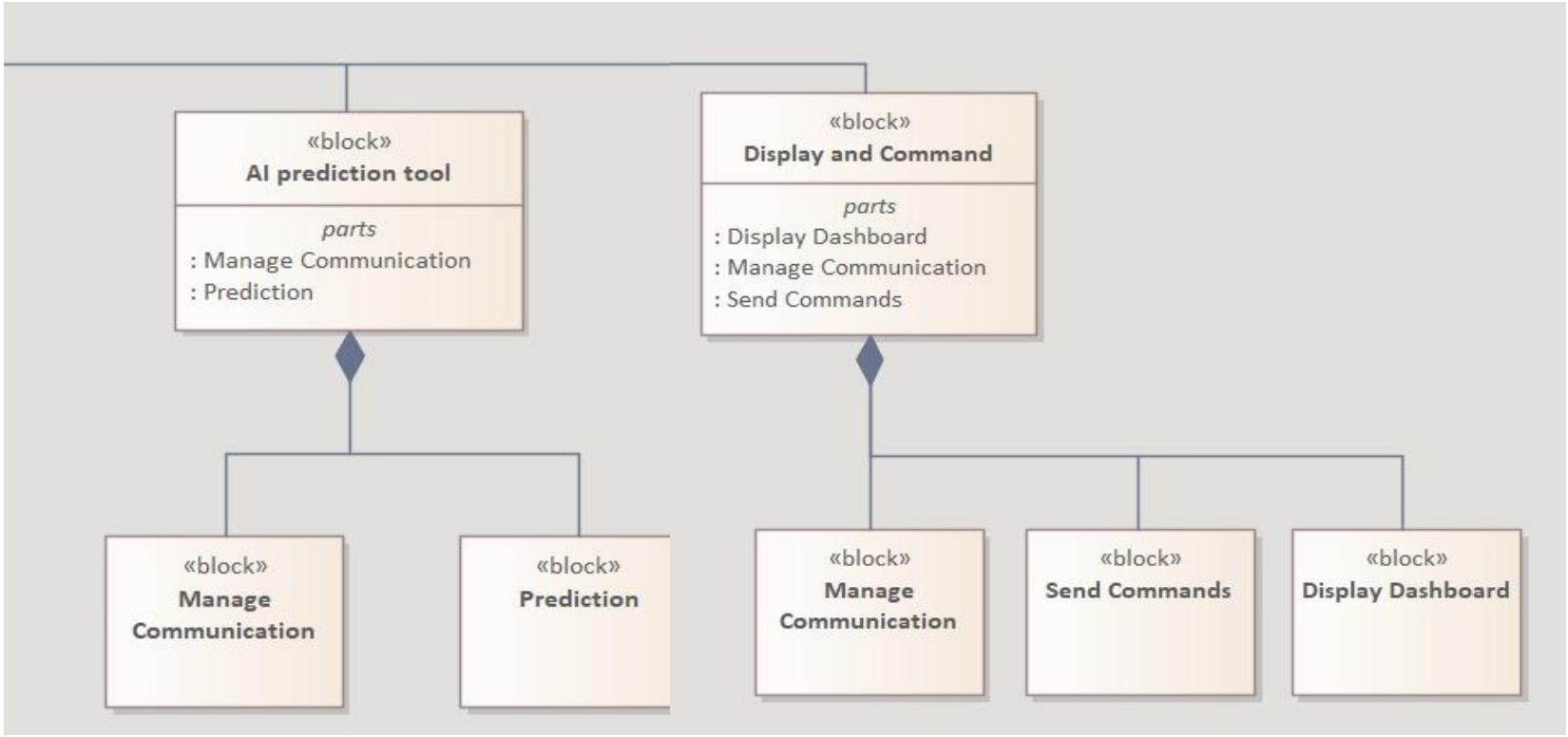
Functional Analysis: Block Diagram



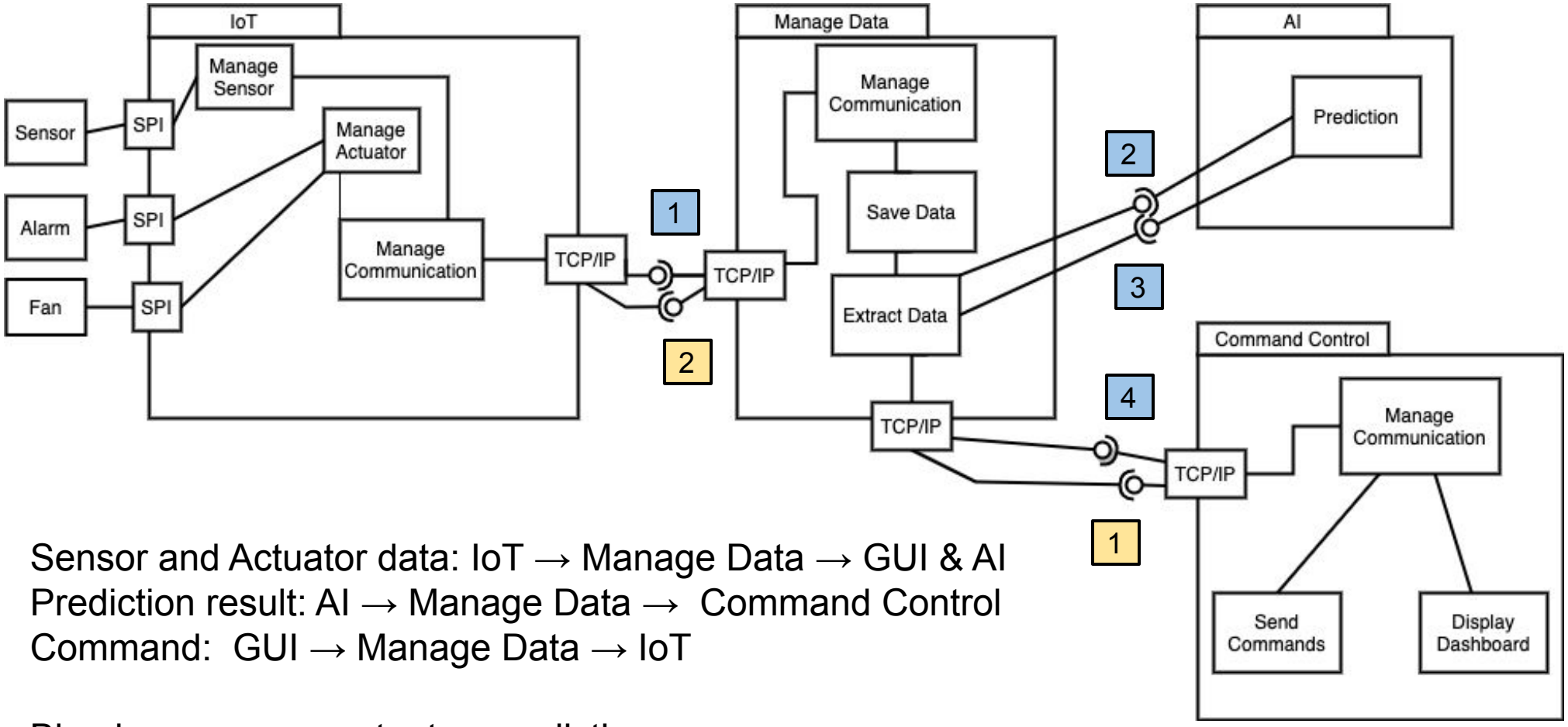
Functional Analysis: Block Diagram



Functional Analysis: Block Diagram



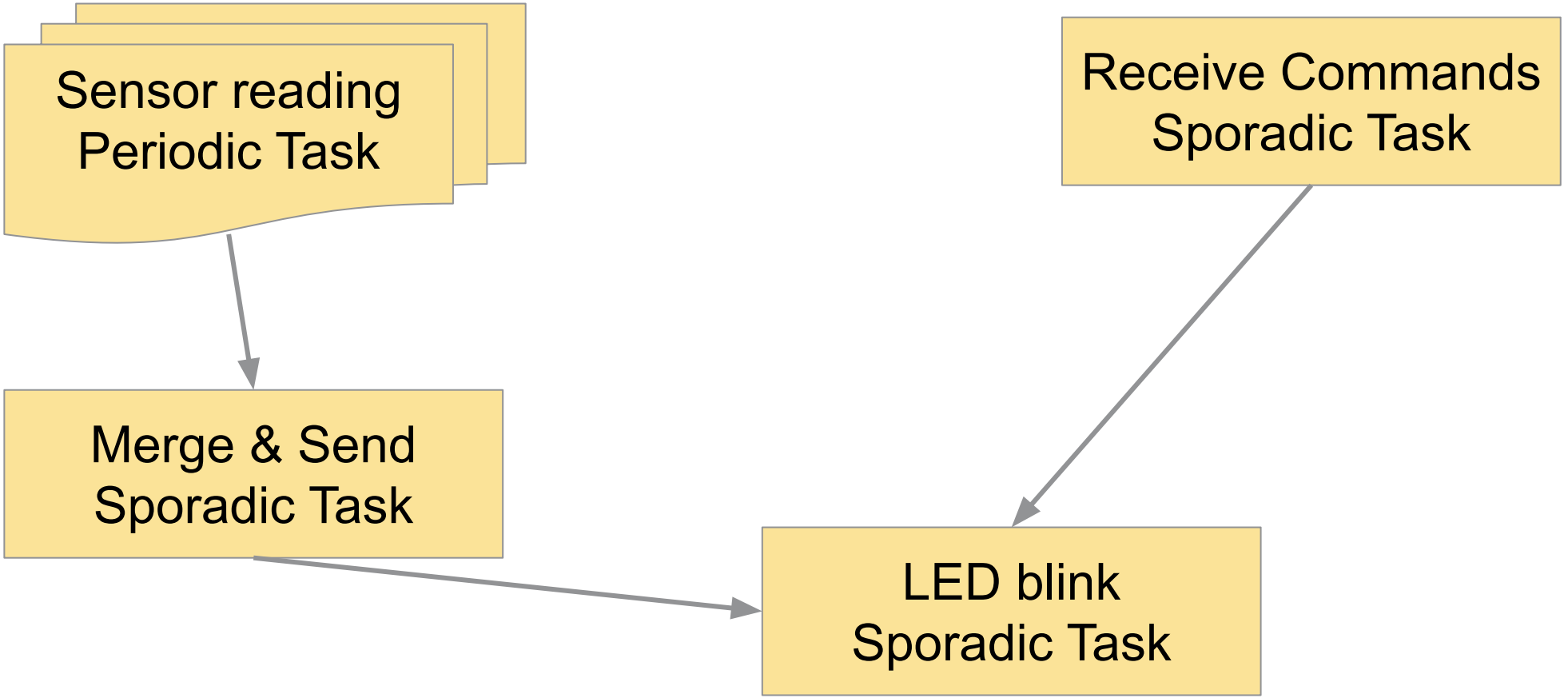
Functional Analysis: Internal Block Diagram



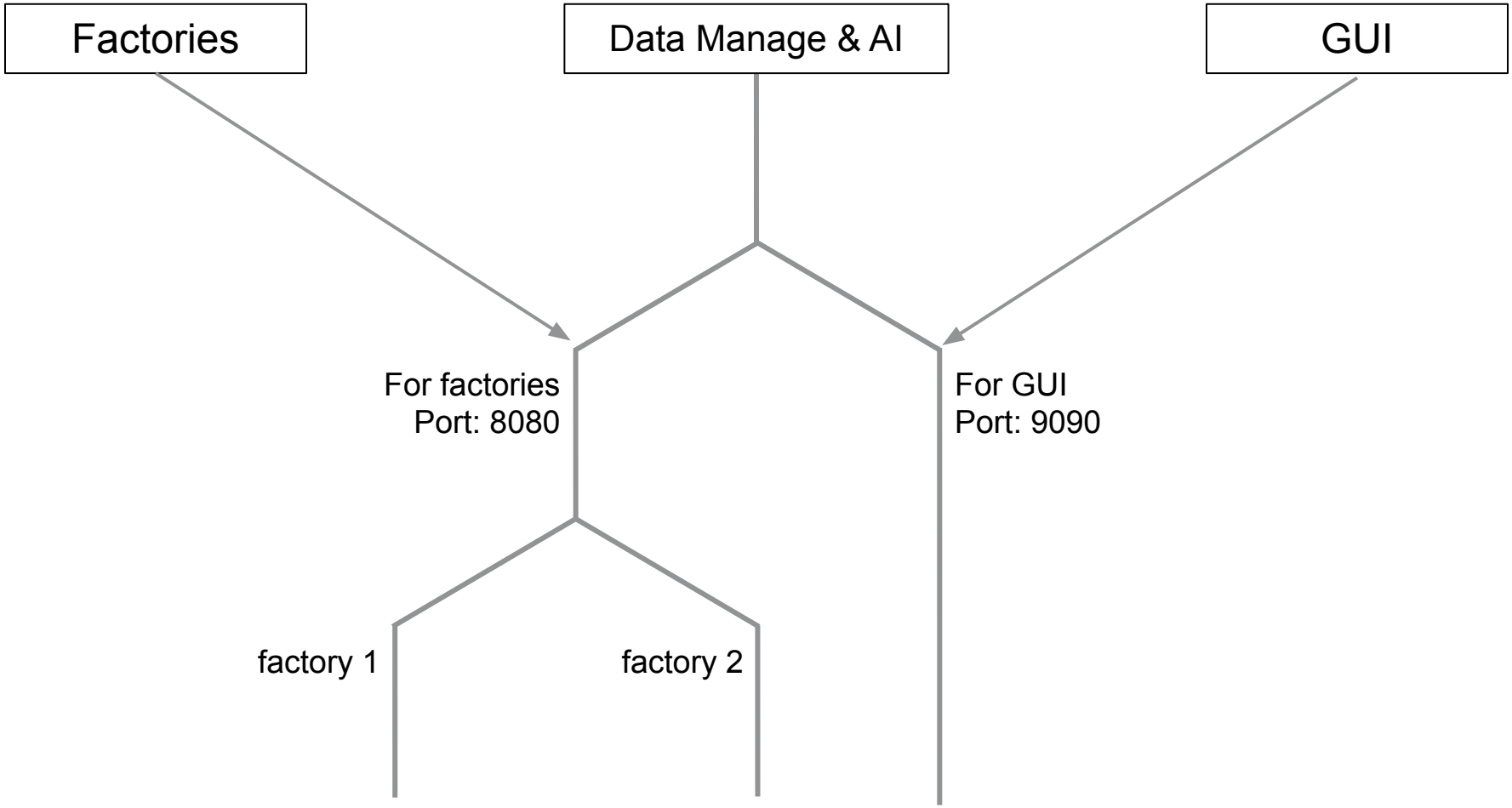
Sensor and Actuator data: IoT → Manage Data → GUI & AI
Prediction result: AI → Manage Data → Command Control
Command: GUI → Manage Data → IoT

Blue box : sensor, actuator, prediction
Yellow box: commands

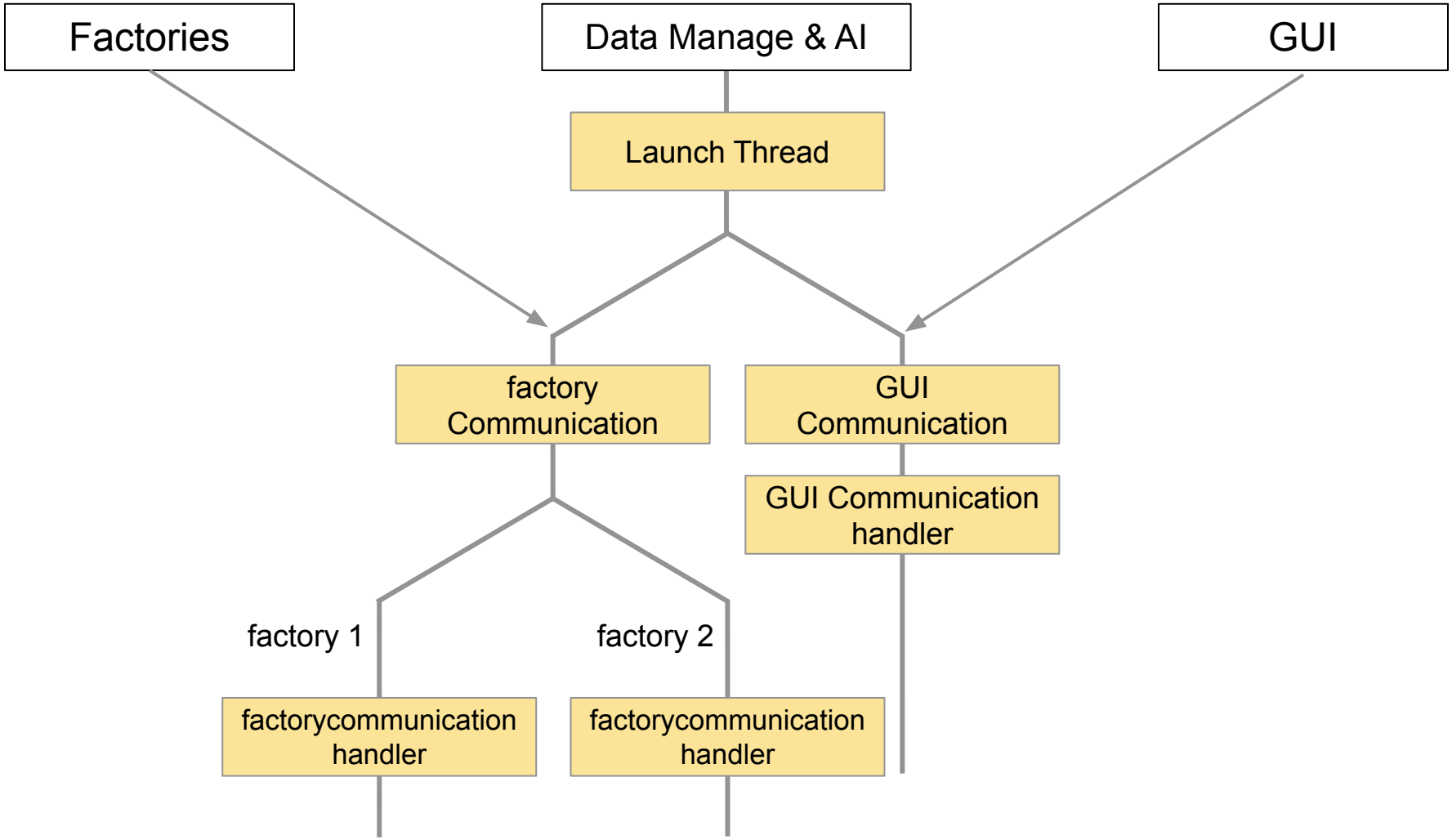
IoT Factories



Data Manage

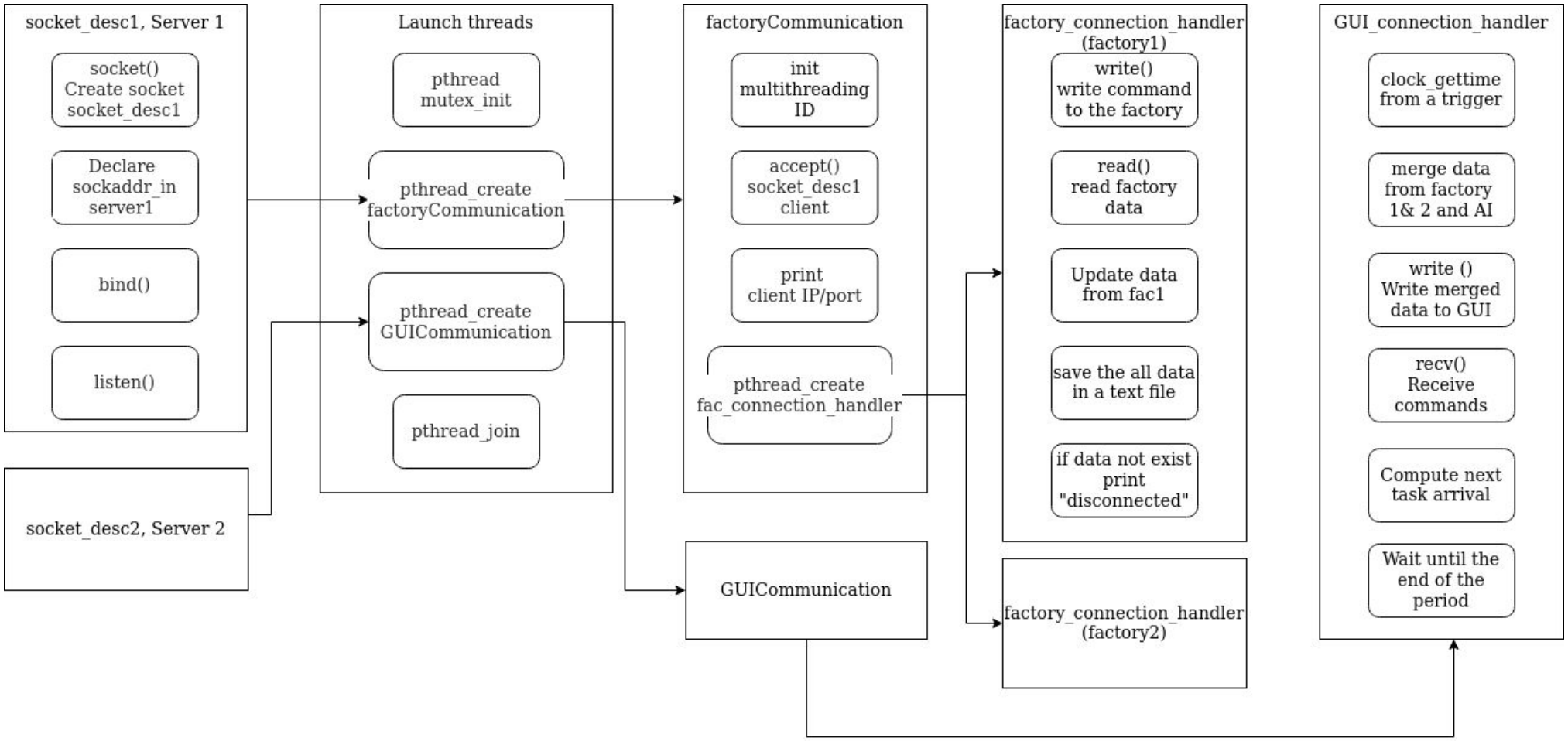

Factories
Data Manage & AI
GUI
For factories
Port: 8080
For GUI
Port: 9090
factory 1
factory 2

Data Manage


Factories
Data Manage & AI
GUI
Launch Thread
factory Communication
GUI Communication
GUI Communication handler
factory 1
factory 2
factorycommunication handler
factorycommunication handler

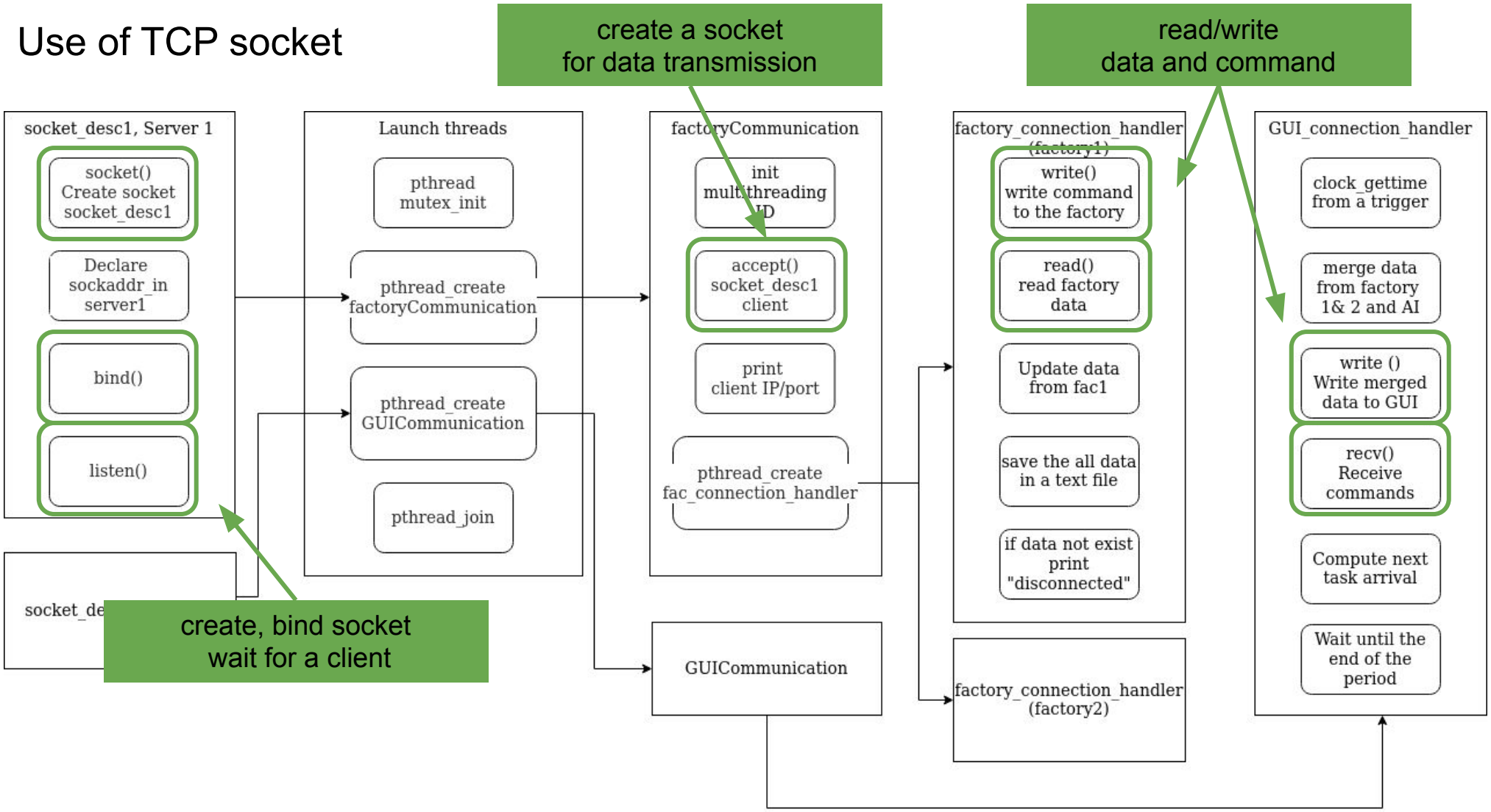
Data Manage

Flow chart



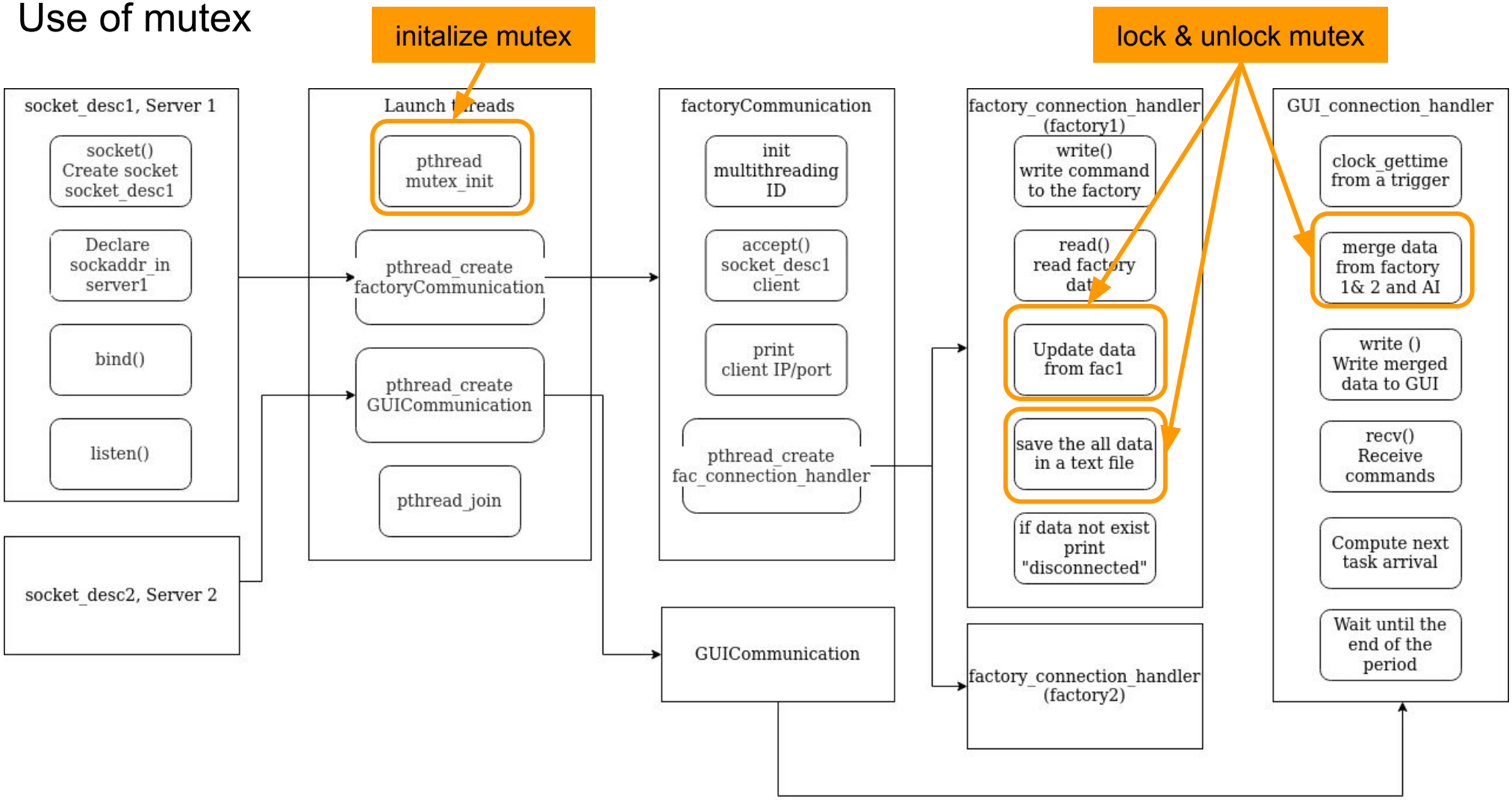
Data Manage

Use of TCP socket

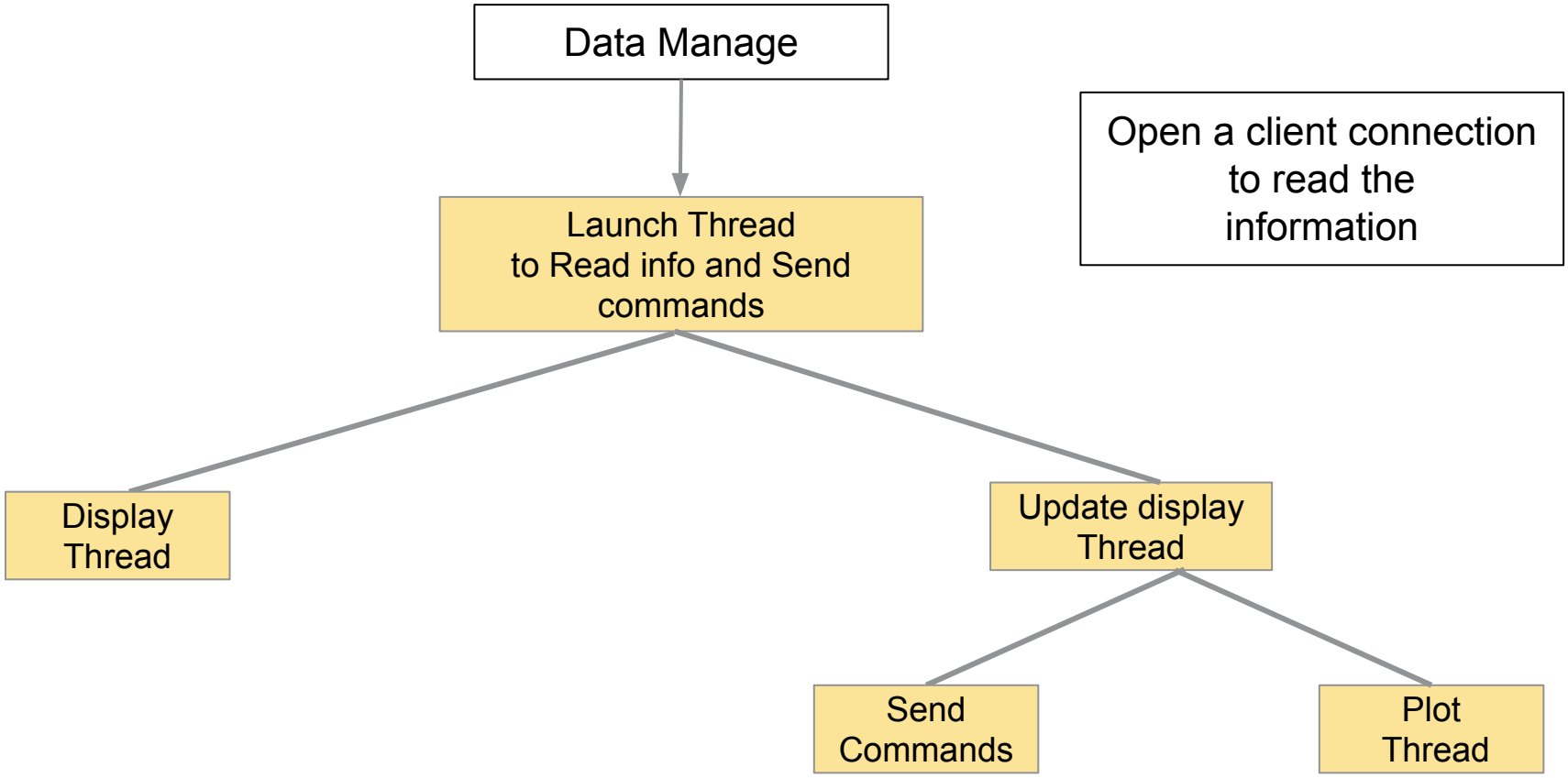


Data Manage

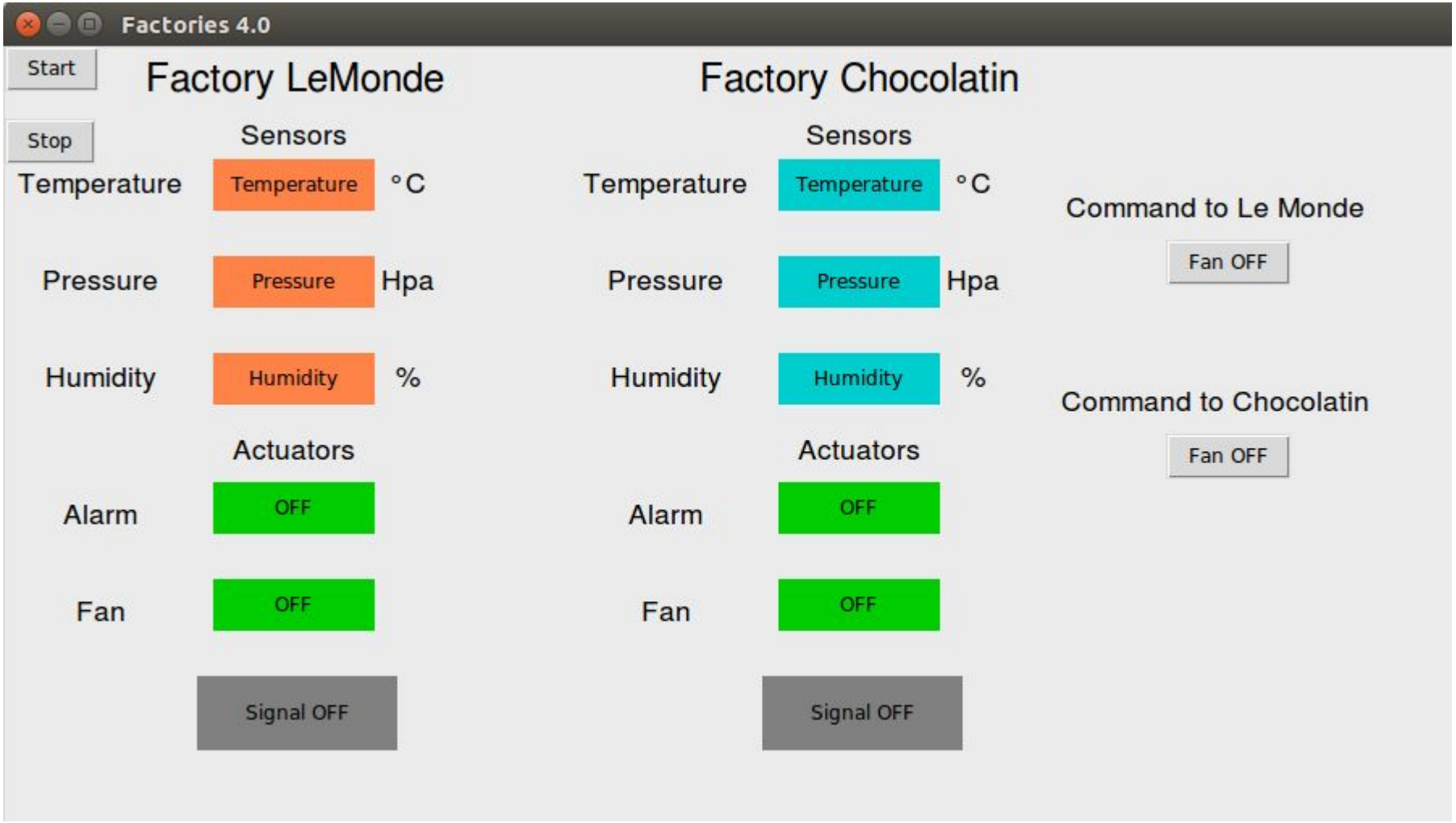
Use of mutex



Graphical Interface



GUI


Factories 4.0
Start
Stop
Factory LeMonde
Sensors
Temperature
Temperature
°C
Pressure
Pressure
Hpa
Humidity
Humidity
%
Actuators
Alarm
OFF
Fan
OFF
Signal OFF
Factory Chocolatin
Sensors
Temperature
Temperature
°C
Pressure
Pressure
Hpa
Humidity
Humidity
%
Actuators
Alarm
OFF
Fan
OFF
Signal OFF
Command to Le Monde
Fan OFF
Command to Chocolatin
Fan OFF

AI

- AI's purpose: To predict values based on received data:

-Time, pressure/humidity/temperature.

-Data received as a structure.

-Prediction made using a linear regression model. This model is computed using the GSL library.

-Data received every 5 seconds.

-Prediction done at every reception of data.

AI : The code

Link with the data processing:

-the function Pred() is called after reception of data. The data comes as a structure.

-The structure is divided in values of time pressure, humidity and temperature. These values are swiped in the existing array and used in the function argument.

-Pred() takes into argument arrays of the time and the received value of data to be predicted.

AI : The function Pred

The function Pred():

-uses the gsl function gsl_fit_linear to calculate the linear regression.

-returns the values of temperature, pressure or humidity predicted as double, later sent to GUI.

THANK YOU