

IAS - Group - 7
Team - 4
Requirement Document
Sensors, controllers communication module

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April 2021

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1 Introduction

- In this module, data is fetched from sensor using kafka and sends the data to application as per need, configure sensors types and its instances and perform sensor registration for the platform.
- Also data collection from the application is performed and send it to specified controller, configure controller types and their instances and perform controller registration for the platform.
- Provides abstraction to the application developer i.e hides the complexity of the specific sensor and controller technologies by providing single format to represent sensor devices so that application developer can directly use them.
- Flexible to add any number of different types of sensors and controllers to the platform and manage them efficiently.
- Following are the different components/sub-systems of this module:
 - Sensors
 - Sensor Manager
 - Sensor type registration
 - Sensor instance registration
 - Controllers
 - Controller Manager
 - Controller type registration
 - Controller instance registration
 - config files

2 Features and Requirements

2.1 Functional Requirements

2.1.1 Registering Sensors

- Whenever sensor is added to the platform for the first time or if platform is initialized, sensor registration is done so that sensors's data can be retrieved.
- During registration, details about sensor like sensor id, input/output type, data rate, location etc. is stored in the platform repository.

2.1.2 Registering Controllers

Similar to sensors, controller registration is performed on the platform.

2.1.3 Interaction with IoT sensors and controllers

APIs are build to provide abstraction to application developer. And sensor and controller communication with APIs are through Kafka.

2.1.4 Identification of sensors for data binding

- On sensor registration, All important details of sensors are stored in the Database. Also, all sensors have unique id thus can be uniquely identified.
- Whenever sensor manager receives data binding request, based upon the parameters it will identify the sensor and sends data for binding in specified format.

2.2 Non Functional Requirements

2.2.1 Scalability

Any number of sensor and controller can be registered to the platform.

2.2.2 Accessibility of data

Application will specify what all sensors it will use in the configuration file and it will be able to access the data from the sensors.

2.2.3 Monitoring

Sensor and controller manager is monitored by heart-beat module by continuous message signal send by these components.

3 Block Diagram

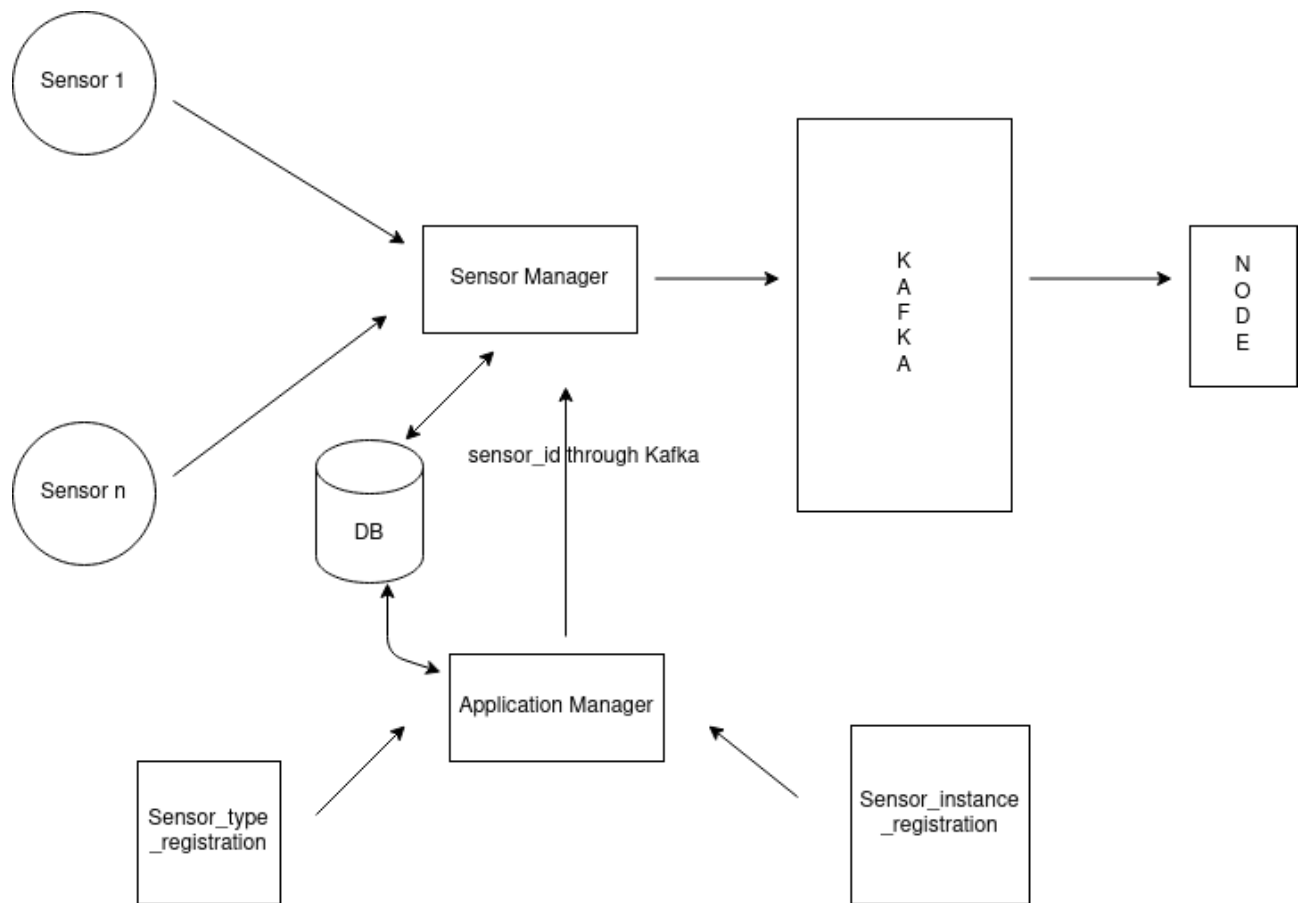


Figure 1: Block diagram of Sensor Subsystem

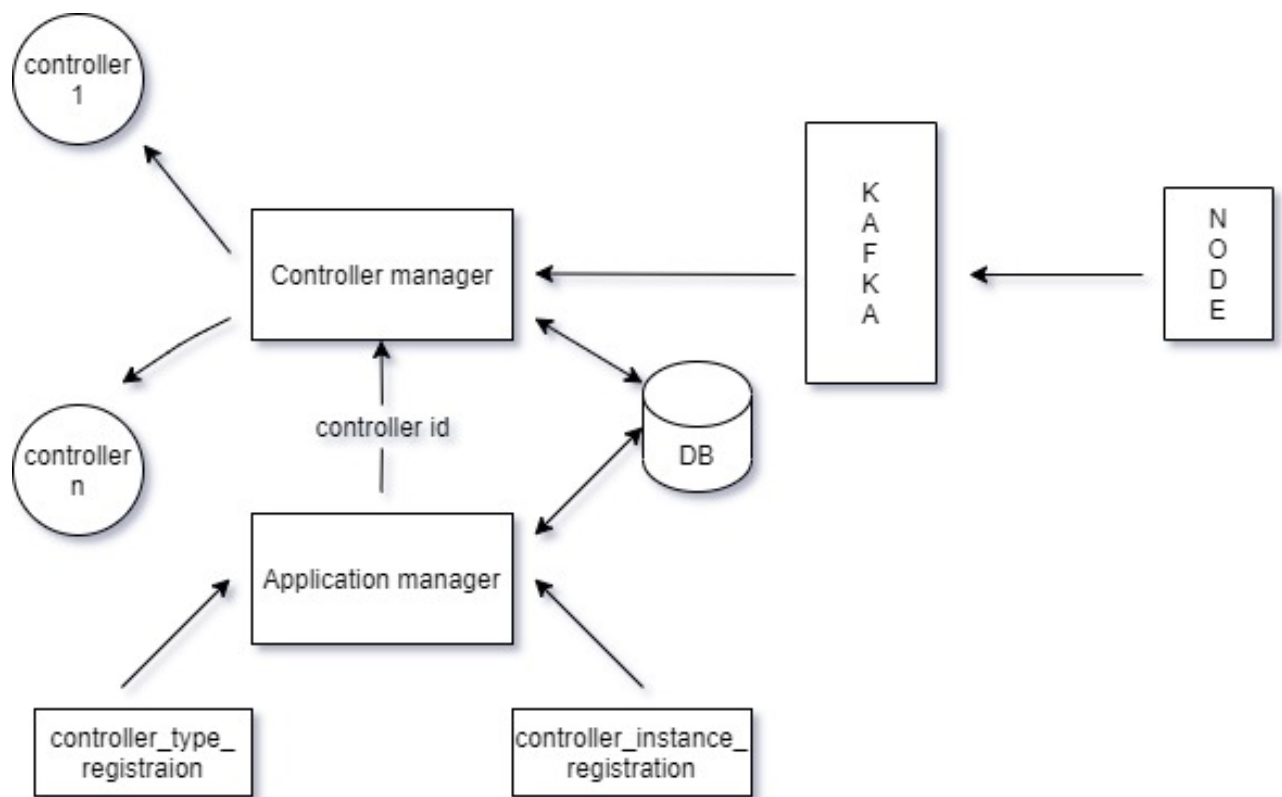


Figure 2: Block diagram of Controller Subsystem

4 Components/ Subsystems

4.1 Sensor and controller

- Sensor/controller connect to sensor manager/controller manager respectively using unique ip and port.
- Each sensor/controller is uniquely identified using sensor id/ controller id respectively.

4.2 Sensor Manager

Sensor manager create topics in kafka for sensor instances and forward the data from sensors to respective partition of topics from where applicaion can consume it accordingly.

4.3 Controller Manager

Controller manager sends message/command to controller whenever application wants to send it.

4.4 Sensor/Controller type registration

For sensor/controller type registration, the zip file is uploaded to the repository and the json file is extracted and database table is created for it.

4.5 Sensor/Controller instance registration

- For sensor/controller instance registration, the zip file is uploaded to the repository and the json file is extracted and database table is created for it.
- For each sensor/controller instance a unique id is generated which is also sent to sensor/controller manager respectively using which Kafka topics can be created.

4.6 config files

config files are zipped inside sensor type registration/ sensor instance registration/ controller type registration/ controller instance configuration based upon the type of config file.

5 Interaction between this and other component

5.1 Sensor/Controller manager and Application manager

Sensor manager and Controller manager will get sensorid and controllerid respectively from the application manager which was generated upon registration of sensor and controller respectively on the platform.

5.2 Sensor/Controller manager and Node manager

An application instance running on a particular node may wish to communicate with the sensor manager and controller manager to send/ receive data stream to/from a particular/multiple sensors and controllers.

5.3 Sensor/Controller manager and Heart-beat manager

Sensor manager and controller manager will send continuous heartbeat message signal on regular interval of time.