Logo, company name

Description automatically generated

Assignment 2

Requirements

The clients of the energy distributor have installed smart meters for each device registered to measure its energy consumption. Each sensor sends data to a server periodically, in the form (timestamp, sensor\_id, measurement\_value), where timestamp is the time instance when the measurement was made and measurement\_value is the value of the energy counter measuring the total energy consumed by the device in kWh since the sensor was installed. Implement a system based on a message broker middleware that gathers data from the sensors and pre-processes them before storing them in the database. If the queue consumer application that preprocesses the data detects a measurement power peak that exceeds the sensor maximum threshold (i.e. sensor maximum value measure in kW defined in Assignment 1) it notifies asynchronously the client on its web interface. To compute a power peak, the instantaneous power in a measurement interval is computed by averaging the energy consumption and dividing the value to the time interval.

A Sensor Simulator will simulate a sensor that reads data from files (sensor.csv), one value at every 10 minutes. The module will contain a timer synchronized with the local clock. The module sends data in the form < timestamp, sensor\_id, measurement\_value > to the message broker. The timestamp is taken from the local timer, the measurement\_value is read from the file at the corresponding index, representing the energy measured in kWh, and the sensor\_id is unique to each instance of the Sensor Simulator and corresponds to the sensor ID associated to a device of a client from the Energy Database.

Java Spring Boot

Java Spring Framework (Spring Framework) is a popular, open source, enterprise-level framework for creating standalone, production-grade applications that run on the Java Virtual Machine (JVM).

Java Spring Boot (Spring Boot) is a tool that makes developing web application and microservices with Spring Framework faster and easier through three core capabilities:

1. Autoconfiguration
2. An opinionated approach to configuration
3. The ability to create standalone applications

React

React. js/React is an open-source frontend framework that is based on JavaScript, developed by Facebook, and best known for its virtual DOM feature. React. js is an open-source JavaScript library that is used for building user interfaces specifically for single-page applications. It's used for handling the view layer for web and mobile apps. React also allows us to create reusable UI components.

DB designGraphical user interface

Description automatically generated with medium confidence

Table Client (defined by ID, name, birth date, address)

Table Device(defined by ID, description, address, maximum\_energy\_consumption, average\_energy\_consumption)

Table Sensor (defined by ID, description, max\_value)

Table Users(defined by ID, name, password, role)

Table Monitored(defined by ID, sensor\_id, measurement\_value, timestamp)

UML Deployment diagram

Diagram

Description automatically generated

Sensor Simulator -jar

java -jar jarPath sensor\_id

Webography

<https://www.ibm.com/cloud/learn/java-spring-boot>

<https://www.youtube.com/watch?v=VlklL6TPlpw&ab_channel=CodeStepByStep>

<https://www.youtube.com/watch?v=-W0-vN6mk78&ab_channel=KindsonTheTechPro>

<https://www.codegrepper.com/code-examples/java/java+repeat+function+every+minute>

<https://www.baeldung.com/java-csv-file-array>

<http://theblasfrompas.blogspot.com/2013/02/json-messages-with-rabbitmq.html>

<https://www.cloudamqp.com/docs/java.html>