MINISTRY OF EDUCATION

TECHNICAL UNIVERSITY
OF CLUJ-NAPOCA, ROMANIA
FACULTY OF AUTOMATION AND COMPUTER SCIENCE
COMPUTER SCIENCE DEPARTMENT

# DISTRIBUTED SYSTEMS

## Project

# Integrated Energy Management System

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# 1. Requirements

Consider the architecture of the Energy Management System below:

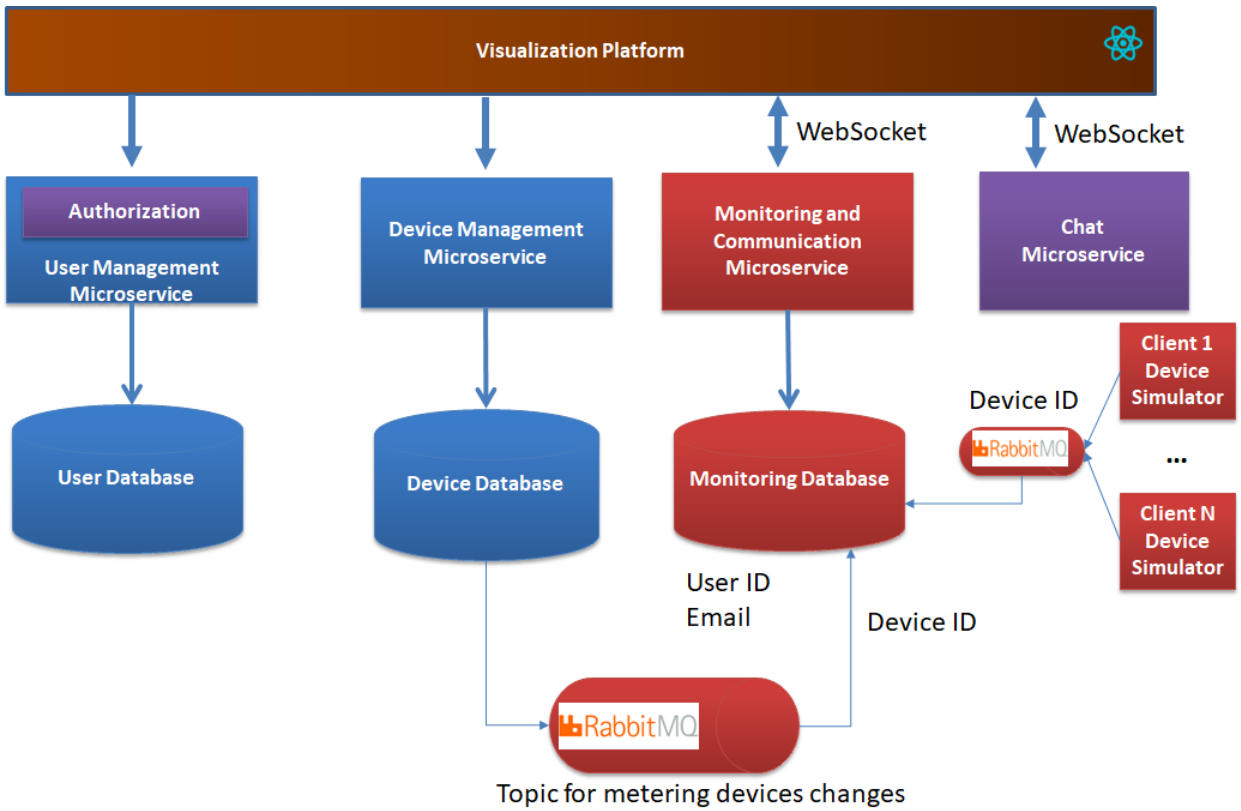


**Figure 1**. Conceptual architecture of the system

The project activity involves creating an integrated system by connecting the microservices developed during laboratory assignments, deploying them on a virtualized infrastructure, and ensuring security features are in place. Configure the network to enable proper communication among the dockerized components. Ensure secure communication using HTTPs, SSL, and JWT among these components.

## 1.1. Functional requirements:

- Will be taken from each laboratory assignment.

## 1.2. Implementation technologies:

Note that the way technologies are chosen during implementation of each laboratory work may impact the final project development and deployment. We recommend the following technology stack:

- Spring REST + Angular JS (or React JS)
- Hibernate + MySQL/PostgreSQL
- RabbitMQ
- JSR 356 or the Java API for WebSocket

- HTTPS and JWT over REST, SSL, WS Security
- Docker for resource virtualization

### 1.3. Non-functional requirements:

- Authentication and Authorization; End-to-End encryption
- Use of Message oriented Middleware systems and asynchronous communication

## 2. Evaluation

The project will be graded as follows:

| Points | Requirements |
|---|---|
| Evaluation 1 – Deploy of Assignment 1 – 10p | |
| **Requirements:**<br>• Code upload on Gitlab passing quality check.<br>• Deployment on Web Servers of applications (not running from IDE)<br>• The components from the Assignment 1 are dockerized and able to communicate over the network | |
| Evaluation 2 – Deploy of Assignment 2 – 10p | |
| **Requirements:**<br>• Code upload on Gitlab passing quality check.<br>• Deployment on Web Servers of applications (not running from IDE)<br>• The components from the Assignment 2 are dockerized and able to communicate over the network<br>• Load Balancing and Reverse Proxy | |
| Evaluation 3 – Deploy of Assignment 3 – 10p | |
| **Requirements:**<br>• Code upload on Gitlab passing quality check.<br>• Deployment on Web Servers of applications (not running from IDE)<br>• The components from the Assignment 3 are dockerized and able to communicate over the network<br>• Load Balancing and Reverse Proxy<br>• Security for each application:<br>• HTTPS and Tokens for Web Services<br>• SSL for RPC and Web sockets<br>• All components must work simultaneously and communicate over the network. | |
| Bonus for 1 extra point at final exam | |
| • Configuration of a CI/CD pipeline by integrating the GitLab repository with Docker Registry and public cloud for hosting and running docker images<br>• Deployment on public cloud in Docker for all components of the lab assignments. | |

***Note: - Each week of delay causes a penalty of 1 point to the corresponding evaluation**