

MINISTRY OF EDUCATION AND RESEARCH



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**TECHNICAL UNIVERSITY**  
OF CLUJ-NAPOCA, ROMANIA

# **DISTRIBUTED SYSTEMS**

## **ASSIGNMENT 1**

### **Online Energy Utility Platform**

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## **I. Assignment Objective**

The aim of this project is to create a system for an online energy utility platform designed to manage clients and their associated devices which are equipped with smart sensors monitoring energy consumption. The system allows two types of users: administrator and clients. The administrator can add new clients, new devices and new measurements and assign devices and measurements to each client. The device usually is an object which is equipped with a smart power meter which register different measurements. The consumption is defined as kWh. As a client, we can view our associated devices and measurements and also an history under a graph form on a specific day for a given day.

## **II. Functional and Nonfunctional Requirements**

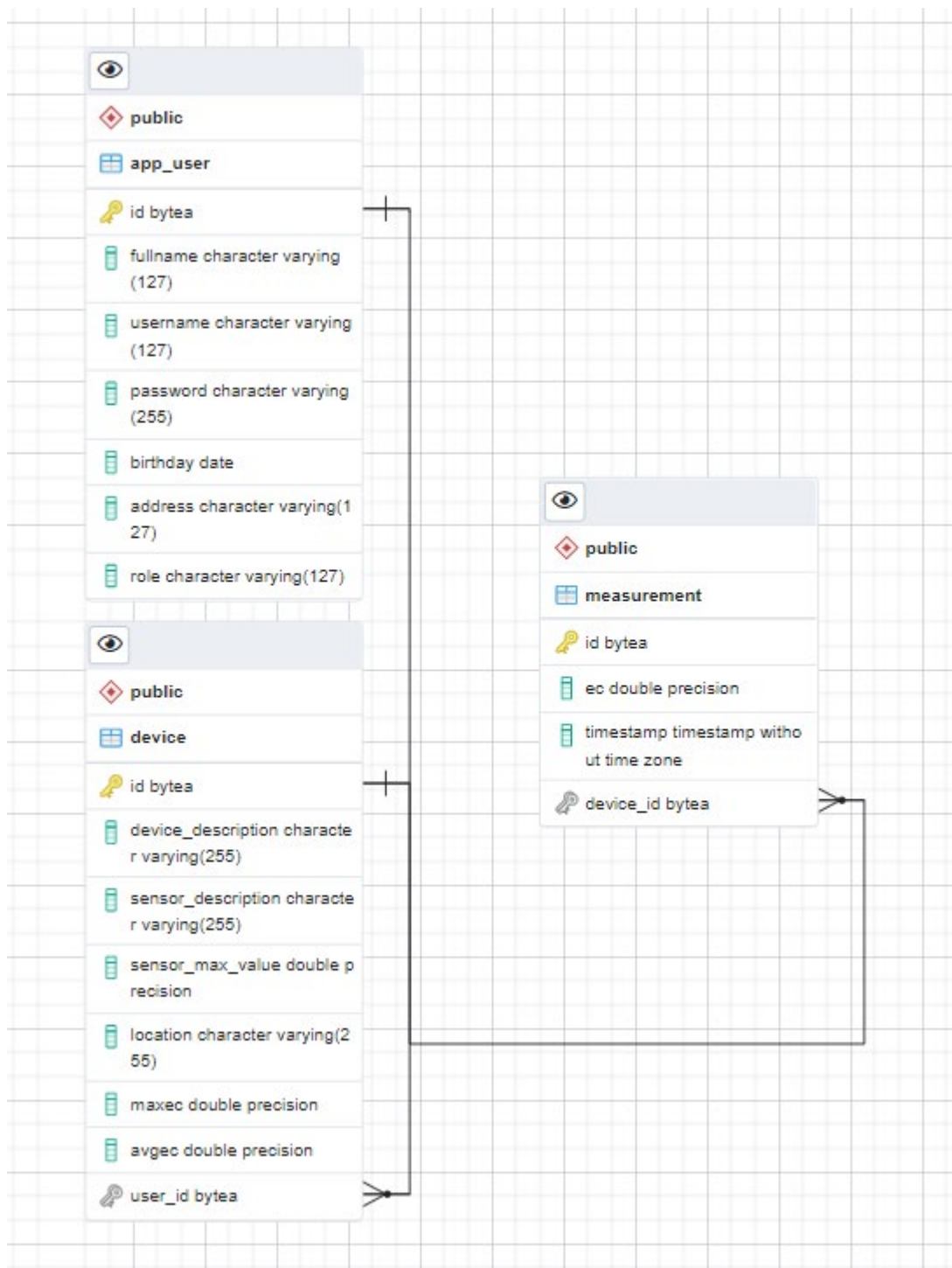
- User log-in with redirect to their page
- Admin:
  - CRUD on clients, devices, measurements
  - Map client-to-device and measurement-device
- Client:
  - View all the devices and measurements
  - View monitored energy consumption (current data and historical
    - The historical data displayed as a line char for a given day (Ox-time, Oy- consumption)
- Security – implemented JWT

## **III. Design and Implementation**

For developing this system we have decided to use the following technologies:

- REST services for backend application – Java Spring
- Frontend – React
- For database – Postgres
- Deployment – Heroku

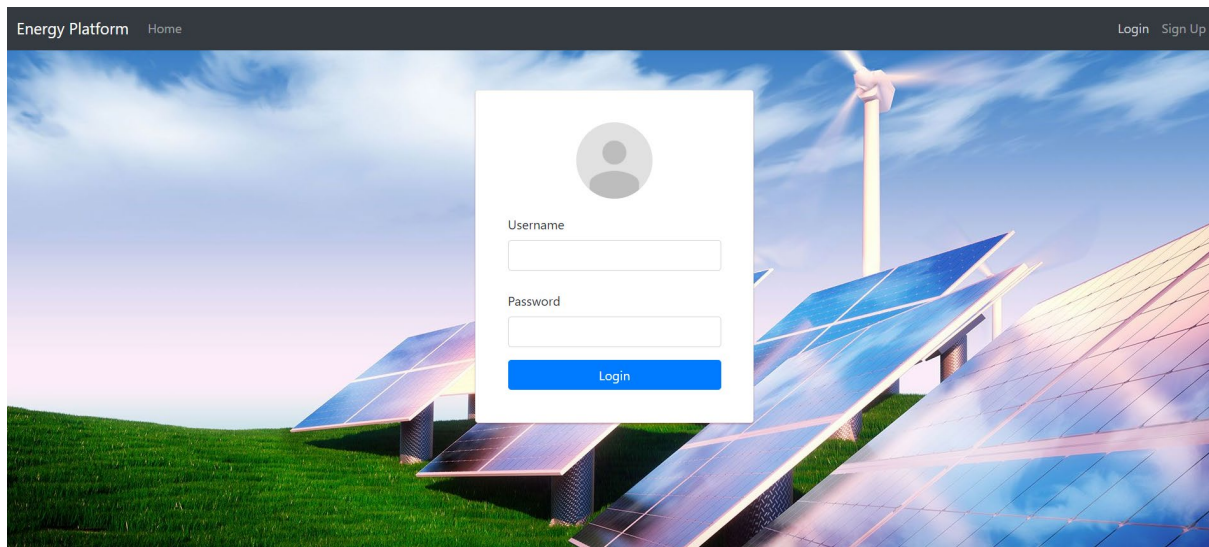
Taking into consideration that we have the following entities – users, devices, measurements our database looks like the following. We can see that between devices-user and measurement-device we have a one-to-many relationship, as a client can have more devices and each device can have many measurements.



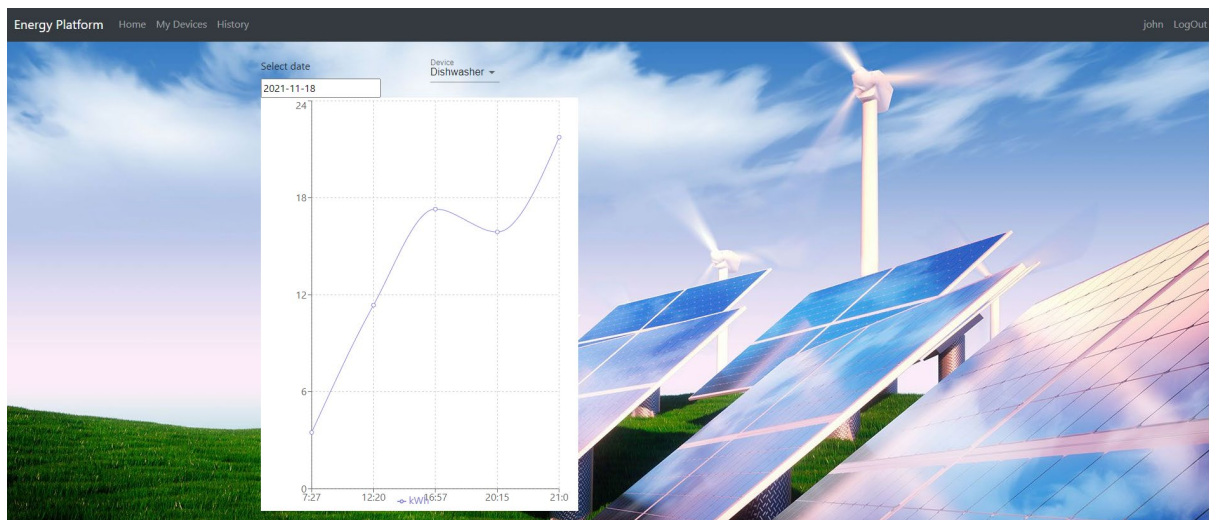
Regarding the backend we have used the normal layered architecture for creating our REST services, including: controllers, services, repositories and DTOs.

For the frontend we have used react and this is how our application looks like.

- Login page



- Client history



## IV. Conclusions

This project proved to be a difficult challenge because there was no previous experience working on such a scale. Many difficult aspects were faced like implementing JWT security, deployment and CI/CD on Heroku as well as the most time-consuming part was building the front UI in React.

The time management and organization were a difficult part for me, because I stumble upon things for many hours. However, in the end I believe I received a lot of new experience about these aspects, but the project is very far from being a successful one, even if everything works accordingly.

In conclusion, I believe that even with these drawbacks the experience gained from delivering this project (even as late deadline) proved to be a good and essential exercise.

## V. Bibliography

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