**Energy Consumption Application**

Presecan Alexandru

Group 30442

1. **General description**

The energy consumption management application is designed to keep track of user devices and their energy consumption. The energy consumption is measured each hour for every active device and will be stored in the database. The users will be able to visualize for each of their devices, the consumption during a specified day. The administrators will be able to see all the users and all the devices and will have the right to perform CRUD operations on them. A user-device mapping feature is also available for admins in order to easily assign devices to users.

1. **Architecture**

The application is composed of 3 interconnected components: database, backend, and frontend.

* **Database**

The database used is PostgresSQL and contains 3 relational tables: user, device, and energy consumption.

* **Backend**

The backend is created using Asp.NET and uses a layered architecture having the following components: controllers (presentation layer), services (business logic layer), data accessors (data access layer), and model classes.

For generating the database and creating migrations from the class models, I used the Entity Framework.

For security, a JWT library is used. The user will receive a JWT token when authenticating, which will be required in order to use any other backend endpoints. The endpoints will behave differently, depending on the token used, for example, creating an admin account will only be available for users with admin privileges.

**Diagram

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**Backend Layered Architecture Diagram**

* **Frontend**

The frontend is created using Angular and uses the common component conventions used by the framework. Other components used were services and models in order to communicate with the backend.

For creating the graphs displaying the energy consumption of a device, the devextreme library is used.

For storing the current user data and token in cookies, the ngx-cookie-service is used.

**Diagram

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**Application Architecture Diagram**

1. **Database design**

The database contains 4 tables: one used for Asp.NET Entity Framework migrations, and 3 relational tables which are used for the Energy Consumption Application. These tables are user, device, and energy consumption. Between the user and the device, we have a one-to-many relationship, and, between the device and the energy consumption, we also have a one-to-many relationship.

A picture containing box and whisker chart

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**Database Diagram**

1. **UML deployment diagram**

Diagram

Description automatically generatedEach of the 3 components runs on a different container under the same docker repository.

**Deployment Diagram**

**Graphical user interface, text, application

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**The containers running in docker**