Fullstack Engineer Home Assignment - LeanCon

Goal

Build a web application that processes an IFC (Industry Foundation Classes) file to display a 3D model of a building and provide a breakdown table of element types and their quantities by building levels. This task aims to simulate real work scenarios at LeanCon, combining 3D model visualization with data extraction and frontend/backend coordination.

Task Description

You are provided with **two IFC files**:

- **Base structure** – the main building skeleton (**mandatory**).
- **System model** – representing building systems (**optional, for bonus**).

Your task is to build the application based on the base structure file only.
You may also process the system model file as a **bonus**, using the same functionality and structure described below.

You are required to develop a web application with the following functionalities:

- **3D Model Visualization:**
  - Given a provided IFC file, the application should display a 3D interactive model of the building.
  - Users should be able to navigate and interact with the 3D model (e.g., pan, zoom, rotate).
- **Element Quantity Table:**
  - Below the 3D model, a table should display information about different building element types.
  - **Table Rows:** Each row in the table represents a unique element type, defined by its name and size.
  - **Table Columns:**

        - **Unit of Measure:** The unit of measure for the element type (e.g., meters, square meters, inch).
        - **Total Amount in Project:** The total quantity of elements of that type across the entire project.
        - **Total Amount in Level (per level):** For each building level, display the aggregated quantity of that element type **expressed in its unit of measure**. For example, if the unit of measure is cubic meters (m^3), the value under each level should represent the total volume (in m^3) of that element type within that level. Elements are considered "in a level" if they are located between the floor and ceiling of that level.
- **Interactive Highlighting:**
    - **Highlight by Element Type:** When a user clicks on a specific element type (header of a row) in the table, all elements of that type should be highlighted in the 3D model.
    - **Highlight by Level:** When a user clicks on a specific level (header of a column) in the table, all elements within that level should be highlighted in the 3D model.

Technical Stack

- **Backend:** Python
- **Frontend:** React

You are encouraged to use any additional libraries or frameworks within these technologies that you believe will aid this assignment.

Submission Guidelines

- Please provide a PDF file explaining your approach and choices, along with your source code and clear instructions on how to set up and run your application.
- We encourage you to ask any questions you may have throughout the assignment.