**Project Steps Explanation**

**Step 1: Organized and Modeled the Data**

* **Objective:** Grouped the detectors by constituency and designed a normalized Entity Relationship (ER) model to represent all data items.
* **Details:** Ensured the model is a "no loss" model, meaning all entities retained all attributes from derived entities. Clearly defined and enumerated all relationships.

**Step 2: Forward Engineered the ER Model to a MySQL Database**

* **Objective:** Used MySQL Workbench and/or PhpMyAdmin to create the required tables and fields based on the ER model.
* **Details:** Defined all primary and foreign key attributes and ensured all fields had appropriate data types.

**Step 3: Cropped and Cleansed the Data**

* **Objective:** Refined the dataset for analysis.
  + Cropped the dataset to include data from 1st January 2015 onwards.
  + Cleansed the cropped dataset to ensure all dates fell between 1st January 2015 and 22nd October 2023.
* **Bonus:** Accomplished the above tasks using PYTHON code for additional learning.

**Step 4: Populated the MySQL Database Tables**

* **Objective:** Imported the cropped and cleansed dataset into the MySQL database.
* **Details:** Used PhpMyAdmin’s “import CSV” feature or MySQL's “LOAD DATA INFILE” statement.

**Step 5: Designed, Wrote, and Ran SQL Queries**

* **Objective:** Created and tested the following SQL queries:
  + Retrieved the date/time, station name, and the highest recorded value of nitrogen oxide (NOx) for the year 2022.
  + Calculated the mean values of PM2.5 and VPM2.5 by each station for 2022 for readings taken around 08:00 hours.
  + Extended the previous query to show these values for all stations for all data.

**Step 6: Modeled, Implemented, and Queried a Selected NoSQL Database**

* **Objective:** Modeled the data for a specific monitor (station) to a NoSQL data model (key-value, xml, timeseries, or graph).
* **Details:** Implemented the selected database type/product and imported a small sample of the data. Implemented an example query and provided a screen capture of the output.

**Key Takeaways**

This project helped me develop a deeper understanding of data management fundamentals, including:

* Practical application of the relational model and SQL for structuring and querying data.
* Implementation of data models and schemas in MySQL.
* Handling and processing real-world data sets for analysis.
* Exploring NoSQL databases and understanding their use cases compared to relational databases.
* Writing and formatting technical reports using markdown syntax.

This project not only enhanced my technical skills but also provided practical insights into data management processes, making it a valuable learning experience.