

Extreme Weather Conditions and Real- Time Alerting

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Big Blue
DATA ACADEMY

Who we are

Katerina Psallida



Work Experience

- Digital Sales for Data & AI Products
- Marketing Professional
- SAP Netweaver / Basis Technical Consultant

Studies

- Data Science Bootcamp
- Professional Diploma in Data Analytics
- MSc Computational Physics
- BSc Physics

Dimitris Kasseropoulos



Work Experience

- Data Engineer & Operations
- Operations Analyst

Studies

- MSc Data Science
- BSc Physics

The Agenda

- 01 The Project Mission
- 02 The Technologies implemented
- 03 The Methodology
- 04 The Results
- 05 The Conclusion & Future Work



01

The Project Mission

The Project Mission : Agriculture & Farming



Helping farmers make data-driven decisions—when to irrigate, when to harvest, and when to take preventive measures.



Providing real-time alerts for weather conditions (frost, heatwaves, heavy rainfall).



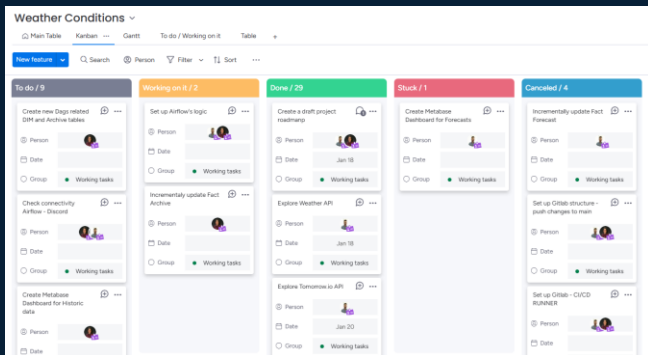
Analyzing historical weather patterns to predict risks and plan crop cycles efficiently.



02

The Technologies implemented

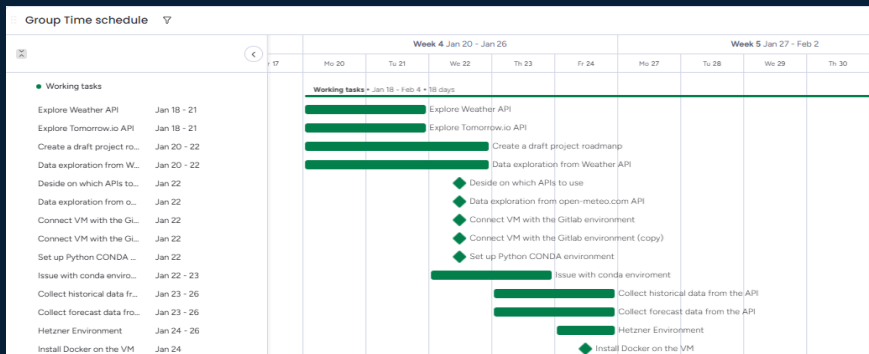
The technologies behind the project: Collaboration



Kanban Board



Code Versioning



Gantt Chart

The Technologies behind the project

HETZNER 



SQL



 pandas



docker



Apache
Airflow



The Technologies implemented : APIs



Open-Meteo
Data since 1940 ● 16 day ahead forecast



National Centers for Environmental Information
Information about the Weather Code



Nominatim
Find city coordinates with an easy to use API

01-01-2020 ● 31-01-2025

25 Cities in Greece

28 weather codes

1.2 million Rows of Hourly
Historical Data

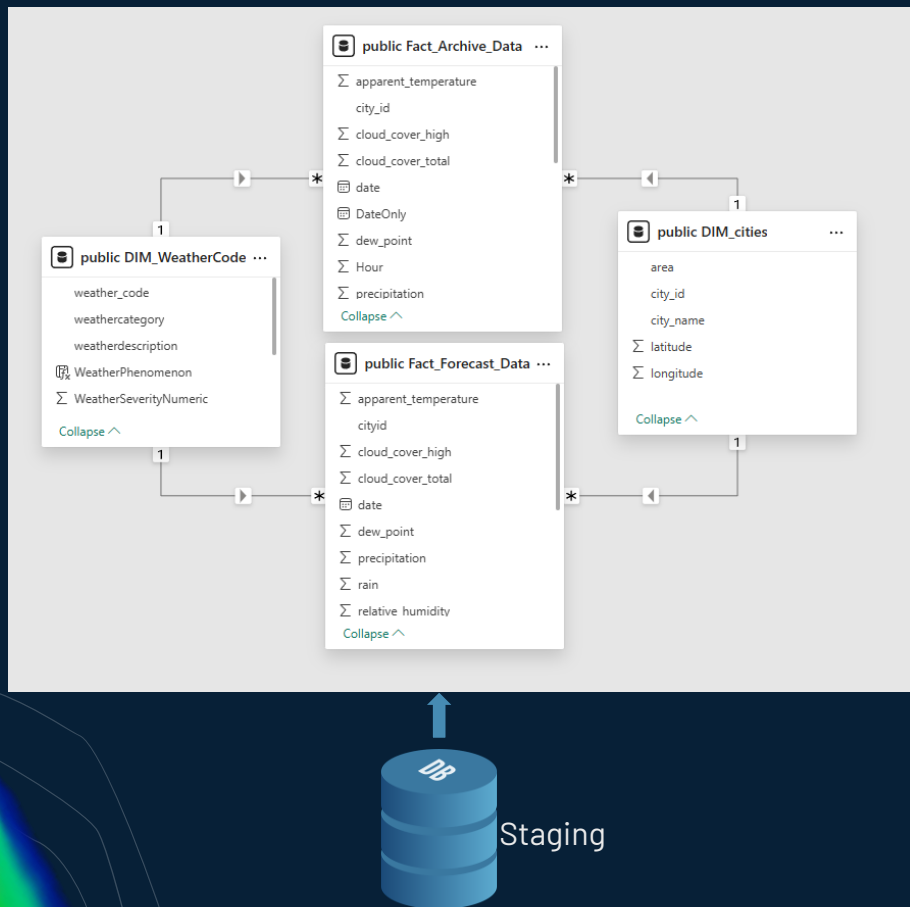
10 K Forecast
Records

The background is a dark blue map of the world, centered on the Atlantic Ocean. Overlaid on the map are several heatmaps and contour lines. A large, irregularly shaped heatmap is visible in the upper right, showing a gradient from blue to green to yellow. To its right, there are two smaller, more circular heatmaps, one of which is predominantly red and yellow. In the lower left, another circular heatmap is visible, also showing red and yellow colors. Contour lines are drawn across the map, following the general shape of the continents and the distribution of the heatmaps.

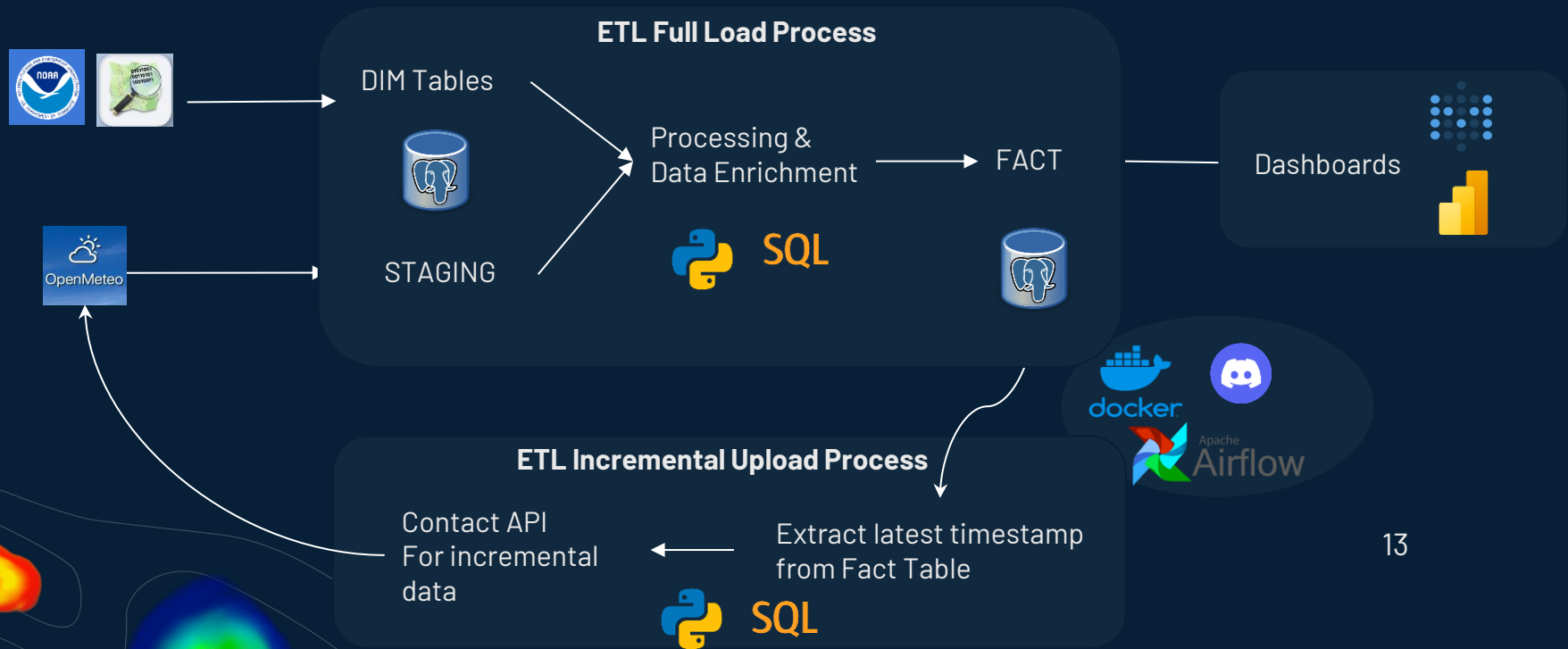
03

The methodology

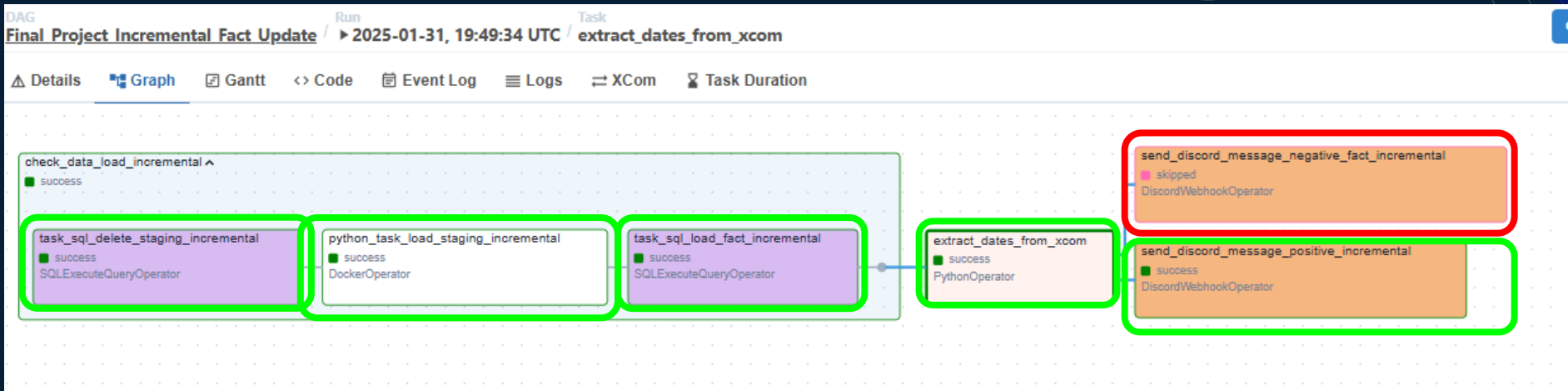
The Methodology: The data model



The methodology: The Data Flow for Historical Analysis



The methodology: AIRFLOW orchestration - Historical



The methodology: AIRFLOW Load Alerts



Airflow Alert **APP** Today at 6:14 μμ

Failure Alert! Incremental Upload of FACT Table 🚨

◆ **DAG:** Final_Project_Incremental_Fact_Update

◆ **Execution Date:** 2025-02-02

Please check Airflow DAG logs for details! ⚠️



Success! Incremental Upload of FACT Table 🎉

◆ **DAG:** Final_Project_Incremental_Fact_Update

◆ **Execution Date:** 2025-02-02



Dates Loaded:

Start Date: 2025-01-25

End Date: 2025-01-30

Rows Updated: 3600



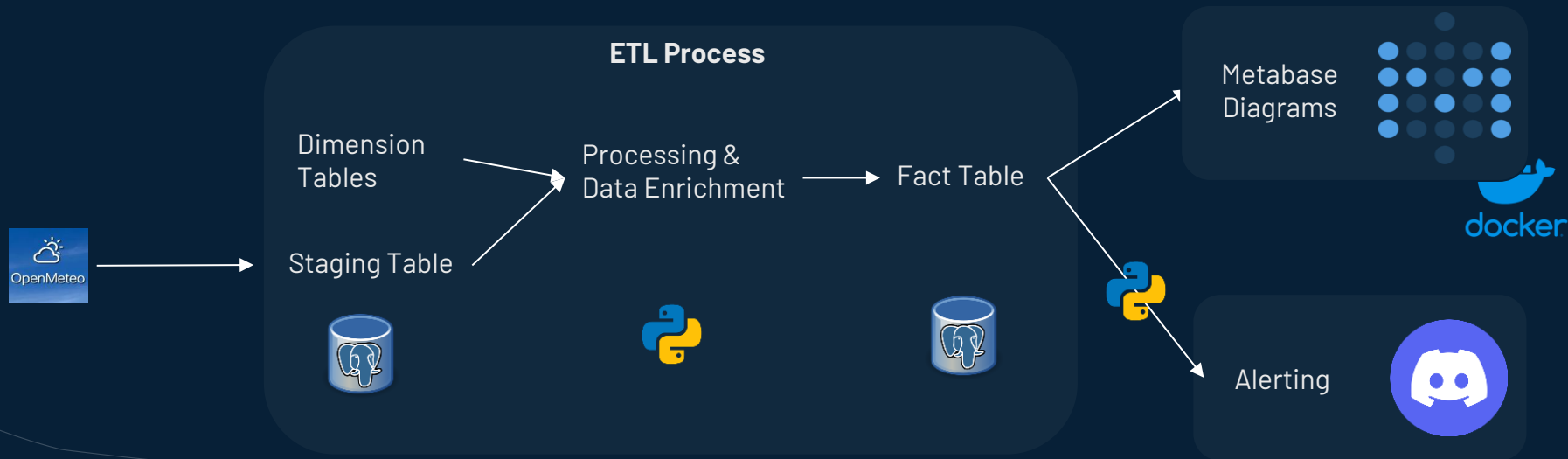
All tasks completed successfully!



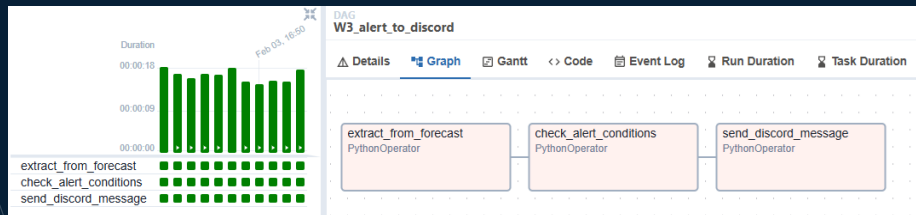
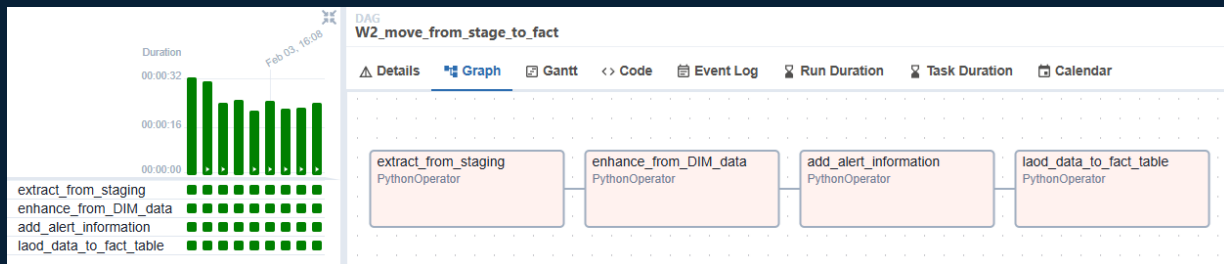
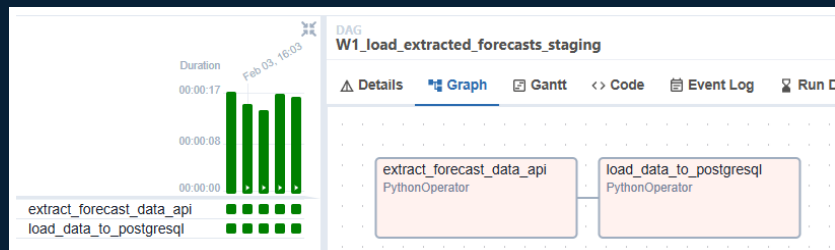
Message #airflow-notify



The methodology: Data Flow for Forecasting & Alerting



The methodology: AIRFLOW orchestration - Forecast



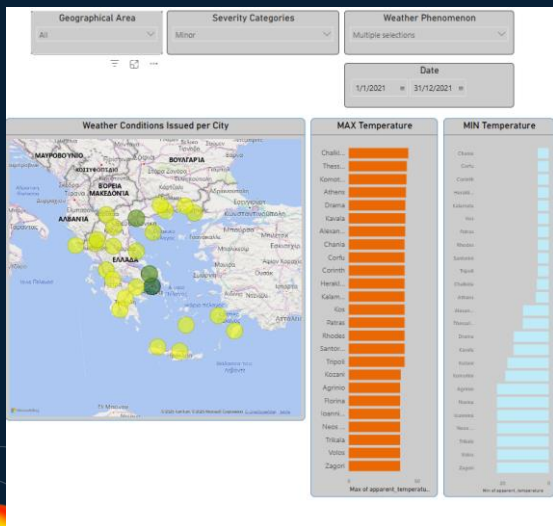


Ø4

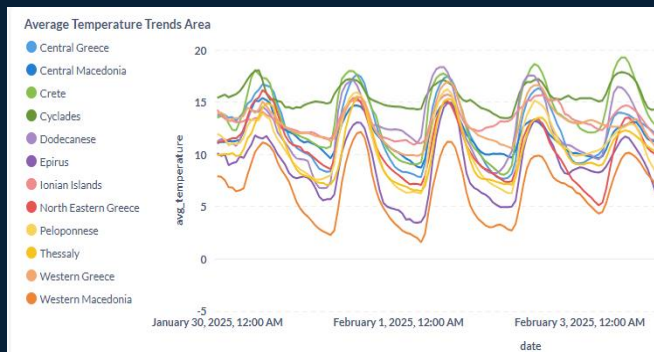
The Results

The Results

Power BI Dashboards



Metabase Diagrams



[Metabase Link](#)

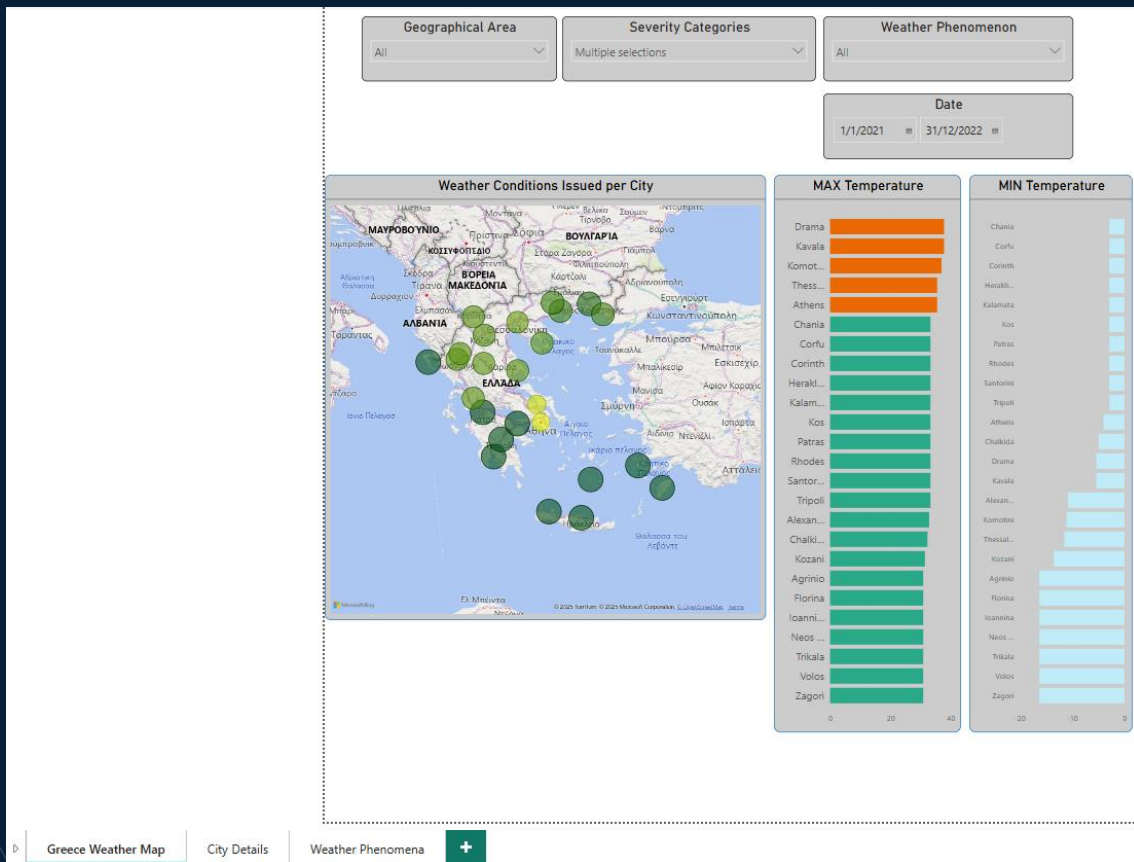
Discord Alert messages

The Alerts for the next 16 days

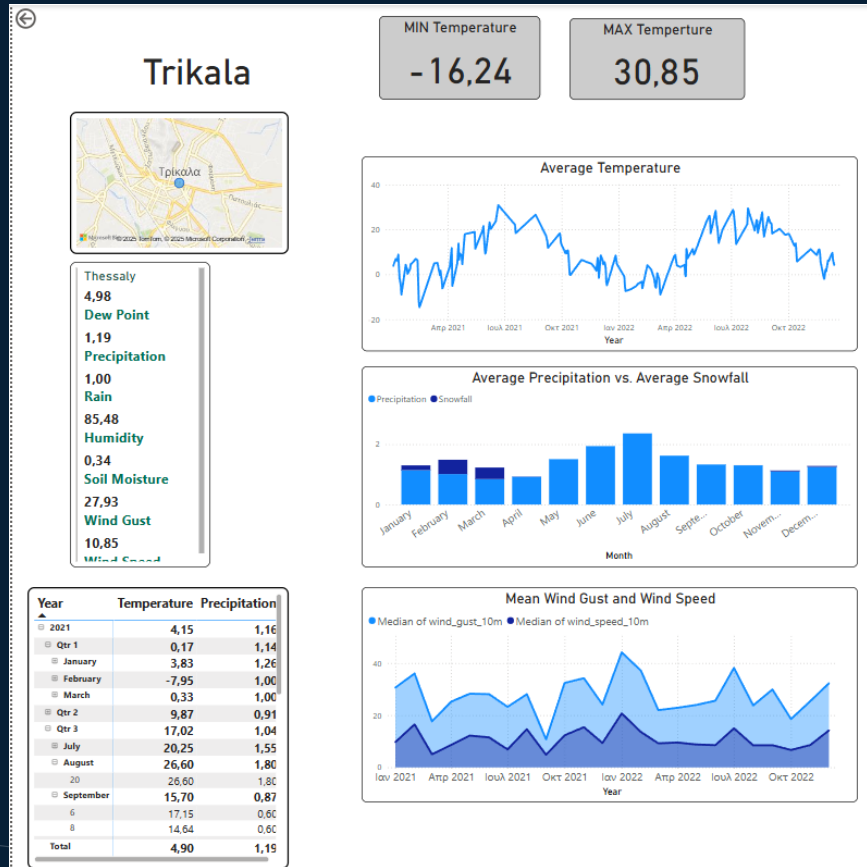
	city_name	date	type_of_alert	weathercategory
0	Agrinio	31/01/2025	cold	Minor
1	Alexandroupoli	03/02/2025	cold	Minor
2	Athens	31/01/2025	cold	Minor
3	Chalkida	31/01/2025	cold	Minor
4	Chania	13/02/2025	cold	Minor
5	Corfu	14/02/2025	cold	Minor
6	Corinth	13/02/2025	cold	Minor
7	Drama	31/01/2025	cold	Minor
8	Florina	31/01/2025	cold	Minor
9	Heraklion	12/02/2025	cold	Minor
10	Ioannina	31/01/2025	cold	Minor
11	Kalamata	31/01/2025	cold	Minor
12	Kavala	14/02/2025	cold	Minor
13	Komotini	13/02/2025	cold	Minor
14	Kozani	31/01/2025	cold	Minor
15	Patras	30/01/2025	cold	Minor
16	Rhodes	31/01/2025	cold	Minor
17	Thessaloniki	03/02/2025	cold	Minor
18	Trikala	05/02/2025	cold	Minor
19	Tripoli	31/01/2025	cold	Minor
20	Volos	31/01/2025	cold	Minor

Please visit link:<http://4.231.126.217:3000/public/dashboard/b2d5d23c-75e7-413f-a8ca-d786bd8405b1> for more information

Power BI – Central Dashboard



Power BI – Drill Through “City Details”

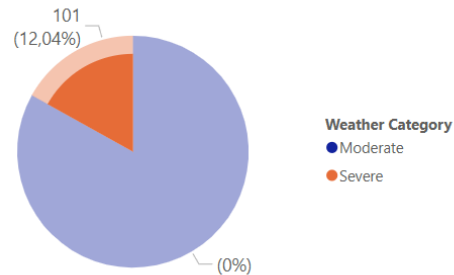


Power BI – Drill Through “Weaahter Phenomena”

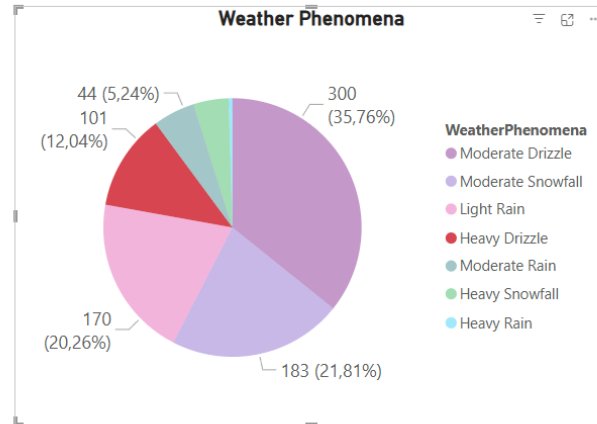


Trikala

Weather Categories



Weather Phenomena





Ø5

The Conclusions and Future Work

The Conclusions & Future Work



Utilize data from more sources



Implement Email alerting



Include more cities and rural areas in the model



Design the architecture to be more scalable and automated

- CI/CD
- DAG triggering



Incorporate more error handling scalability and fault tolerance

Θενξ !

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