⛈️ Weather Forecast Dashboard Using Power BI and WeatherAPI

1. Project Overview

This project focuses on building an **interactive weather forecast dashboard** using **Power BI** and real-time data from **WeatherAPI**.
 The dashboard provides weather insights such as temperature, air quality, and forecast conditions for multiple cities, presented in both **Light Mode and Dark Mode** views for better user experience.

The goal of this project is to demonstrate:

- API data integration

- Data transformation using Power Query

- Data modeling best practices

- DAX calculations

- Interactive report design in Power BI

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2. Data Source

The data for this dashboard is obtained from the **WeatherAPI Forecast endpoint**.

API Features Used:

- City-based weather search

- Daily weather forecast

- Air Quality Index (AQI) data

- Weather conditions and astronomy details

The API returns data in **JSON format**, which includes nested structures such as:

- Location information

- Forecast days

- Air quality metrics

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3. Data Import and Transformation

3.1 Connecting to the API

The API endpoint is connected to Power BI using the **Web connector**.
Query parameters such as city name, forecast days, AQI, and alerts are passed through the URL.

3.2 Power Query Transformations

Since the API response is nested, several transformation steps were applied:

- Expanded `location` data to extract:

    - City name

    - Region

    - Country

    - Latitude and longitude

- Expanded `forecast.forecastday` list to create:

    - One row per city per day

- Further expanded nested fields like:

    - Daily temperature values

- ○ Weather condition details

  - ○ Air quality metrics

- Converted text-based numeric fields into proper **decimal numbers**

- Renamed columns for readability

These steps ensured the dataset followed a **tabular, analysis-ready structure**.

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4. Data Modeling

The project follows a **clean data model** approach:

- Forecast data acts as the **fact table**

- City and date attributes are used for filtering and slicing

- Relationships are based on the Date and Location fields

This structure allows efficient filtering and accurate calculations across visuals.

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5. DAX Calculations

Several DAX measures were created to enhance analysis and visualization:

5.1 Air Quality Color Logic (PM10 Example)

DAX logic was used to assign color codes based on PM10 air quality levels.
These color values are used in **conditional formatting** to visually represent air quality severity.

5.2 Weekday Sorting

To ensure weekdays appear in chronological order:

- A weekday number column was created

- The weekday name column was sorted using **Sort by Column**

This ensures slicers display days from Monday to Sunday correctly.

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6. Dashboard Design

6.1 Light Mode and Dark Mode Pages

The dashboard includes two separate pages:

- **Light Mode**

- **Dark Mode**

Both pages contain identical visuals and layout, differing only in:

- Background colors

- Visual styling

- Text contrast

This improves accessibility and user preference.

6.2 Navigation Buttons

Two circular buttons were added:

- **Orange circle** → Light Mode

- **Blue circle** → Dark Mode

Each button uses **Page Navigation** to switch between pages.
 Inactive buttons are visually muted to indicate the current mode.

6.3 Interactivity

- Slicers for city and date selection

- Synced slicers across both pages

- Hover tooltips and responsive visuals

- Conditional formatting for AQI values

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7. Key Learnings

Through this project, the following skills were developed:

- Working with REST APIs in Power BI

- Handling nested JSON data

- Using Power Query for transformation

- Writing DAX measures for logic and formatting

- Designing professional dashboards

- Implementing light/dark mode navigation

- Understanding slicers, filters, and context

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8. Conclusion

This Weather Forecast Dashboard demonstrates how **Power BI can be used with live API data** to create dynamic, visually engaging reports.
 The project combines data engineering, analytics, and design principles to deliver meaningful insights in a user-friendly format.

This dashboard can be further extended by:

- Adding more cities

- Including historical weather trends

- Automating refresh schedules

- Publishing to Power BI Service

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9. Tools Used

- Power BI Desktop

- WeatherAPI

- Power Query

- DAX