***Problem Statement:***

Designing a real-time weather monitoring and analysis system. The system should gather weather data from various locations, store it efficiently, and provide analytical insights to users.

***Functional Requirements:***

**Data Collection:**

* Utilize a weather data API (e.g., OpenWeatherMap) to obtain real-time weather information for various locations.
* Store weather data efficiently in the Weather\_Data table, ensuring data integrity and consistency.

**Data Analysis:**

* Develop SQL queries to display real-time weather conditions for different locations.
* Calculate trends and patterns in weather data over time (e.g., hourly temperature changes, monthly precipitation trends).
* Integrate weather data with forecasting models to visualize potential future weather conditions.
* Utilizes advanced SQL features such as joins, window functions, subqueries, and common table expressions (CTEs) for complex analysis tasks.
* Implement features to calculate and display weather metrics such as average temperature, total precipitation, and highest wind speed for each location.

**Data Maintenance:**

* Implement mechanisms to periodically fetch new data from the weather data API and update the database accordingly.
* Ensure data consistency and accuracy by handling errors and exceptions during data retrieval and storage processes.

***Databases Schema***

***Locations Table:***

* **location\_id (Primary Key)**: Unique identifier for each location.
* **location\_name:** Name of the location.
* **latitude:** Latitude coordinate of the location.
* **longitude:** Longitude coordinate of the location.

**Weather\_Data Table:**

* **data\_id (Primary Key):** Unique identifier for each weather data entry.
* **location\_id (Foreign Key):** Reference to the location the data belongs to.
* **timestamp:** Timestamp of the weather data entry.
* **temperature:** Temperature recorded at the location.
* **humidity:** Humidity level recorded at the location.
* **precipitation:** Precipitation amount recorded at the location.
* **wind\_speed:** Wind speed recorded at the location.
* **weather\_condition:** Description of the weather condition (e.g., sunny, rainy, cloudy).