Project Design Phase

Solution Architecture

Date	1 March 2025
Team ID	PNT2025TMID00740
Project Name	Global Food Production and Trend analysis
Maximum Marks	4 Marks

Solution Architecture:

Solution architecture is a complex process – with many sub-processes – that bridges the gap between business problems and technology solutions. Its goals are to:

- Find the best tech solution to solve existing business problems.
- Describe the structure, characteristics, behaviour, and other aspects of the software to project stakeholders.
- Define features, development phases, and solution requirements.
- Provide specifications according to which the solution is defined, managed, and delivered.

Architecture Overview:

The project leverages **Power BI** for data visualization and analytics to study global food production trends from 1961 to 2023. The architecture consists of:

1. Data Sources:
    - FAO and other global food production datasets (CSV, Excel, SQL databases)
    - Public APIs for agricultural production statistics
    - Historical datasets manually processed for trend analysis
2. Data Processing & Transformation:
    - Data cleaning and transformation using **Power Query** in Power BI
    - Creating relationships between various datasets (commodities, regions, years)
    - Aggregating data for insightful reporting
3. Data Modeling & Storage:
    - Data is structured and stored in **Power BI's in-memory model**
    - Measures and calculated columns created using **DAX (Data Analysis Expressions)**
4. Visualization & Reporting Layer:
    - Power BI Dashboards & Reports featuring:
        - Gauge Charts (Tea production analysis)
        - Bar & Stacked Charts (Fruit & coffee production comparison)
        - Area Charts (Trends of wheat, maize, and rice over time)
        - Donut Charts (Maize production distribution)
    - Interactive filtering by year, region, and commodity
5. Deployment & Accessibility:

- Hosted on **Power BI Service** for real-time data access
- Reports shared via **Power BI Embedded & Power BI Mobile** for accessibility

6. Scalability & Future Enhancements:
   - Integration with real-time data sources via **APIs**
   - Expansion to include more agricultural commodities and regional insights

Example - Solution Architecture Diagram:

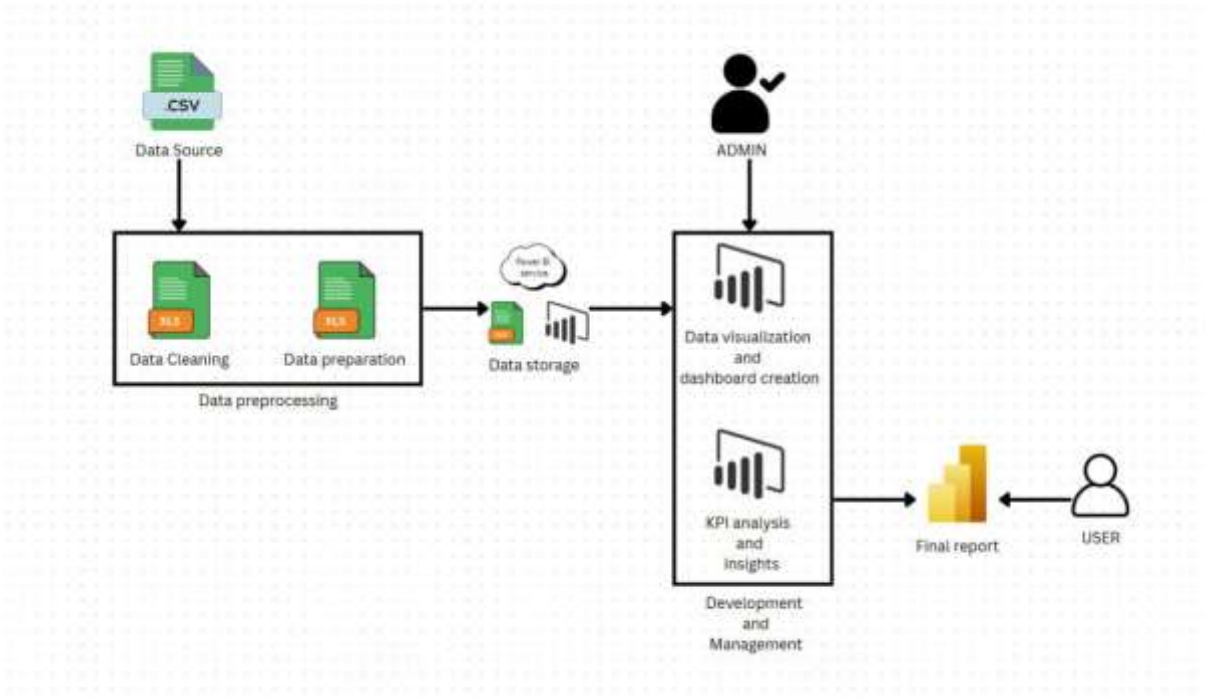

Figure 1: Architecture and data flow of the Global food production analysis system