

## Project Design Phase

### Solution Architecture

Date	13 March 2025
Team ID	PNT2025TMID02840
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:

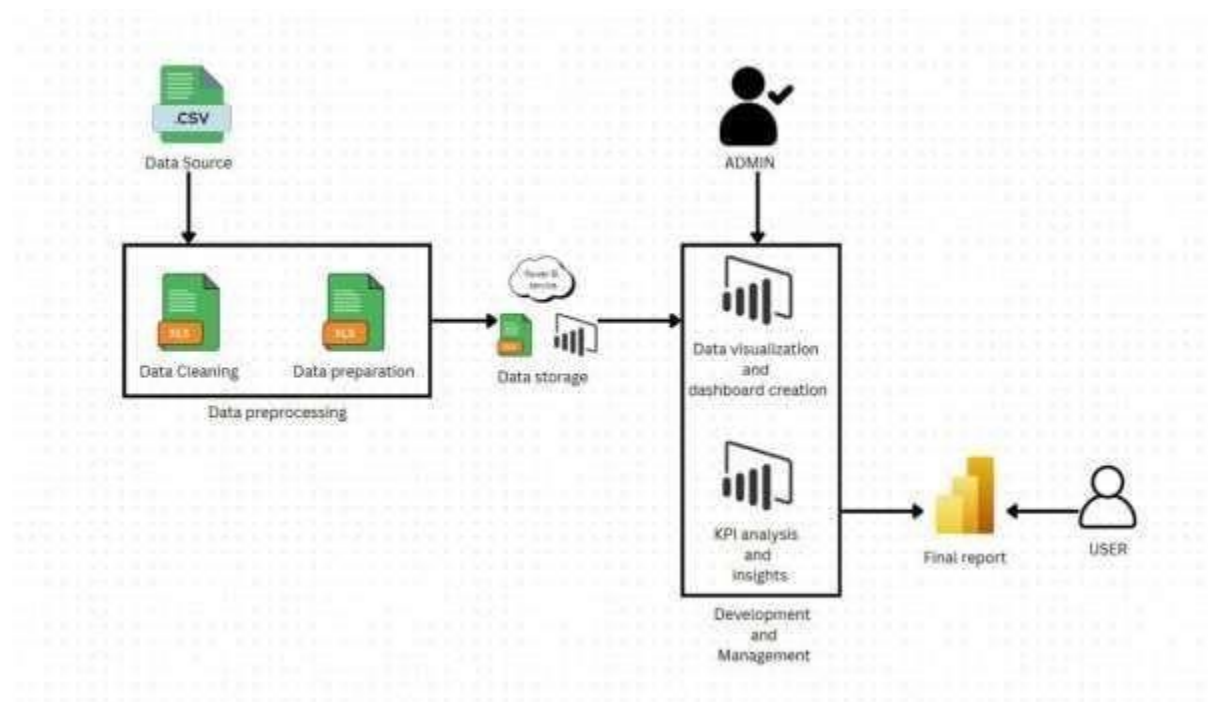


Figure 1: Architecture and data flow of the Global food production analysis system