

Project Design Phase-II
Technology Stack (Architecture & Stack)

Date	31 January 3035
Team ID	PNT2025TMID04678
Project Name	Global Food Production Trends and Analysis (1961-2023) using Power BI
Maximum Marks	4 Marks

Table-1 : Components & Technologies:

S.No	Component	Description	Technology
1.	User Interface	Interactive dashboards for data exploration and insights visualization.	Power BI, Web UI, React.js
2.	Application Logic-1	Data extraction and transformation	Python , Pandas, SQL
3.	Application Logic-2	Data aggregation and trend analysis	Power BI DAX, SQL Queries
4.	Application Logic-3	Forecasting and ML model integration	Scikit-learn, TensorFlow, AutoML
5.	Database	Stores historical and real-time food production data	MySQL, PostgreSQL, NoSQL (MongoDB)
6.	Cloud Database	Cloud-based database service	Azure SQL, Google BigQuery, AWS RDS
7.	File Storage	Stores large datasets (CSV, JSON, etc.)	Azure Blob Storage, AWS S3
8.	External API-1	Fetches real-time weather & climate data	OpenWeather API, NOAA API
9.	External API-2	Retrieves agricultural and trade data	FAO API, World Bank API
10.	Machine Learning Model	Predicts food production trends and shortages	Time Series Models, LSTMs, XGBoost

11.	Infrastructure (Server / Cloud)	Deployment of dashboards and ML models	Azure, AWS, Google Cloud, Kubernetes
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Table-2: Application Characteristics:

S.No	Characteristics	Description	Technology
1.	Open-Source Frameworks	Open-source tools or frameworks used in data processing and visualization.	Power BI, Python (Pandas, NumPy), Jupyter Notebook, DAX, SQL
2.	Security Implementations	Security measures for data integrity, access control, and report sharing.	Role-based access control (RBAC), Data Encryption (AES-256), Microsoft Defender for Cloud, Power BI Row-Level Security (RLS)
3.	Scalable Architecture	Scalable architecture for handling large datasets from 1961 to 2023 across multiple sources.	Azure Data Lake, Power BI Premium, SQL Server, Data Pipelines (ETL using Python, Azure Data Factory)
4.	Availability	Ensuring data availability through cloud integration and distributed computing.	Power BI Service, Azure SQL Database, Cloud Storage (OneDrive, SharePoint), On-Premises Gateway
5.	Performance	Optimization strategies for better dashboard performance, faster query execution, and real-time data processing.	Data Aggregation, Power BI Composite Models, Query Reduction Techniques, Power Query Optimization