Project Design Phase-II
Technology Stack (Architecture & Stack)
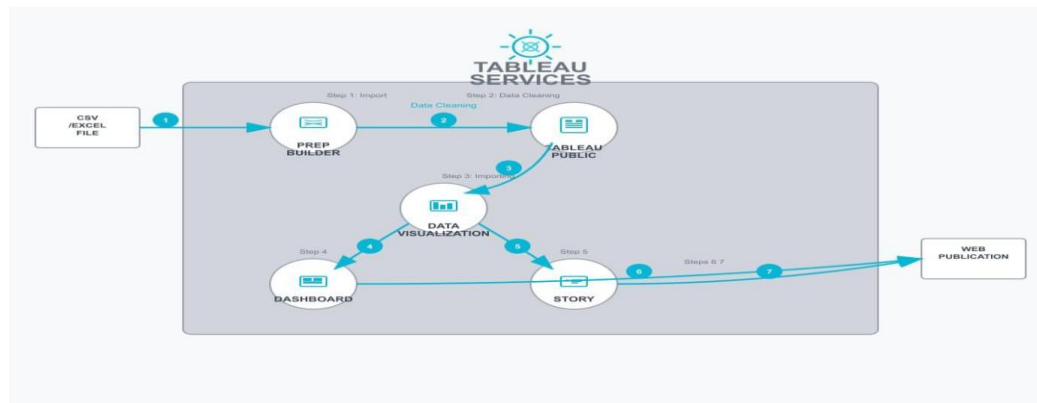
Date	23 june 2025
Team ID	LTVIP2025TMID47753
Project Name	Visualizing Housing Market Trends: An Analysis of Sale Prices and Features
Maximum Marks	4 marks

Technical Architecture – Housing Trends Visualization System

This system ingests and processes housing data from multiple sources (e.g., APIs like Zillow, Realtor, government census datasets), stores it in a central database, and presents it through an interactive dashboard using modern web technologies.
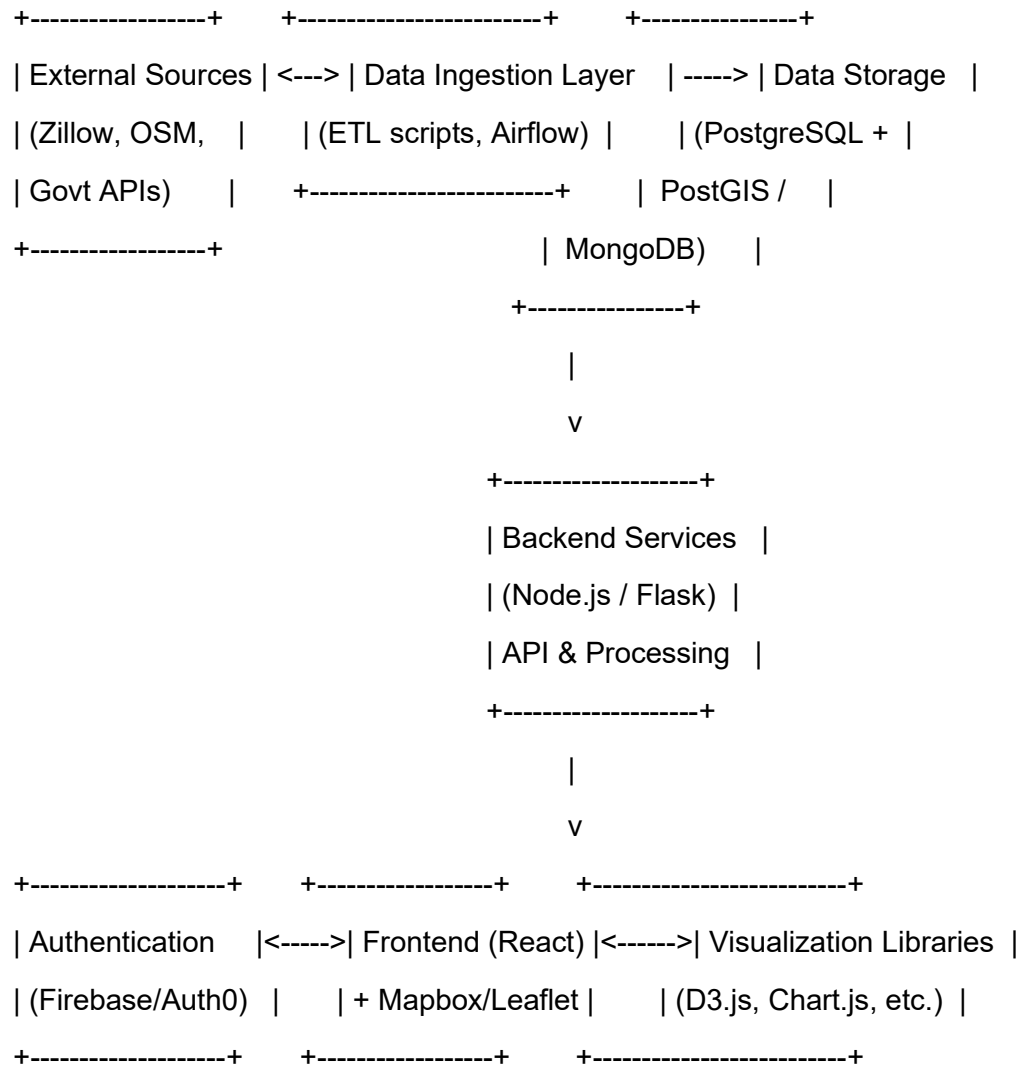
Technical Architecture:

Architectural Diagram

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+-----------------+      +----------------------+      +---------------+
| External Sources | <---> | Data Ingestion Layer  | -----> | Data Storage  |
| (Zillow, OSM,    |      | (ETL scripts, Airflow) |      | (PostgreSQL + |
| Govt APIs)       |      +----------------------+      |  PostGIS /    |
+-----------------+                                     |  MongoDB)     |
                                                        +---------------+
                                                                |
                                                                v
                                                        +------------------+
                                                        | Backend Services |
                                                        | (Node.js / Flask) |
                                                        | API & Processing  |
                                                        +------------------+
                                                                |
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+------------------+      +----------------+      +----------------------+
| Authentication   |<----->| Frontend (React) |<------>| Visualization Libraries |
| (Firebase/Auth0) |      | + Mapbox/Leaflet |      | (D3.js, Chart.js, etc.) |
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```

Table 1: System Components and Responsibilities

Component	Technology	Responsibility
Data Ingestion Layer	Python scripts / Apache Airflow	Collect and transform raw data from APIs
Data Storage	PostgreSQL + PostGIS / MongoDB	Store housing data, trends, geospatial info
Backend Services	Node.js + Express / Flask	Expose APIs, handle logic and queries
Authentication	Firebase / OAuth2 / JWT	User login, registration, and session management
Frontend	React.js + Mapbox / Leaflet	Display housing trends, maps, filters, charts
Visualization Libraries	D3.js, Chart.js, Recharts	Render graphs and interactive charts
ML & Analytics Layer (Optional)	Python, scikit-learn	Predict trends, perform data modeling
Deployment/Hosting	AWS / Heroku / Vercel	Host application and data pipelines

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Table 2: Data Flow and Interactions

Step	From	To	Data Type	Description
1	External APIs (Zillow, OSM)	ETL/Data Pipeline	JSON, CSV, GeoJSON	Raw housing & geo data collected periodically
2	Data Pipeline	Database	Structured data	Cleaned, normalized housing and geo-location data
3	Frontend (user action)	Backend API	HTTP request	Fetch filtered trends or geo data
4	Backend API	Database	SQL query	Retrieve requested data
5	Backend API	Frontend	JSON	Send data to render in UI
6	Frontend	Visualization Libraries	Structured JSON	Render visualizations dynamically

Step	From	To	Data Type	Description
7	User	Authentication Service	Credentials	Register/login via email, Google, etc.

References:

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