Project Design Phase
Solution Architecture

Date	3 February 2026
Team ID	**LTVIP2026TMIDS82973**
Project Name	Visualization Tool for Electric Vehicle Charge and Range Analysis
Maximum Marks	4 Marks

Solution Architecture for the EV Data Visualization Platform:

The solution architecture for the project "Visualization Tool for Electric Vehicle Charge and Range Analysis" defines a structured approach to solving the core problem of fragmented, inaccessible, and unvisualized electric vehicle (EV) data. This architecture bridges the gap between business needs like helping consumers and researchers compare EV specifications and charging infrastructure and technological tools like Tableau, Python, and publicly available CSV datasets.

The primary goal of this architecture is to build a centralized, interactive data visualization platform that simplifies EV research and decision-making. It aims to offer clear insights into EV specifications such as price, range, efficiency, body style, and charging availability through dynamic dashboards and summary cards. At the same time, it supports stakeholders including prospective EV buyers, government bodies, and environmental researchers in understanding global and Indian EV markets.

At the core of the architecture lies a multi-layered solution structure. It begins with the data source layer, consisting of four CSV files—EVIndia.csv, ElectricCarData_Clean.csv, Cheapestelectriccars.csv, and electric_vehicle_charging_station_list.csv. These datasets contain valuable information about EV brands, models, pricing, efficiency, and locations of charging stations.

These raw datasets are passed through a data cleaning and preprocessing layer, using tools like Python (Pandas), Excel, or Tableau Public. This stage involves extracting numerical values from text-based fields (e.g., parsing range from "312 Km"), removing null or irrelevant values, harmonizing brand names, and creating new derived fields such as Range_Km and Efficiency.

Solution Architecture Diagram:

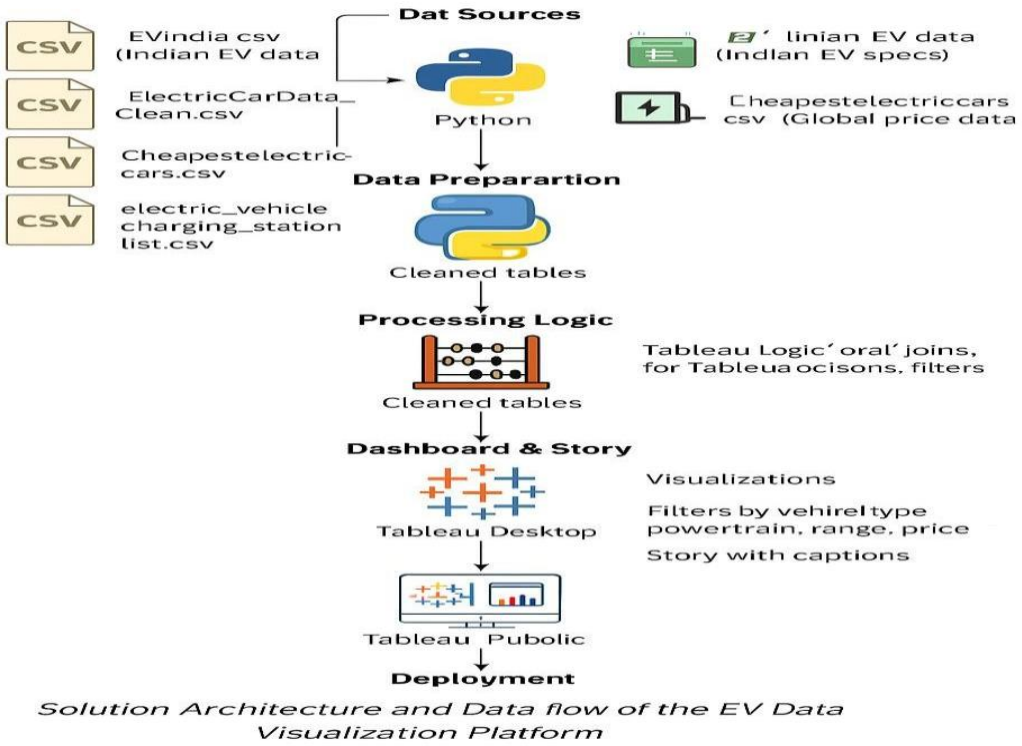

Figure 1: Architecture and data flow of the voice patient diary sample application

The processed data is then transformed within the processing logic layer. Here, calculated fields are added, relationships across datasets are defined, and filters (e.g., by segment, vehicle type, or powertrain) are enabled. The data is now structured for optimal use in interactive Tableau dashboards.

The dashboard and story layer represents the user-facing component of the system. Using Tableau public, multiple dashboards are created including bar charts, scatter plots, maps, pie charts, and summary KPI cards. These dashboards allow users to filter EVs by various dimensions and gain insights visually. Additionally, a narrative-driven Tableau Story is created, consisting of slides focused on specific insights such as charging infrastructure, best-value EVs, performance leaders, and brand diversity. Each story point includes a customized title and caption for context.

Finally, the project is deployed through Tableau Public, making the visualizations accessible via a shareable link. The platform can also be embedded into a web page using HTML or Bootstrap, allowing for broader distribution and public access.

Technically, the project stack includes CSV files as data sources, Python for preprocessing, Tableau for data visualization, and Tableau Public for deployment. This lightweight but effective architecture ensures that all project components from raw data to end-user experience are well-connected and purpose-driven.

In summary, this solution architecture efficiently connects real-world problems like data fragmentation and decision-making complexity with practical, visual, and accessible technology. It provides clear value by enabling data-backed decision-making in the electric mobility ecosystem, while being flexible enough to scale with future datasets and additional functionalities.