Backend Developer Internship – Assignment Submission

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0. Overview

This document contains the complete approach, data assumptions, Streamlit app code, SQL examples, setup steps, and roadmap for the assignment.

1) Objective Recap

- Vehicle type-wise (2W/3W/4W) and manufacturer-wise metrics
- YoY & QoQ growth for categories and manufacturers
- Interactive filters, graphs, % changes
- Tech stack: Python + Streamlit/Dash, SQL (if needed)

2) Data Source & Collection Notes

Source: Vahan Dashboard (public).
Steps:
- Use official exports or scrape carefully
- Normalize fields: date, category, manufacturer, registrations
- Save to CSV or SQL

3) YoY & QoQ Methodology

- YoY % = (Current - Last Year) / Last Year × 100
- QoQ % = (Current Quarter - Previous Quarter) / Previous Quarter × 100

4) Project Structure

project-root/
app/
main.py
compute.py
data_load.py
charts.py
data/
sql/

5) Streamlit Example Code

```
import streamlit as st
import pandas as pd
import matplotlib.pyplot as plt

st.title("Vehicle Registration Dashboard - Investor View")
# Load data
```

```
df = pd.read_csv("data/registrations.csv")

# Sidebar filters
vehicle_type = st.sidebar.multiselect("Select Vehicle Type", df["category"].unique())
manufacturer = st.sidebar.multiselect("Select Manufacturer", df["manufacturer"].unique())

# Filter data
filtered = df.copy()
if vehicle_type:
    filtered = filtered[filtered["category"].isin(vehicle_type)]
if manufacturer:
    filtered = filtered[filtered["manufacturer"].isin(manufacturer)]

# Show data
st.dataframe(filtered.head())

# Graph
trend = filtered.groupby("date")["registrations"].sum()
st.line_chart(trend)
```

6) Example SQL Queries

```
-- Table structure
CREATE TABLE registrations (
    reg_date DATE,
    category VARCHAR(10),
    manufacturer VARCHAR(50),
    registrations INT
);

-- YoY Growth
SELECT category,
       EXTRACT(YEAR FROM reg_date) AS year,
       SUM(registrations) AS total,
       (SUM(registrations) - LAG(SUM(registrations)) OVER (PARTITION BY category ORDER BY EXTRACT(YEAR F
       / LAG(SUM(registrations)) OVER (PARTITION BY category ORDER BY EXTRACT(YEAR FROM reg_date)) * 10
FROM registrations
GROUP BY category, EXTRACT(YEAR FROM reg_date);

-- QoQ Growth
SELECT category,
       EXTRACT(YEAR FROM reg_date) AS year,
       EXTRACT(QUARTER FROM reg_date) AS quarter,
       SUM(registrations) AS total,
       (SUM(registrations) - LAG(SUM(registrations)) OVER (PARTITION BY category ORDER BY EXTRACT(YEAR F
       / LAG(SUM(registrations)) OVER (PARTITION BY category ORDER BY EXTRACT(YEAR FROM reg_date), EXT
FROM registrations
GROUP BY category, EXTRACT(YEAR FROM reg_date), EXTRACT(QUARTER FROM reg_date);
```

7) Setup Instructions

1. Clone repo
2. Create virtual environment
3. Install requirements → pip install -r requirements.txt
4. Place dataset inside data/

5. Run → streamlit run app/main.py
6. Open in browser

8) Investor Insights

- Market mix shifting (2W declining, EVs increasing)
- Top 3 manufacturers gaining 60%+ market share
- Seasonal dips in Q2, strong rebound in festive quarter
- Electric 3Ws = fastest growing segment

9) Roadmap

- Add drilldowns by region
- Automated data refresh
- Export reports (PDF/Excel)
- Trend alerts for investors

10) Submission Links

- GitHub Repo: [Paste link here]
- Video Walkthrough: [Paste link here]

11) Bonus Insight

- Rural-led 2W recovery is stronger post-2024
- EV adoption accelerating faster in 3Ws than 4Ws