

Project Title: Smart City Traffic & Accident Analytics

Problem Statement (Through Storytelling)

Welcome to **MetroCity**, a rapidly growing urban hub facing **severe traffic congestion** and **frequent road accidents**. The city administration wants to create a **Smart Traffic Management System** to **reduce congestion** and **improve road safety** using data analytics.

Every day, thousands of vehicles move through the city, creating bottlenecks at key intersections. Despite installing **traffic sensors and surveillance cameras**, the city struggles to analyze data efficiently and make proactive decisions. The administration now seeks a **data-driven solution** to:

1. Analyze **traffic patterns** across different locations.
2. Identify **accident-prone areas** based on historical data.
3. Predict **congestion hotspots** during peak hours.
4. Provide **insights for better traffic management and road safety policies**.

Your Mission

As a **Data Analyst**, your task is to design an **Intelligent Traffic & Accident Analytics System** using:

- **SQL** – To manage traffic, sensor, and accident data.
- **Python** – For data transformation, trend analysis, and predictive modeling.
- **ETL Pipeline** – To extract sensor data, clean it, and load it into the data warehouse.
- **Data Warehousing** – To consolidate traffic, accident, and sensor data.
- **Tableau** – For interactive visualizations and reporting.

Project Requirements

1. **Data Collection & Integration**
 - Consolidate traffic sensor, accident, and vehicle data into a unified Data Warehouse.
2. **Data Processing & ETL**
 - Use Python to clean and transform raw data into meaningful metrics (e.g., congestion index, accident severity score).
3. **Traffic Analysis**
 - Write SQL queries to analyze vehicle flow, congestion levels, and average speeds.
4. **Accident Prediction**
 - Use Python to build a model predicting high-risk accident locations based on traffic patterns, weather conditions, and time of day.
5. **Visualization & Insights**
 - Design Tableau dashboards showing:
 - Real-time traffic congestion
 - Accident-prone areas
 - Peak hour analysis

- Predictive insights for road safety improvements

Dataset (Sample Data Provided)

- 📁 **Sensor Data** – Location and status of installed sensors
- 📁 **Traffic Data** – Hourly traffic flow, speed, and congestion levels
- 📁 **Accident Data** – Accident details, location, severity, and weather conditions

Expected Outcome

Your system will enable the MetroCity administration to:

- Reduce traffic congestion by **identifying and managing bottlenecks**
- Improve road safety by **predicting high-risk zones**
- Develop **data-driven policies** for traffic management
- Save lives by **ensuring faster emergency response**