📦 AI Agent for E-Commerce Data - Project Overview

Developed by: Vigneshwari  
  
This document outlines the structure and working of an AI Agent that intelligently answers e-commerce data queries using natural language questions. It integrates with a backend API, utilizes the Gemini LLM for language-to-SQL translation, and optionally returns visual charts and streamed typing effects in the UI.

# ✅ Final Project Architecture

🗂 Backend: Python (FastAPI)  
🧠 AI: Gemini API (you’ll give the key)  
🗄 Data: SQLite (loaded from 3 Excel files)  
📊 Bonus: Plotly or Matplotlib for charts  
💬 Typing effect: via frontend stream  
🖥️ Frontend: Simple HTML/CSS with JS to send questions  
🔐 Login Page: Just basic sign-in UI (no database login needed)  
🟣 Deployed on: Replit (you'll use the correct Replit prompt)

## 🔧 Backend Build Overview

✔️ Convert datasets to SQL → done using load\_data.py  
✔️ Connect LLM → Gemini API used  
✔️ SQL queries → dynamically created from questions  
✔️ Respond via API → /ask endpoint via FastAPI  
  
Components to finalize:  
- ai\_service.py → use Gemini API to convert natural questions into SQL  
- sql\_service.py → execute SQL from the DB  
- Bonus: plot\_sales\_chart() logic

## 🔹 Bonus Features

1. Visualizations (Matplotlib or Plotly)  
2. Typing Effect (Frontend JS to simulate real-time reply)

## 💡 Frontend UI

A simple web interface with:  
- Login screen showing Vigneshwari's name  
- Question input field (like ChatGPT)  
- Visual area for responses and graphs

# 🧠 How the AI Agent Understands Questions and Answers with SQL

This section explains how the system converts human questions into SQL queries and returns answers.

## Step-by-Step Process

1. User Asks a Question (Natural Language)

Example: “What is the total sales for product ID P123?”

2. Convert Question into SQL Query (Using Gemini API)

The AI (Gemini) understands the question and converts it into a SQL query like:  
 SELECT SUM(total\_sales)   
 FROM total\_sales   
 WHERE product\_id = 'P123';

3. Run SQL on Database

The system connects to SQLite (ecommerce.db) and executes the SQL query to fetch the result.

4. Return Friendly Answer

The result is formatted back into a human-readable sentence:

“The total sales for product ID P123 is ₹15,000.”

## ✅ Full Flow Diagram

User Question → Gemini API → SQL → SQLite DB → Formatted Answer