Shop Smart AI Recommender - LLMOps Project

Welcome to the **Shop Smart AI Recommender**! This project showcases a complete, end-to-end LLMOps pipeline for a conversational AI application. The system provides intelligent product recommendations based on real customer reviews, all wrapped in a modern, cloud-native architecture.

Project Overview

This application provides intelligent product recommendations using a Retrieval-Augmented Generation (RAG) architecture. It demonstrates:

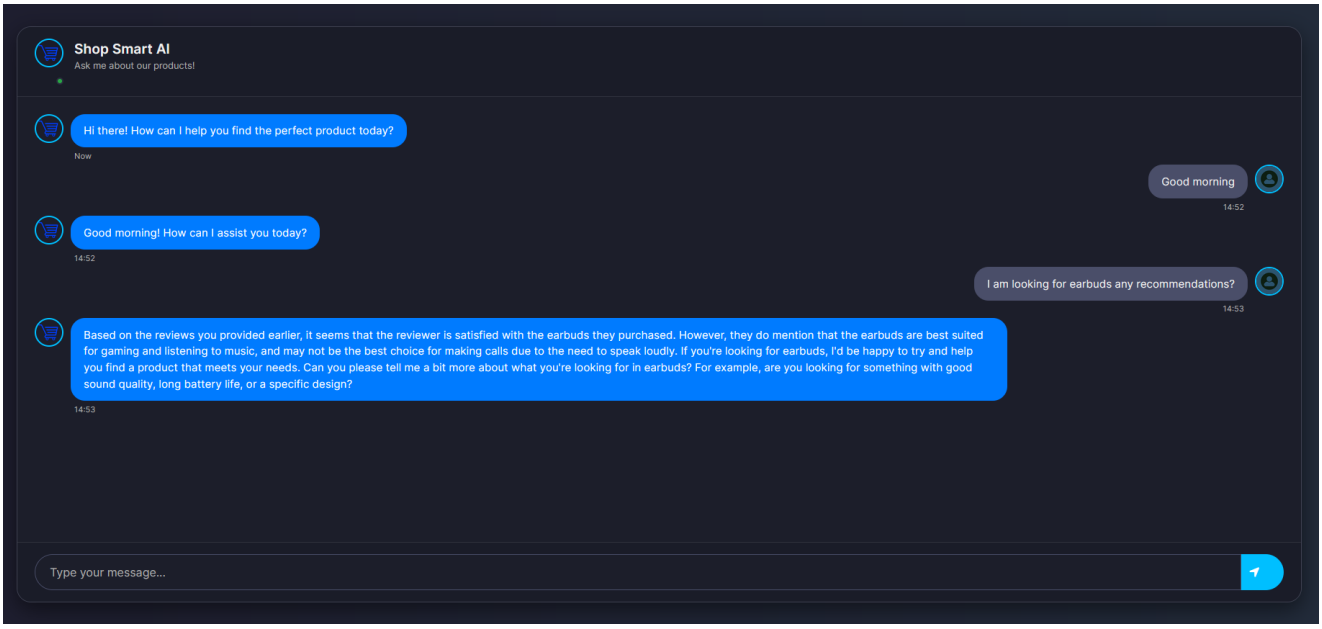
- **Local Development**: Building a robust Python application with a clear, modular structure.
- **Containerization**: Packaging the application and its dependencies using Docker for portability.
- **Cloud Deployment**: Orchestrating the entire application stack on a Google Cloud VM using Kubernetes (Minikube).
- **Secure Configuration**: Managing secrets and API keys safely with Kubernetes Secrets.
- **Real-time Monitoring**: Observing application health and performance with Prometheus and Grafana.
- **CI/CD Ready**: A clean project structure ready for future automation workflows.

Tech Stack

Tool	Purpose
Python	Core application development
LangChain	Framework for building the RAG chain
Groq & Hugging Face	LLM and embedding models
Flask	Web framework for the backend API
Astra DB	Cloud-native vector database
Docker	Containerization
Kubernetes (Minikube)	Orchestration and deployment
GCP	Infrastructure hosting
Prometheus & Grafana	Observability and monitoring

Screenshots

Here is a snapshot of the deployed Shop Smart AI Recommender in action:



Project Structure

/ ├── assets/ # Project images and screenshots ├── chain/ # Core RAG chain logic ├── config/ # Application configuration ├── data/ # Raw dataset ├── grafana/ # Grafana Kubernetes manifests ├── prometheus/ # Prometheus Kubernetes manifests ├── static/ # CSS and other static assets ├── templates/ # HTML templates ├── utils/ # Reusable helper modules ├── .env # (Local Only) Secret keys and APIs ├── .gitignore # Files to be ignored by Git ├── app.py # Main Flask application entry point ├── Dockerfile # Instructions to build the container image ├── flask-deployment.yaml # Kubernetes manifest for the Flask app ├── requirements.txt # Python dependencies └── setup.py # Project packaging script

Setup and Deployment Instructions

For a detailed guide on local setup and cloud deployment, please refer to our comprehensive **Project Documentation**.

The guide includes:

- GitHub setup and initial push
- Local setup with a Python virtual environment
- Docker image build process
- Kubernetes and Minikube configuration on a GCP VM
- Prometheus and Grafana integration for monitoring

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