🛍️ 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:

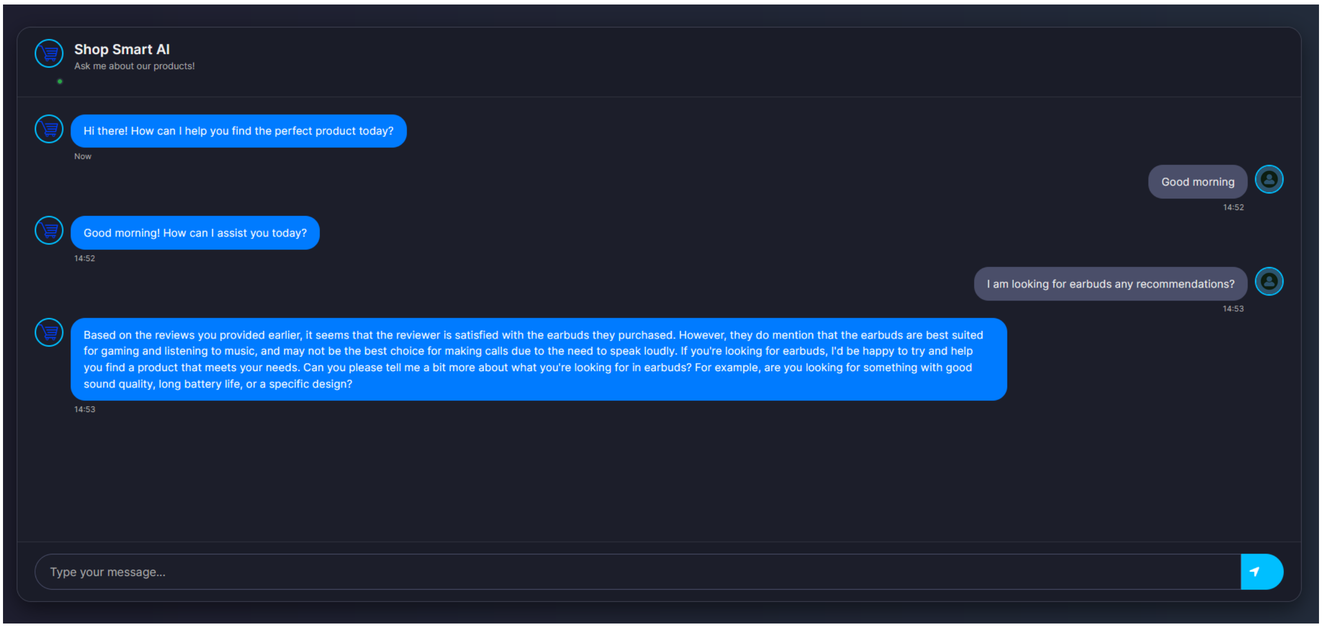
- **Local Development**: Building a robust Python application with a clear, modular structure.
- **Containerization**: Packaging the application and its dependencies using Docker for portability.
- **Cloud Deployment**: Orchestrating the entire application stack on a Google Cloud VM using Kubernetes (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:



Shop Smart AI

Ask me about our products!

Hi there! How can I help you find the perfect product today?

Now

Good morning

14:52

Good morning! How can I assist you today?

14:52

I am looking for earbuds any recommendations?

14:53

Based on the reviews you provided earlier, it seems that the reviewer is satisfied with the earbuds they purchased. However, they do mention that the earbuds are best suited for gaming and listening to music, and may not be the best choice for making calls due to the need to speak loudly. If you're looking for earbuds, I'd be happy to try and help you find a product that meets your needs. Can you please tell me a bit more about what you're looking for in earbuds? For example, are you looking for something with good sound quality, long battery life, or a specific design?

14:53

🗁 Project Structure

```
.
├── assets/                # Project images and screenshots
│   └── shop_smart_ai_pic2.png
├── chain/                 # Core RAG chain logic
│   ├── __init__.py
│   └── rag_chain.py
├── config/                # Application configuration
│   ├── __init__.py
│   └── config.py
├── data/                  # Raw dataset
│   └── flipkart_product_review.csv
├── grafana/               # Grafana Kubernetes manifests
│   └── grafana-deployment.yaml
├── prometheus/            # Prometheus Kubernetes manifests
│   ├── prometheus-configmap.yaml
│   └── prometheus-deployment.yaml
├── static/                # CSS and other static assets
│   └── style.css
├── templates/             # HTML templates
│   └── index.html
├── utils/                 # Reusable helper modules
│   ├── __init__.py
│   ├── custom_exception.py
│   ├── data_converter.py
│   ├── data_ingestion.py
│   └── logger.py
├── .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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📄 License

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