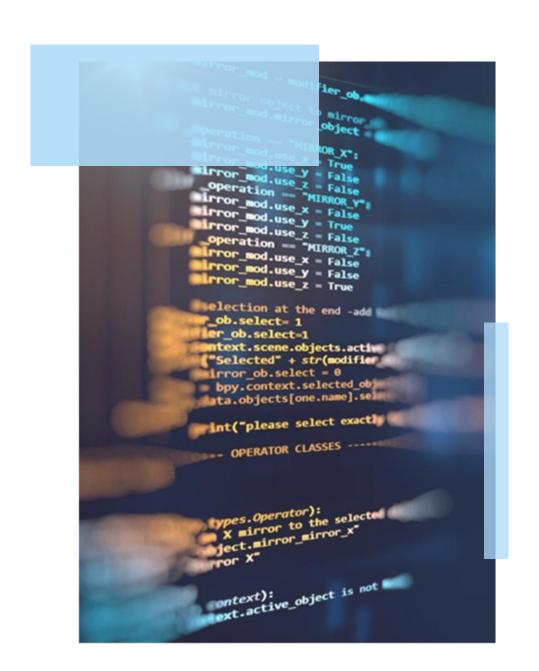
MECA DYNAMICS

RAG APPLICATION WITH HACKEREARTH







AGENDA

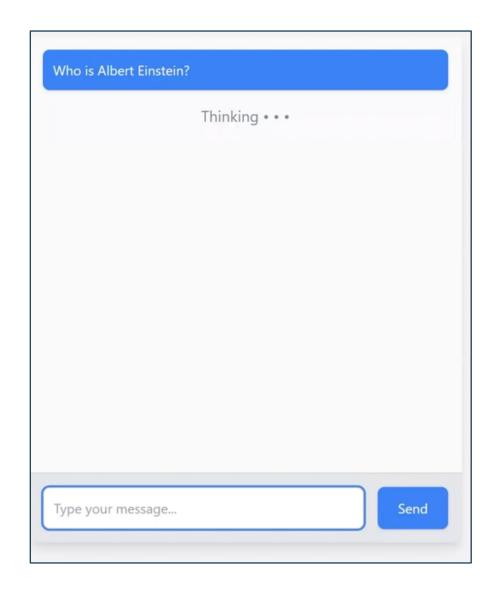
Project Overview

App Demo

Our Solution

Challenges

Future Improvements



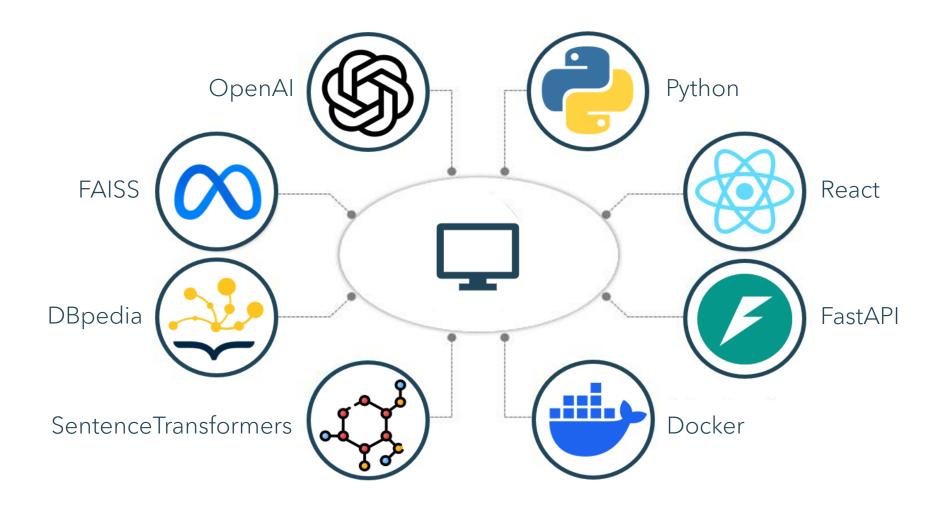
PROJECT OVERVIEW

- RAG application using Wikipedia as a knowledge base
- Combines Knowledge Graph + Vector Search
- Chatbox UI for user questions and answers
- Custom dataset: class notes integration
- Deployed using Docker

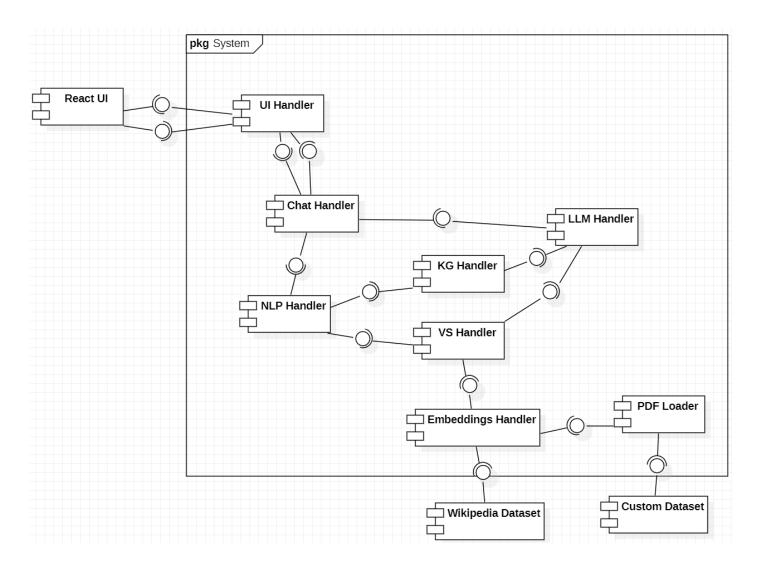
APP DEMO

OUR SOLUTION

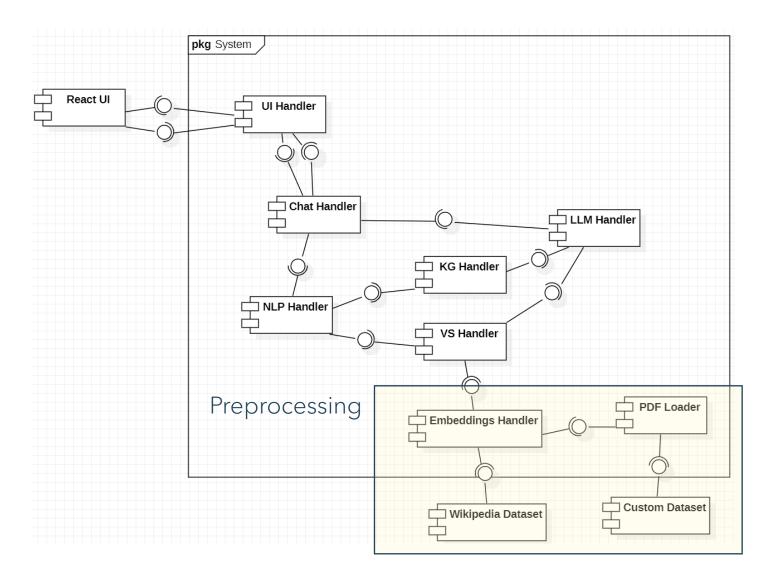
TECH STACK



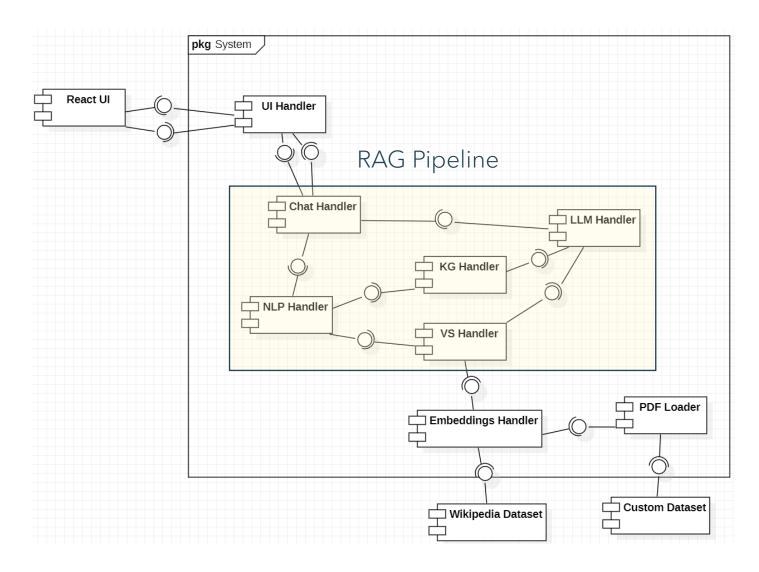
HOW IT WORKS



HOW IT WORKS

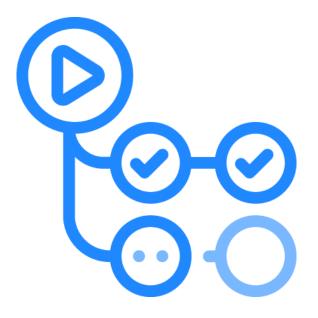


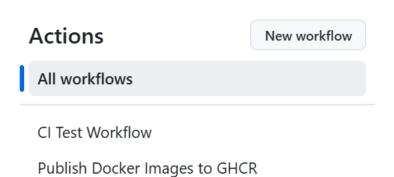
HOW IT WORKS



TESTING & PERFORMANCE

- GitHub Actions for testing + deployment
- 16 unit tests across key components
- Avg. response time: ~8 seconds





CHALLENGES

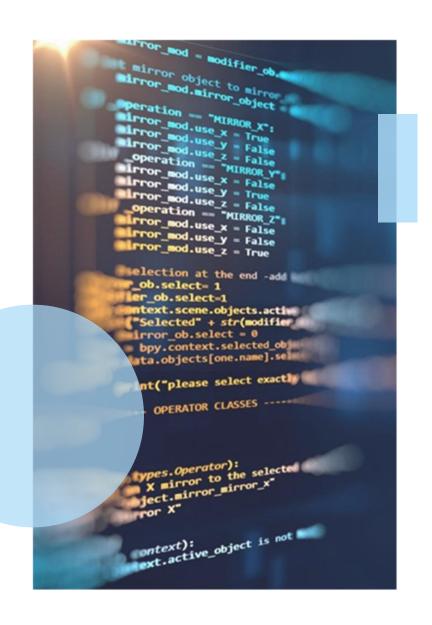
VECTOR SEARCH & EMBEDDINGS

Vector Search

- Worked with small data
- Struggled with large embeddings
- Switched to SentenceTransformers + sentence-based splitting

Embedding Generation

- 2-3 GB file
- Required high computing power
- Regenerated multiple times during tuning



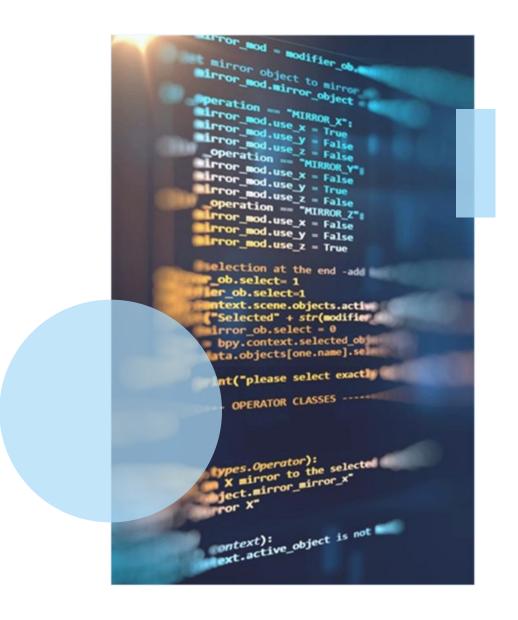
LLM & QUERY HANDLING

LLM Performance

- DistilBERT: fast but weak
- LLaMA 2.7B: accurate but slow
- OpenAI: fast + accurate

Query Handling

- Recovers from missing KG or VS results
- Rejects harmful or unsafe questions



FUTURE IMPROVEMENTS

FUTURE WORK



- Improve NLP for complex queries + moderation
- Add more domain-specific datasets (e.g., health, finance)
- Support multimodal input (text, images, diagrams)
- Enable saved chats, user login, and memory

CONCLUSION

- Built a full RAG application using knowledge graph and vector search
- Supports large-scale Wikipedia data and custom class note datasets
- Deployed with Docker and tested with GitHub Actions
- Reliable performance with clear paths for future expansion

Who is Albert Einstein? Albert Einstein (14 March 1879 - 18 April 1955) was a Germanborn theoretical physicist, renowned as one of the most influential scientists in history. He is best known for developing the theory of relativity, particularly the mass-energy equivalence formula E = mc2, which is one of the most famous equations in physics. In 1921, he received the Nobel Prize in Physics for his contributions to theoretical physics, especially for the discovery of the photoelectric effect, a key development in quantum theory. Einstein's intellectual achievements have made his name synonymous with genius. Throughout his career, he also contributed to statistical mechanics and quantum theory, though he struggled with the evolution of these ideas later in life. He emigrated to the United States in 1933 to escape the Nazi regime and became an American citizen in 1940. Type your message... Send

