TBS MySQL Chatbot

Project Background

Qualcomm is a leader in wireless connectivity, RF front-end, high-performance computing, and on-device intelligence. Within the Test Base Station (TBS) initiative, we develop internal cellular test systems that rival commercial solutions, supporting a global engineering team and a portfolio of over 2000 systems used daily.

We are excited to invite CSM students to participate in a forward-looking project: the development of a Generative AI-powered MySQL Chatbot. This chatbot will allow users to interact with MySQL databases using natural language, translating queries into SQL and visualizing results dynamically. The project will leverage Qualcomm's Gen AI platform, LangChain, LangGraph, and other cutting-edge tools.

Project Description

Objectives

- Build a Gen AI-based chatbot that translates natural language into MySQL queries.
- Chatbot will have contextual awareness of TBS MySQL Database based on available documentation.
- Enable dynamic data visualization based on user-selected formats (e.g., charts, tables).
- Suggest visualization based on the data output to the user.
- Integrate Qualcomm Gen AI SDKs and services, including LangChain and LangGraph.
- Utilize a local vector database for contextual memory and prompt enrichment.
- Ensure compliance with Qualcomm's Gen AI development policies and tooling standards.

Key Responsibilities

- Design and implement the chatbot interface using ReactJS and TypeScript.
- Develop backend logic with FastAPI and Python to handle query translation and execution.
- Integrate Qualcomm Gen AI tools, including Code Assistant for rapid development.
- Support visualization of SQL query results using user-selected formats.
- Containerize the application for scalable deployment using Docker.
- Collaborate with Qualcomm engineers to align on scope, architecture, and milestones.

Example Chatbot Interactions

- "Show me the top 10 problematic stations with degraded performance." → SQL query + table.
- "What's the MTBR (Mean Time Between Repair) by release?" → SQL + bar chart.
- "Visualize daily trends over the last 30 days." → SQL + line graph.

The chatbot will also allow users to specify the type of visualization they prefer, and intelligently suggest alternatives based on the data type.

Development Environment

- Frontend: ReactJS, TypeScript
- Backend: FastAPI (Python)
- Database: MySQL for retrieval.
- AI/ML: Qualcomm Gen AI SDK, LangChain, LangGraph
- Vector DB: Local vector store for RAG (Retrieval-Augmented Generation)
- Containerization: Docker
- DevOps: Git-based repositories, JIRA for sprint tracking

Development will take place on Qualcomm's Windows virtual machines with remote access and allocated compute resources.

Desired Skill Set

- Experience with web interface design
- Proficiency in: TypeScript/ReactJS, Python3 and FastAPI, MySQL and SQL query optimization
- Familiarity with: Generative AI, LangChain, LangGraph, Prompt engineering and RAG, Git and collaborative development workflows
- Strong problem-solving and debugging skills

Preferred Team Size

A team of three students is ideal to start, with potential to scale based on project scope and resource availability.

Location

The project will be supported remotely, with guidance from Qualcomm engineers in Bridgewater, NJ and Boulder, CO. Occasional on-site meetings may be arranged for key milestones.

Resources

- Remote development environments
- Access to Gen AI SDKs and tools
- Mentorship from experienced engineers
- Documentation and internal APIs

Contact

For high-level project inquiries, please contact:

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