

TBS Analytics 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.

The Data Analytics Chatbot project aims to design and prototype a high-accuracy, GenAI-powered analytics chatbot that can answer natural-language queries involving complex data and schema-driven questions across multiple databases, with a strong emphasis on correctness and evaluability. Students will work on modular components such as skill definitions, additional MCPs (e.g., schema introspection or visualization), lightweight visualization support via a minimal UI, and containerized services where appropriate. Students will have access to cutting-edge tools, including the latest models (Claude, Gemini, GPT, etc.), coding agents within VS Code or Claude Code, Qualcomm's GenAI platform, and frameworks such as LangChain and LangGraph.

Project Description

Objectives

- Translate natural language questions into SQL/other query languages.
- 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.
- Leverage 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 utilization 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, MSFT SQL Server, Oracle
- 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

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

Resources

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

Contact

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