



# Intelligent Search for **Global Gender Research and Policy**

Enhancing Data Retrieval with GenAI, LLMs, RAG, and SQL Generation for a Global Organization



## Overview

The GenAI Search solution transforms how stakeholders interact with vast, complex datasets related to global gender equality. By integrating Large Language Models (LLMs), Retrieval-Augmented Generation (RAG), and SQL query generation, the solution provides instant, precise, and context-aware search results. Decision-makers, policymakers, and analysts can now efficiently retrieve key insights—whether identifying funding partners for gender initiatives, analyzing financial reports on women, security, humanitarian action or tracking systemic outcomes. The solution simplifies complex queries, accelerates search processes, and enhances engagement, enabling users to make informed decisions with ease.

### Client Profile

International intergovernmental organization that operates in over 150 countries working in areas such as poverty, governance, and environment with a strong focus on gender equality and women's empowerment.

## Business Challenges

- Existing search functionality relied on conventional keyword-based search, often failing to retrieve relevant insights from a vast and complex dataset spanning multiple domains.
- Managing a large-scale database with both structured and unstructured data made it difficult for users to execute precise searches, often requiring manual effort and technical expertise.

- Inefficiencies in query execution led to high processing times, making information retrieval slow and unreliable.
- Strict data privacy and security requirements added complexity to handling sensitive information, limiting the effectiveness of conventional search methods.
- Conventional search tools frequently returned incomplete or irrelevant results, forcing users to refine queries multiple times to find the right information.
- Slow response times in the previous system caused delays in accessing critical data, hampering real-time decision-making and reporting.

## Business Requirement

The client required a GenAI-driven search module to optimize data retrieval within their Transparency Portal. The system needed to integrate seamlessly with existing data sources, enhance search capabilities, and maintain high performance while ensuring data security.

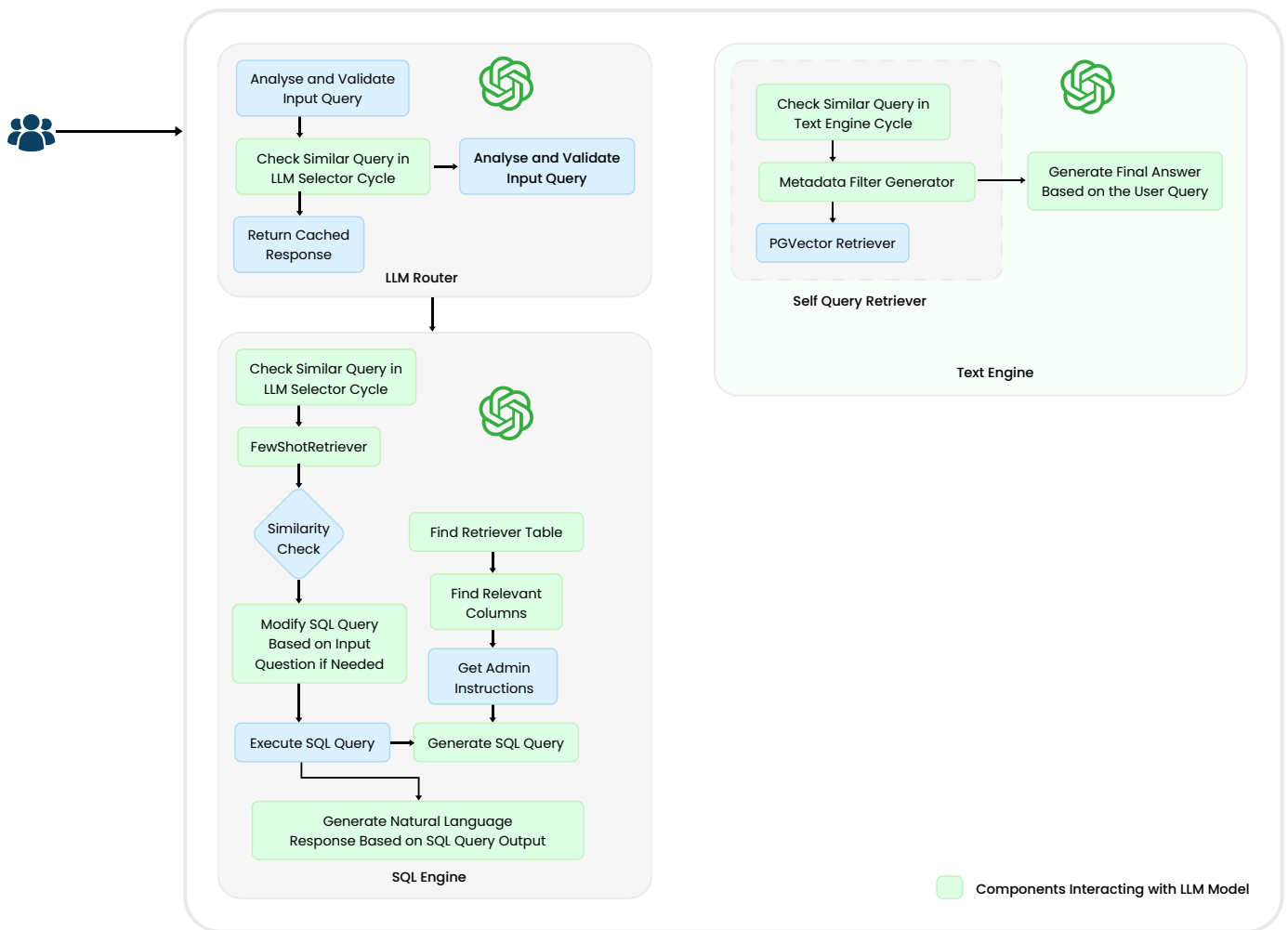
## Our Solution

The GenAI search solution followed a three-phase roadmap:

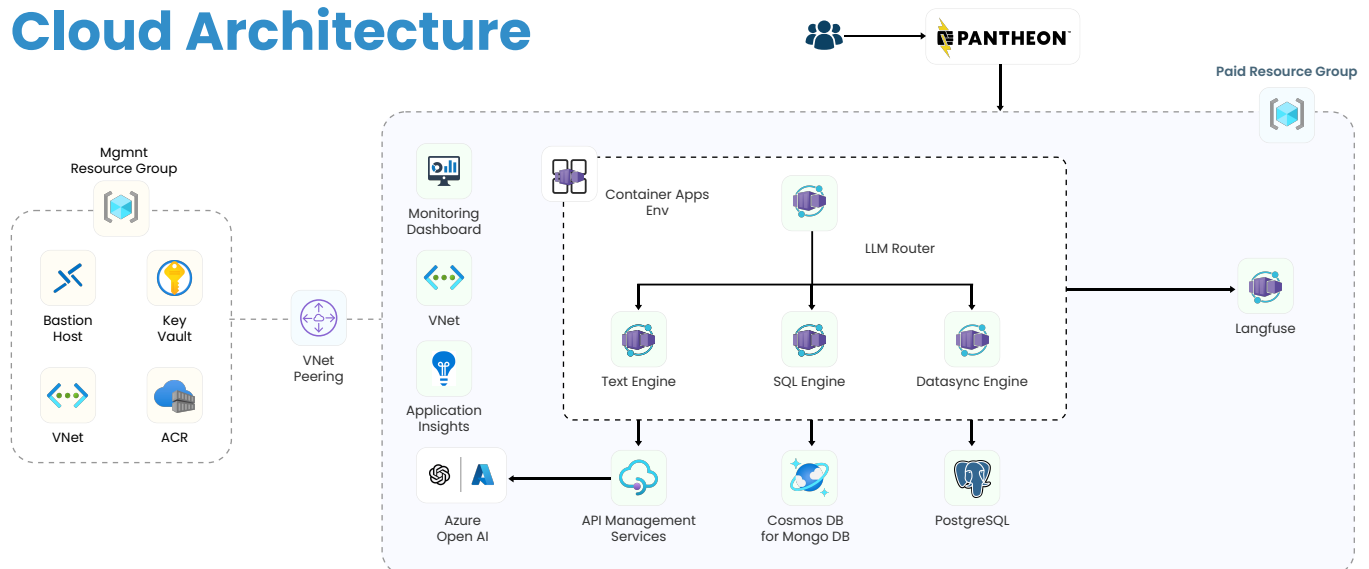
- 1. SQL Generator:** Development of a natural language to SQL query generator that could translate user requests into precise database queries.
- 2. Similarity Search:** Implementation of vector-based similarity search to quickly identify relevant information from the knowledge base.
- 3. LLM Router, Text & SQL Engine:** Integration of a sophisticated GenAI system that routes queries to the appropriate processing engine (text or SQL) based on query type and generates comprehensive answers.

This multifaceted approach ensures that users can retrieve information through natural language queries without requiring technical knowledge of database structures or query languages. The system intelligently determines whether to process a request through direct text analysis or database querying, providing the most accurate and efficient response.

## Application Architecture

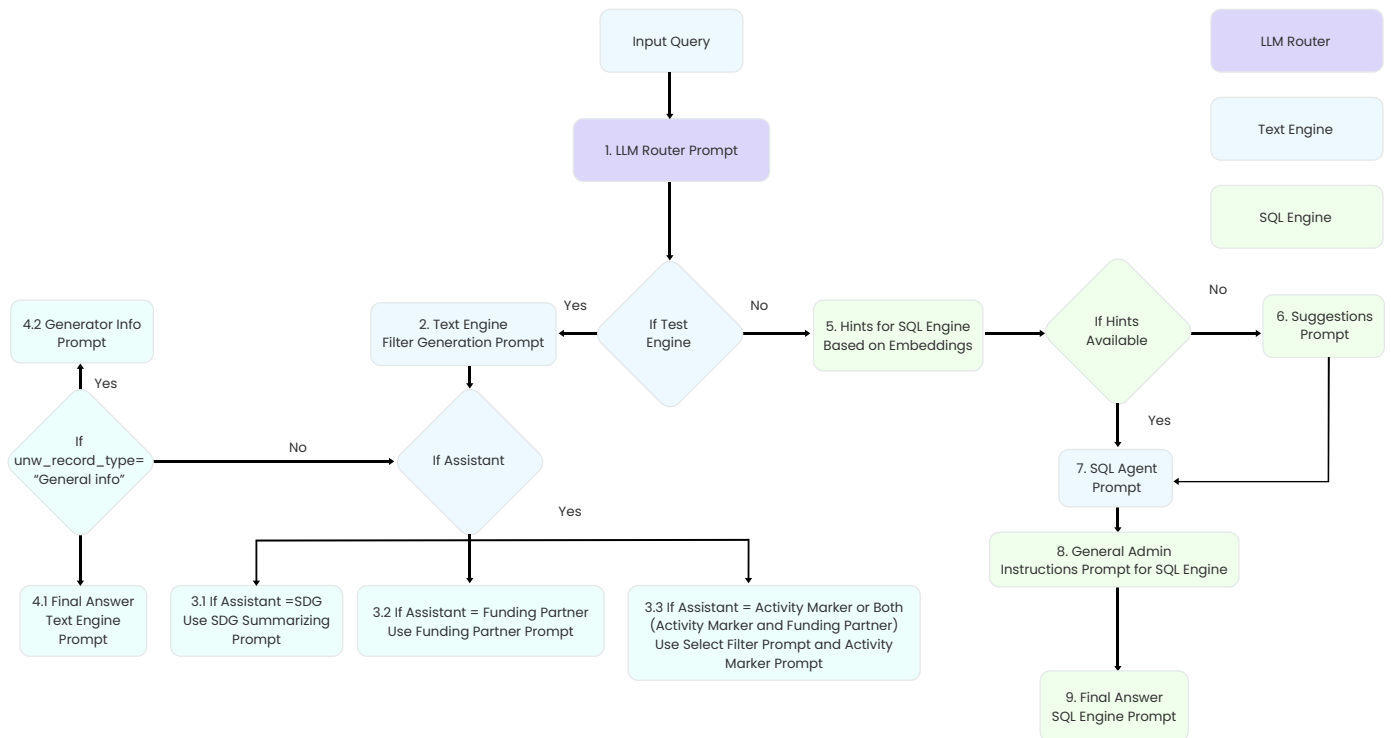


## Cloud Architecture





# Prompt Workflow



## Key Features

- Intelligent GenAI query routing automatically determines the most appropriate processing method for each query.
- Natural language processing enables the system to understand complex conversational queries.
- Multilingual support allows seamless handling of queries in multiple languages.
- Context-aware responses generate answers that consider the broader context of the inquiry.
- Dynamic SQL generation converts natural language into optimized database queries.
- Vector-based similarity search quickly identifies relevant information from vast knowledge bases.

- High-performance architecture ensures scalability while maintaining speed even under heavy loads.
- Enterprise-grade security provides robust protection for sensitive data throughout the processing pipeline.
- Clickable terms enable interactive exploration for deeper insights.
- Smart query clarification enhances accuracy by refining ambiguous requests.
- Conversational search offers seamless user interaction for intuitive querying.
- Multi-part queries support complex data requests with structured processing.
- Enhanced speed and precision, leveraging GenAI-driven optimization for faster results.
- Graphical insights transform data into visual representations for better analysis.

## Tools and Technologies



LLMs

RAG



pgvector



Azure Pipelines

Re-ranking

## Business Benefits

- Accelerated information access led to an 85% reduction in time required to retrieve complex information.
- Enhanced decision support improved data accessibility, enabling evidence-based decision-making.
- Multilingual inclusivity significantly improved access for non-English speaking team members.
- Data-driven insights make it easier to identify patterns and trends across programs and regions.
- Improved donor reporting ensures accurate and timely updates for stakeholders.
- Increased knowledge sharing enhanced cross-organizational visibility of programs and outcomes.
- Scalable and secure design ensures a future-ready solution that complies with data security regulations.

