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UNIVERSITY: Gujarat Technological University

INSTITUTE: Government Engineering College Rajkot

COURSE: B.E. Computer Engineering (3rd Year)

SELECTED STATEMENT: Problem Statement 1

STATEMENT:

Transforming Early Talent Engagement and Hiring through Advanced Analytics and AI.

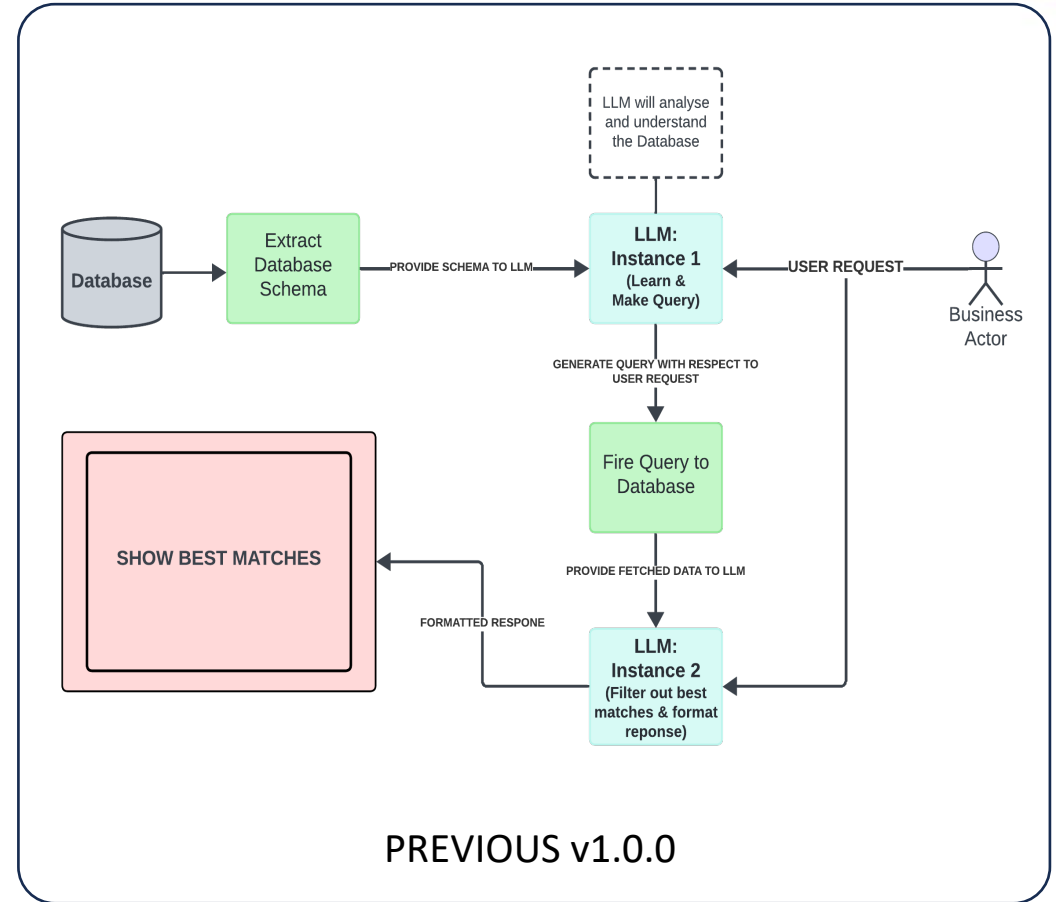
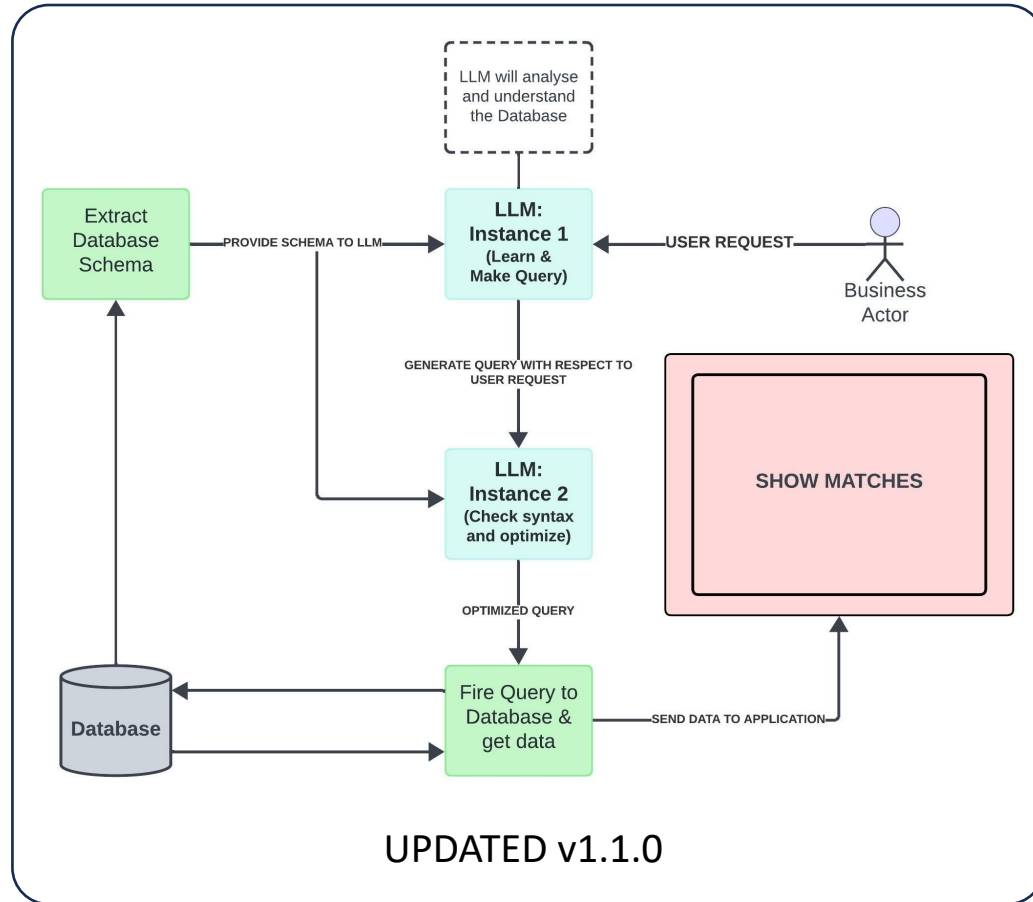
SOLUTION:

Use of LLM instances to analyze data along with the database and match the best candidates according to the requirements of Hiring Organization.

CONTENT

- **CONCEPT**
 - Updates and Explanation
- **PROTOTYPE (Application of Concept)**
 - Development of Solution based on the Concept
- **PROTOTYPE (Working)**
 - Explaining final application after development.
- **DEMO (Video)**
 - Link to demonstration video uploaded on YouTube

CONCEPT



CONCEPT (Updated v1.1.0)

- **REQUEST:** The organization request to find prospective candidates.
- **EXTRACT:** By interfacing with Database, its schema is extracted and forwarded to LLM. The interfacing can be done Python, C++, Java etc.
- **ANALYZE:** The input schema is then analyzed by LLM to understand the structure of data in database.
- **GENERATE:** After analyzing the data LLM is then provided a request in Natural Language which has the requirements of Hiring Organization. The LLM Generates the Query according to the request and structure of database.
- **CORRECT:** As LLM may make mistake or add some unnecessary natural language the response generated by first LLM instance is passed to the second LLM to check for any syntax error and remove any natural language if present.
- **OPTIMIZE:** The query is then optimized for better results by second LLM instance itself. It will help to fetch data from database more efficiently.
- **FETCH:** The Query is then fired to database via database interface and the result is received from the database.
- **FORMAT:** The data will be delivered in a JSON format, it will then be formatted and manipulated by the platform according to its requirement.
- **SHOW:** Matched candidates' data will then be presented to User Interface, where they they will be able to invite candidates for interview.

PROTOTYPE (v1.1.0): (Tech)

- **TECH STACK (UPDATE):**

- The prototype is developed with local environment and minimal use of Azure services.

- **Backend**

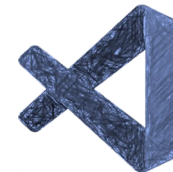
- LLM: Azure OpenAI (gpt-35-turbo)
- Tool: Prompt Flow
- Database: Azure Cosmos DB for PostgreSQL
- Deployment: Docker Container

- **Frontend**

- Language: Python
- Framework: Streamlit

- **Development:**

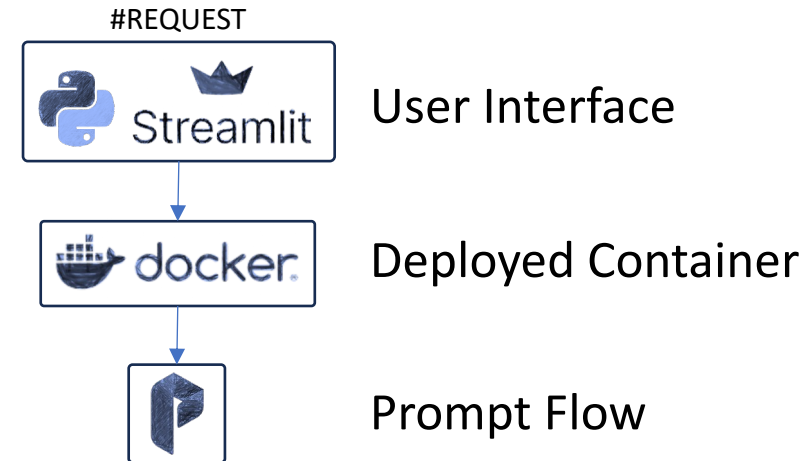
- Code editor: Visual Studio Code



PROTOTYPE (v1.1.0): (Application of Concept)

1. REQUEST (PYTHON):

- The organization provides the request for the candidates from User Interface in Natural Language.
- The request is then sent to the Docker Container, where Prompt Flow is deployed.

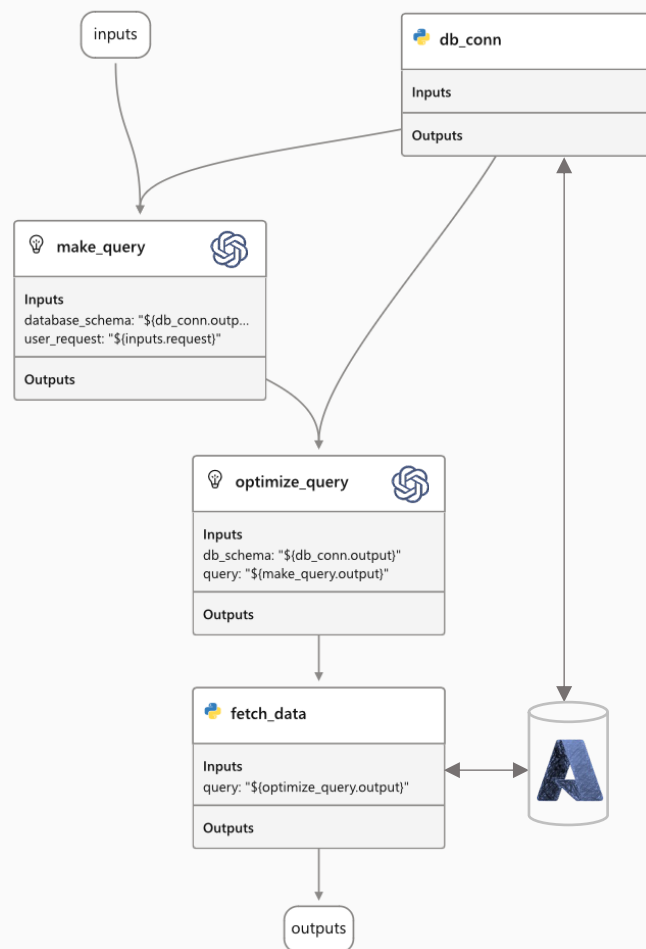


DATABASE:

- Hosted on Azure Cosmos DB for PostgreSQL Cluster.
- Database contains Stack Overflow 2018 Developer Survey dataset available on Kaggle, which contains 27 thousand developer's data after filtering.
- Database is not normalized due to storage limitations, thus has a single Table with 9 columns.

PROTOTYPE (v1.1.0): (Application of Concept)

Graph

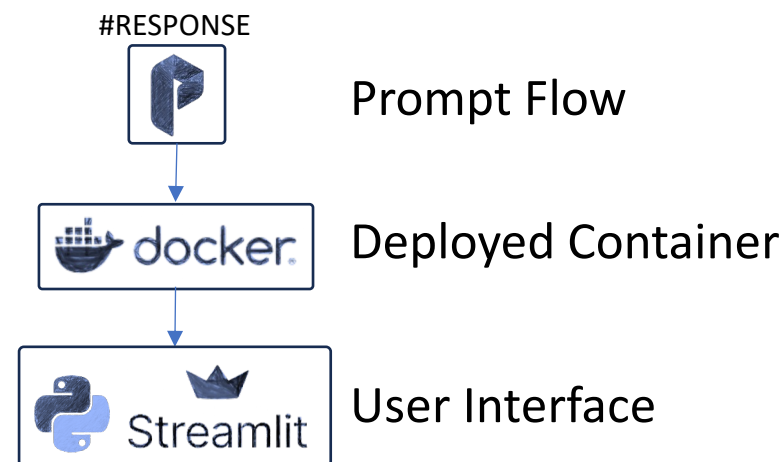


PROMPT-FLOW-GRAPH v1.1.0

2. **EXTRACT (PYTHON - *db_conn*):** After the input is received, Prompt Flow will run python script. The script will fetch database schema along with first few rows .
3. **ANALYSE (LLM – *make_query*):** From database schema and rows LLM instance will analyse it to understand the structure of database and data stored.
4. **GENERATE (LLM – *make_query*):** After the analysis of data and database the LLM instance will generate the PostgreSQL query according to the input.
5. **CORRECT (LLM – *optimize_query*):** The generated query may have some errors or use of some Natural Language along with query. Thus, LLM instance will correct syntax errors and remove any Natural Language if found.
6. **OPTIMIZE (LLM – *optimize_query*):** After correction, the LLM will optimize the query for efficient results.
7. **FETCH (PYTHON – *fetch_data*):** The optimized query will then be forwarded to python script. It will be then fired to the Database to get the required results.

PROTOTYPE (v1.1.0): (Application of Concept)

8. **FORMAT (PYTHON):** Response received from Prompt Flow will be in the JSON format. It will be converted to a Pandas DataFrame for better representation.



Prospective Candidates

Here are some matches: (You add candidates to invite by checking the box in the 'Invite' column)

ID	Student	Education	UndergradMajor	DeveloperType
31	<input checked="" type="checkbox"/>	Master's degree (MA, MS, M.Eng., MBA, etc.)	Computer science, computer engineering, or software engineering	Back-end developer,Front-end developer,Full-stack developer
57	<input checked="" type="checkbox"/>	Bachelor's degree (BA, BS, B.Eng., etc.)	Computer science, computer engineering, or software engineering	Back-end developer,Front-end developer,Student
72	<input type="checkbox"/>	Bachelor's degree (BA, BS, B.Eng., etc.)	Computer science, computer engineering, or software engineering	Back-end developer,Database administrator,Designer,Front-end developer,Full-sta
78	<input type="checkbox"/>	Bachelor's degree (BA, BS, B.Eng., etc.)	Computer science, computer engineering, or software engineering	Back-end developer,Front-end developer,Full-stack developer
82	<input type="checkbox"/>	Master's degree (MA, MS, M.Eng., MBA, etc.)	Mathematics or statistics	Back-end developer,DevOps specialist,Front-end developer,Full-stack developer,M
3,145	<input type="checkbox"/>	Associate degree	Computer science, computer engineering, or software engineering	Back-end developer,Desktop or enterprise applications developer,Engineering mai
3,147	<input type="checkbox"/>	Bachelor's degree (BA, BS, B.Eng., etc.)	Web development or web design	Back-end developer,Database administrator,Designer,DevOps specialist,Front-end
3,151	<input type="checkbox"/>	Bachelor's degree (BA, BS, B.Eng., etc.)	Computer science, computer engineering, or software engineering	Back-end developer,Designer,Full-stack developer
3,160	<input type="checkbox"/>	Bachelor's degree (BA, BS, B.Eng., etc.)	Computer science, computer engineering, or software engineering	Back-end developer,Data scientist or machine learning specialist,Full-stack develo
3,182	<input type="checkbox"/>	Master's degree (MA, MS, M.Eng., MBA, etc.)	Another engineering discipline (ex. civil, electrical, mechanical)	Back-end developer,Front-end developer,Full-stack developer

Add Invites +

Search again

STREAMLIT UI

9. **SHOW (STREAMLIT):** The processed data of prospective candidates is then presented to the organization on Hiring Platform.

PROTOTYPE (v1.1.0): (Working)



1. **REQUEST:** The Organization will provide the request for candidates in Natural Language.

Write your request here:

Our organization needs Java developer with Android development and 5+ years of experience.

Submit

Prospective Candidates

Here are some matches: (You add candidates to invite by checking the box in the 'Invite' column)

ID	Student	Education	UndergradMajor	DeveloperType
31	<input checked="" type="checkbox"/>	Master's degree (MA, MS, M.Eng., MBA, etc.)	Computer science, computer engineering, or software engineering	Back-end developer,Front-end developer,Full-stack developer
57	<input checked="" type="checkbox"/>	Bachelor's degree (BA, BS, B.Eng., etc.)	Computer science, computer engineering, or software engineering	Back-end developer,Front-end developer,Student
72	<input type="checkbox"/>	Bachelor's degree (BA, BS, B.Eng., etc.)	Computer science, computer engineering, or software engineering	Back-end developer,Database administrator,Designer,Front-end developer,Full-sta
78	<input type="checkbox"/>	Bachelor's degree (BA, BS, B.Eng., etc.)	Computer science, computer engineering, or software engineering	Back-end developer,Front-end developer,Full-stack developer
82	<input type="checkbox"/>	Master's degree (MA, MS, M.Eng., MBA, etc.)	Mathematics or statistics	Back-end developer,DevOps specialist,Front-end developer,Full-stack developer,M
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3,151	<input type="checkbox"/>	Bachelor's degree (BA, BS, B.Eng., etc.)	Computer science, computer engineering, or software engineering	Back-end developer,Designer,Full-stack developer
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3,182	<input type="checkbox"/>	Master's degree (MA, MS, M.Eng., MBA, etc.)	Another engineering discipline (ex. civil, electrical, mechanical)	Back-end developer,Front-end developer,Full-stack developer

Add Invitees +

Search again

2. **RESPONSE:** After processing the request in the Prompt Flow, as discussed in previous slides, the response will be displayed as shown in the image.

- NOTE:** The limit of the response is set to 20 rows.

PROTOTYPE (v1.1.0): (Working)



	FrameworkWorkedWith	Gender	Invite
	Android,AWS,Linux	Male	<input checked="" type="checkbox"/>
ive-C,PHP,Python,Kotlin,HTML,CSS,Bash/Shell	Android,iOS,Raspberry Pi,Firebase	Male	<input checked="" type="checkbox"/>
Script,Python,Rust,SQL,HTML,CSS,Bash/Shell	Android,Linux,Windows Desktop or Server	Male	<input checked="" type="checkbox"/>
	Android,Google Cloud Platform/App Engine,iOS,Windows	Male	<input checked="" type="checkbox"/>
pt,HTML,CSS,Bash/Shell	Android,iOS,Linux	Male	<input checked="" type="checkbox"/>
ective-C,Python,Swift,HTML,CSS	Android,AWS,iOS,Mac OS,Raspberry Pi,Firebase	Male	<input type="checkbox"/>
PHP,SQL,Visual Basic 6,HTML,CSS	Amazon Echo,Android,Arduino,Azure,iOS,Mac OS,Window	Male	<input type="checkbox"/>
SQL,Python,HTML,CSS,Bash/Shell	Android,Linux,Windows Desktop or Server	Male	<input type="checkbox"/>

3. ADD INVITEES: Select Candidates and add them to invite list.

Add Invitees

Candidates added to the invite list.

Send Invitations

4. **SEND INVITATION:** After selecting the candidates and rechecking the final list, invitation can be sent to the selected candidates.
- NOTE:** The response will not contain and PII (Personally Identifiable Information) of the candidate through which and organization can directly contact them.
 - Until the candidate is hired the organization will only be able to interact with him/her over the hiring platform.

Invitations

Candidates you are inviting:

	YearsCoding	LanguageWorkedWith	FrameworkWorkedWith	Gender	Invite
	11	Assembly,C,C++,C#,Java,JavaScript,Python,SQL,HTML,CSS,Bash/Shell	Android,Arduino,Heroku,Linux,Raspberry Pi	Male	<input checked="" type="checkbox"/>
-stack developer,Mot	26	C#,Go,Java,JavaScript,Objective-C,PHP,Python,Kotlin,HTML,CSS,Bash/Shell	Android,iOS,Raspberry Pi,Firebase	Male	<input checked="" type="checkbox"/>
	26	C,C++,Java,SQL,Bash/Shell	Android,AWS,Linux	Male	<input checked="" type="checkbox"/>
	14	C#,Java,JavaScript,SQL,HTML	Android,Google Cloud Platform/App Engine,iOS,Windows Desktop or Server,WordPre	Male	<input checked="" type="checkbox"/>
er,QA or test develop	17	Assembly,C,C++,Go,Java,JavaScript,Python,Rust,SQL,HTML,CSS,Bash/Shell	Android,Linux,Windows Desktop or Server	Male	<input checked="" type="checkbox"/>

edit invitations?

Send Invites

Invitations sent to 5 candidates: [57, 82, 3151, 28686, 28713]!

Search for other roles

DEMO (Video): <https://youtu.be/fUb6gH7m3So>

CODE (GITHUB): <https://github.com/Devrajsinh-Gohil/UTP>