

N26 AI Engineer Interview

RAG presentation
02/11/2025
Gowtham B C

Architecture Overview

- Gemini api key: Dev time hit threshold with gemini and got blocked.
- Used Local ollama Gemma 3n models for LLM, nomic-embed-text for embedding

Features implemented:

- UI to ingest vectors (<http://localhost:8000/>)
- Qdrant for Vector DB and search engine (<http://localhost:6333/dashboard>)
- Reranker algorithm ([cross-encoder/ms-marco-MiniLM-L-6-v2](#))
- Api test cases using [Pytest](#) and Good exception handling
- Clear all Vector Collections
- Swagger for API docs (<http://localhost:8000/docs>)
- Model Drift score for DB health check ([Index Coherence score](#))
- Git Repository (<https://github.com/Gowtham171996/N26-Gowtham-AI-Engineer>)
- Dockerised & docker-compose run in any hardware (Qdrant, Ollama, API-Backend)

Assumptions & Trade-offs

File type

- Explicitly mentioned as .txt, but can take word, pdf with texts. Mounted to local “data” directory to ingest real time (Poor for tables pypdf , imaged pdf OCR)

Track of Model Vector drift

- Vector index drift Score identification along with updated time

When deployed will be on GPU Cloud

- While it is fast, it is expensive for POC. While our own models are free to run with GPU enabled hardware.

From PoC to production (15k parallel requests)

Features to add

- Add redis (A bit higher TTL)
- Deploy on Kubernetes
- Reverse proxy of Traefik, Nginx with load balancer
- Run multiple instances of api-backend container
- CI/CD pipelines (Built, Has issues)
- Vanilla HTML to framework such as Typescript React for UI
- Load balancer

(Single instance with uvicorn can handle approx 7k parallel requests, for time consuming tasks, thread pool should be used. If needed Gunicorn can be used)

Monitoring & Metrics

- Document permission Management (Private: User only, Public: All user) (Qdrant supports its efficiently)
- Simple sqlite User Auth Management
- Config in yaml to Config from SQLite table only for Admin
- Real time logs view Dashboard (Like docker logs, only to Admin)
- Rate limiter per minute & Security headers (Geo fencing if needed)
- Different pipelines for images and tables
- Kafka Message queue
- Grafana, Telemetry and prometheus

Personal takenote

- While in free tier i should have been wary about gemini embedding. I ran POC and it blocked me. I should have implemented rate limiter earlier.
- While it was fun weekend coding, there was certainly time pressure of deadline
- Could have cleaned code better
- Reduced docker size
- More time integration testing
- But was very happy when docker compose ran in peer testing laptop.

Looking forward for next round of interview!! Cheers!!

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N26 AI Engineer role

02/11/2025

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Declaration:

Since Gemini key wasn't given, I ran through **free tier quota** for embedding and LLM and couldn't develop or build using cloud. Hence local ollama docker was used to complete the assignment.

While 90% of the code is same and 100% of concept is same, it is totally free as well.

I will try to make the entire solution live as well: <https://rag.solventumrnd.com/> (Not in scope of assignment)

Prerequisite

Run all these commands to ensure, Cuda enabled Nvidia graphics card and docker is up and running on hardware. Stable internet and 20GB of hardware memory

1. Nvidia-smi
2. nvcc -V
3. docker
4. open docker desktop application

If Nvidia graphics card is not configured, please visit docker compose file and comment the line from 72 to 78 i.e. Deploy section
By default, GPU is enabled it since it is too slow on CPU.

Steps to run:

Please follow every step carefully:

1. have signed in GitHub account. <https://github.com/Gowtham171996/N26-Gowtham-AI-Engineer>
open <https://github.com/Gowtham171996/N26-Gowtham-AI-Engineer/archive/refs/heads/master.zip>
2. Extract the zipped file
3. Open command prompt in folder path and hit DIR
4. Make sure n26rag-compose.yml file is visible. If not you are in wrong path.

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5. Run "docker compose -f n26rag-compose.yml up -d"

(Make sure with Cuda GPU enabled or only CPU) Read prerequisites.

6. Wait for 10mins (pip requirements are very bulk in size, please wait)

7. Open the URLs:

- <http://localhost:8000/> (for main application)
- <http://localhost:6333/dashboard> (for qdrant)
- <http://localhost:8000/docs> (for docs)

8. The UI will load with files ingested. if not click "Trigger full ingestion" button

9. Ask a query to the model and observe the links it pulled information from.

10. Want to modify ingestion? In "data" folder add a new file (txt, word doc, pdf with text)

11. Delete the vector collection by clicking on UI

12. Perform step 7 to ingest new file.

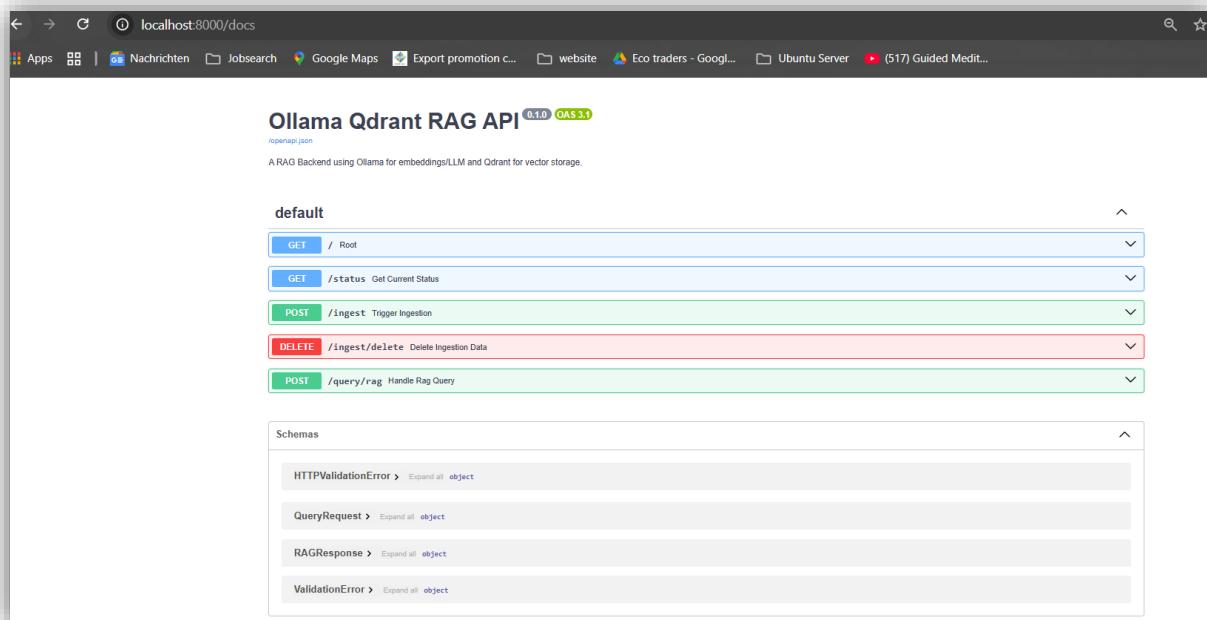
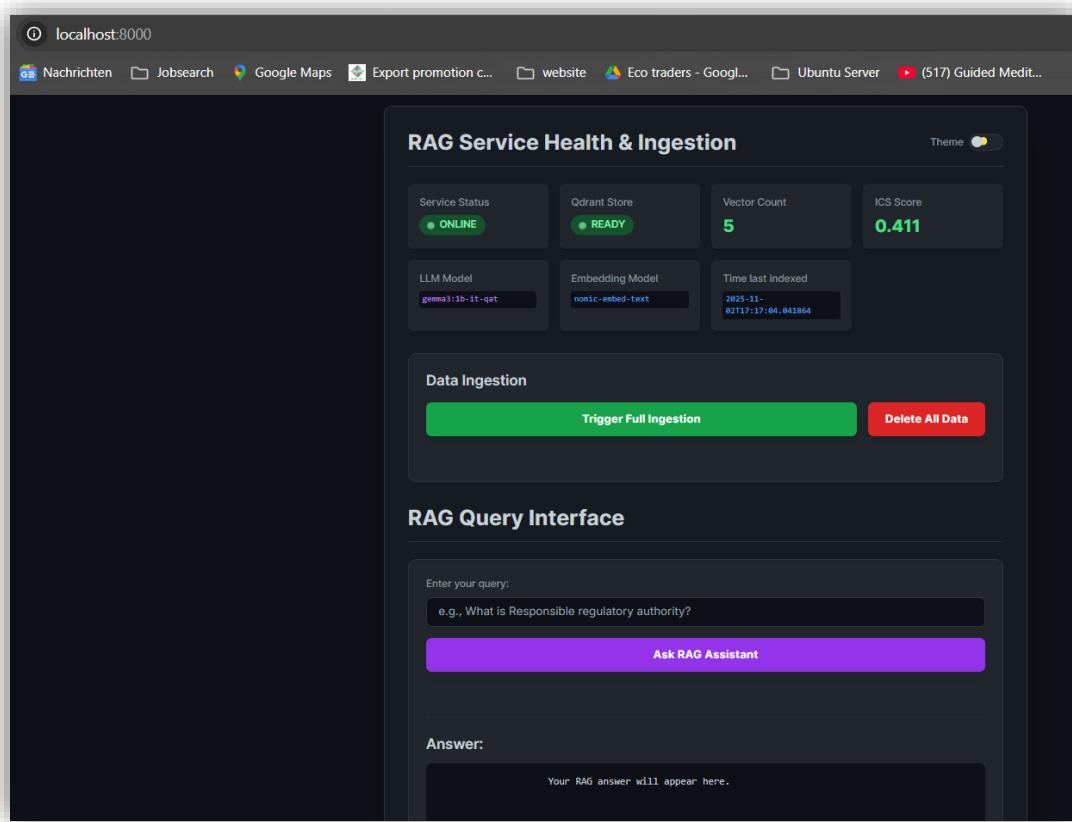
13. Perform step 8 with newly added file.

Known Issues:

1. Twice ingestion is taking place, even though ingestion is persistent.
2. Docker build images are heavy. (For Cuda enabled environment, along with reranker algorithm. PIP requirements are too much.)

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Gallery



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RAG Query Interface

Enter your query:

What is the responsible regulatory authority for N26?

Ask RAG Assistant

Answer:

The legal authority responsible for N26 is the Federal Financial Supervisory Authority (BaFin). You can find more information on the BaFin's website: [https://www.bafin.de] (https://www.bafin.de)

Sources:

Source 1:
File: legal documents.txt
Similarity Score: 0.7052

Source 2:
File: banks documents.txt
Similarity Score: 0.5922

Source 3:
File: money beam.txt
Similarity Score: 0.5273

Source 4:
File: money beam.txt
Similarity Score: 0.4633

Source 5:
File: banks documents.txt
Similarity Score: 0.3213

The screenshot shows the Qdrant web interface at localhost:6333/dashboard#/collections. The interface has a dark theme with a sidebar on the left containing icons for navigation and search. The main area is titled "Collections" and features a search bar. A table lists a single collection:

Name	Status	Points (Approx)	Segments	Shards	Vectors Configuration (Name, Size, Distance)	Actions
ai_knowledge_base	green	5	6	1	default 768 Cosine	⋮