



# Power up LLMs to be Factual Ninjas using GraphRAG

New way of doing RAG

# Hi, I'm Sid



Developer Relations, APAC at Neo4j

Started my career with IBM as Java Technology Engineer

10+ years in Developer Relations & Community Building

Ex-Google and worked at 2 Startups

Google Developer Expert in Gen-AI

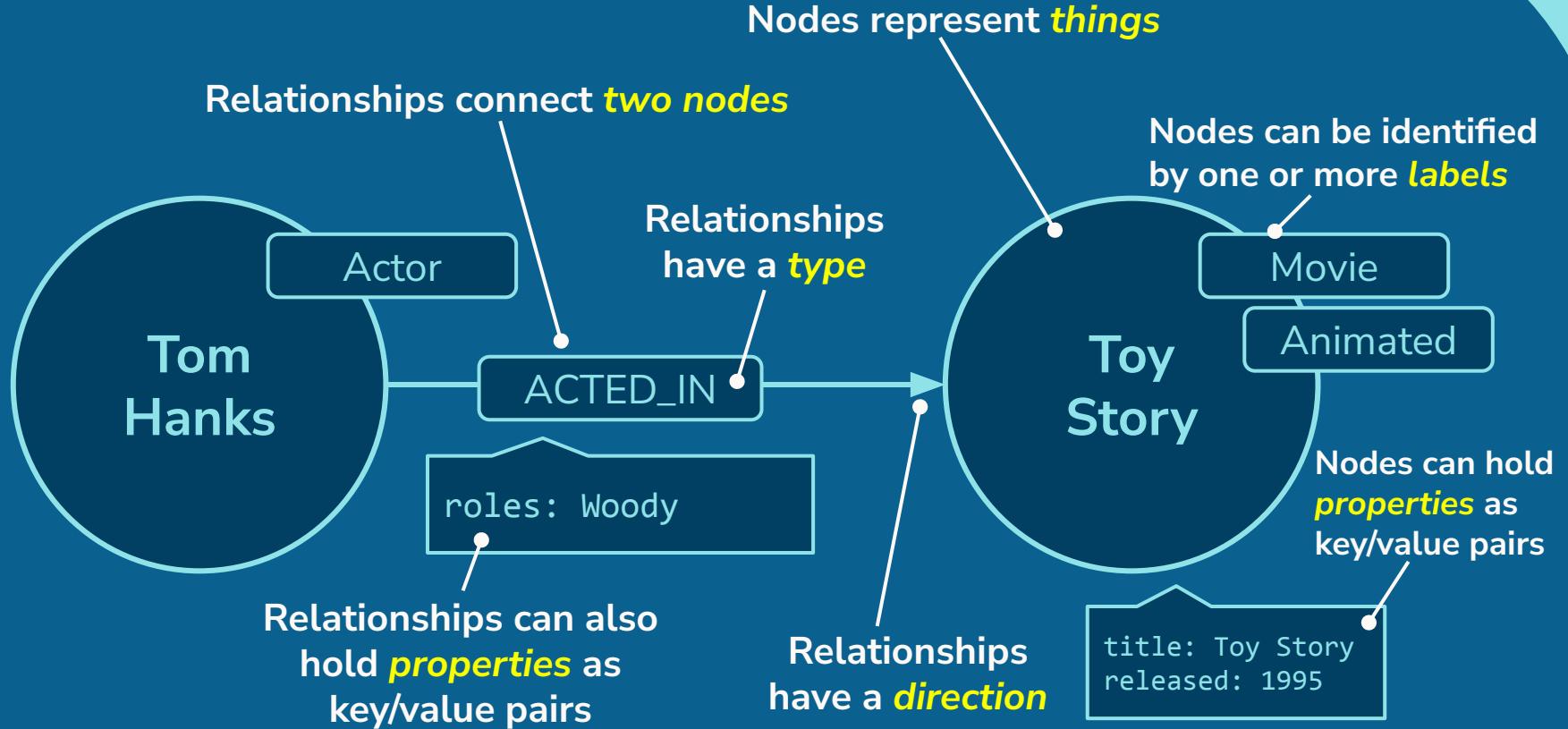
GDG and GDG Cloud Bengaluru Organizer



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Who has heard  
of and worked with  
Neo4j?





# Neo4j: Graph Data Platform

## Native Graph Database

The foundation of the Neo4j platform; delivers enterprise-scale and performance, security, and data integrity for transaction and analytical workloads.

## Data Science and Analytics

Explorative tools, rich algorithm library, and Integrated supervised Machine Learning framework.

## Development Tools & Frameworks

Tooling, APIs, query builder, multi-language support for development, admin, modeling, and rapid prototyping needs.

## Discovery & Visualization

Code-free querying, data modeling and exploration tools for data scientists, developers, and analysts.

## Graph Query Language Support

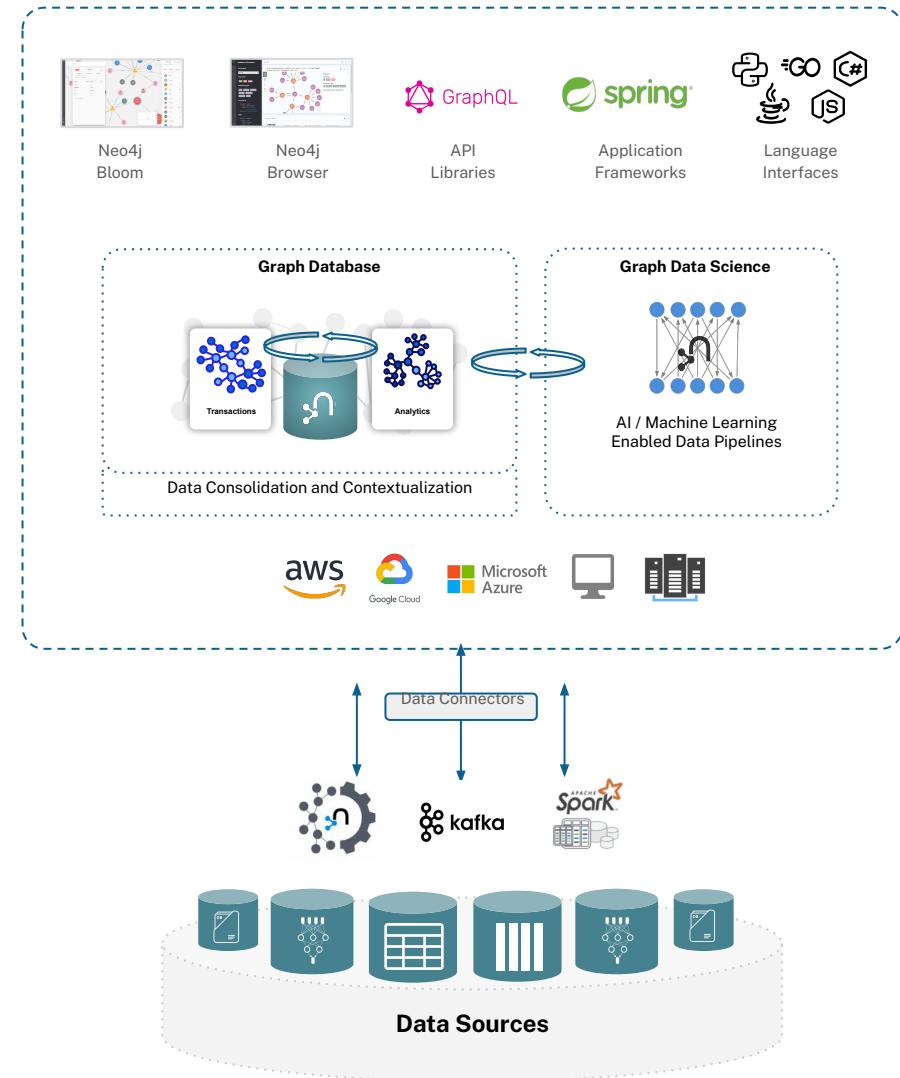
Cypher & openCypher; Ongoing leadership and standards work (GQL) to establish lingua franca for graphs.

## Ecosystem & Integrations

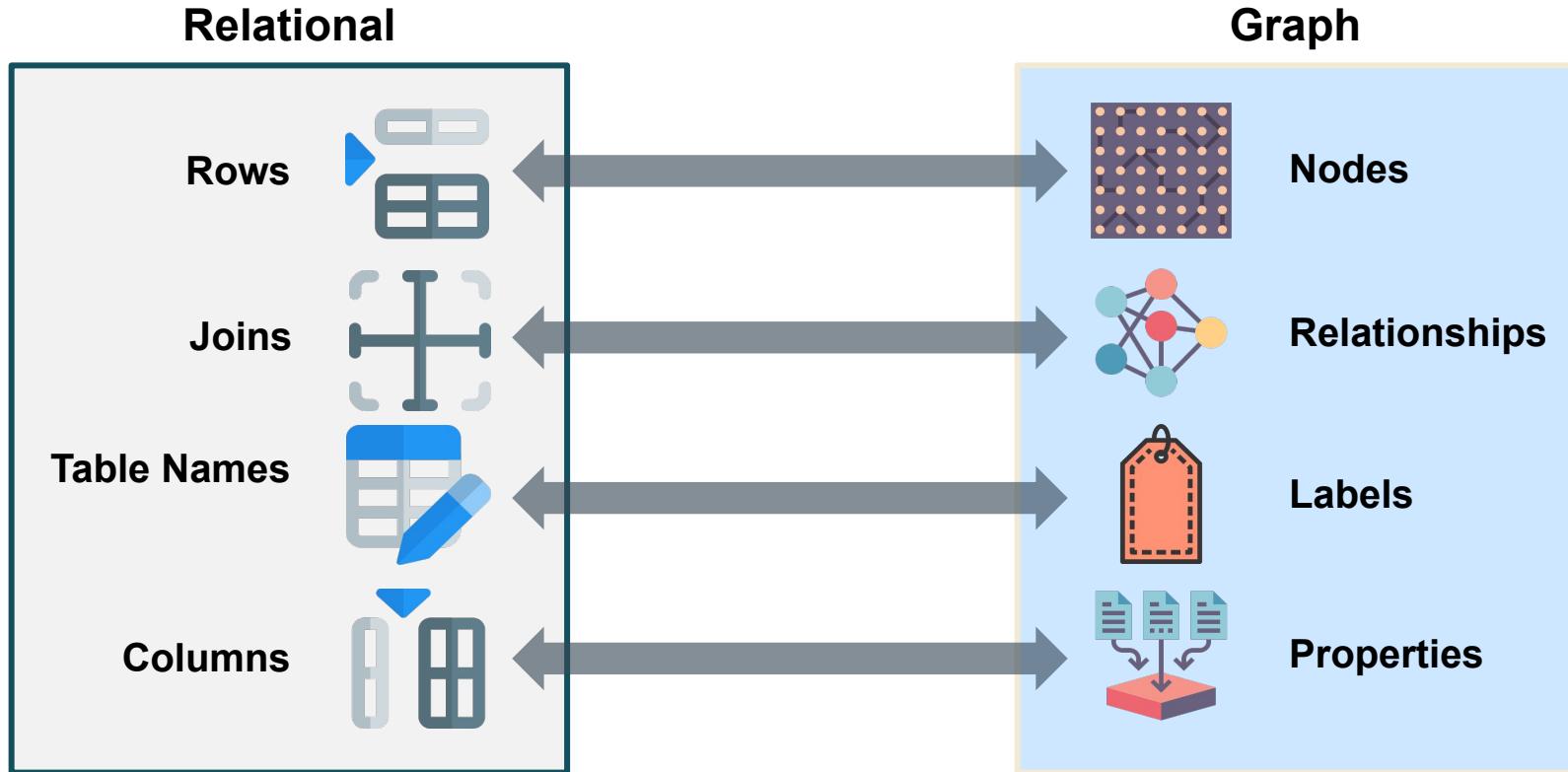
Rich ecosystem of tech and integration partners. Ingestion tools (JDBC, Kafka, Spark, BI Tools, etc.) for bulk and streaming needs.

## Runs Anywhere

Deploy as-a-Service (AuraDB) or self-hosted within your cloud of choice (AWS, GCP, Azure) via their marketplace, or on-premises.



# Conceptual Mapping Relational → Graph



# Popular Graph Use Cases



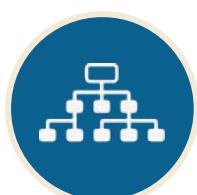
Real-Time  
Recommendations



Fraud  
Detection



Network &  
IT Operations



Master Data  
Management



Risk &  
Compliance



Identity & Access  
Management



# RAG with Neo4j

# LLMs make things up



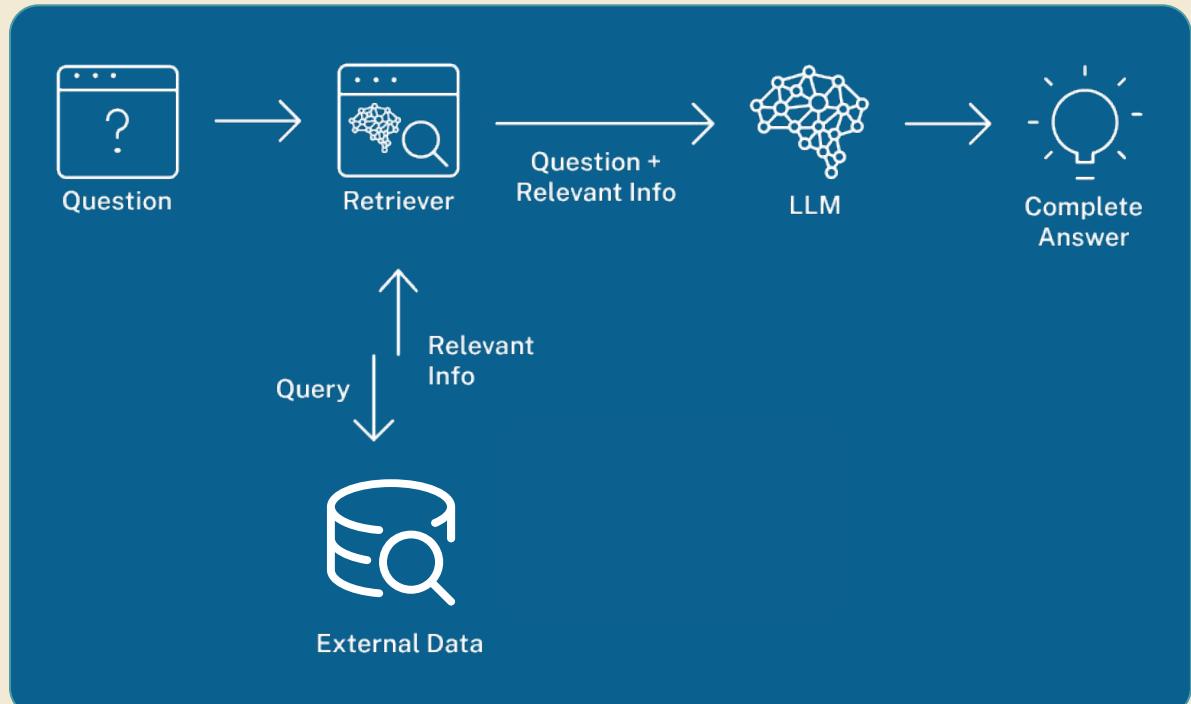
Hallucination

# Retrieval-Augmented Generation (RAG) Is Becoming an Industry Standard

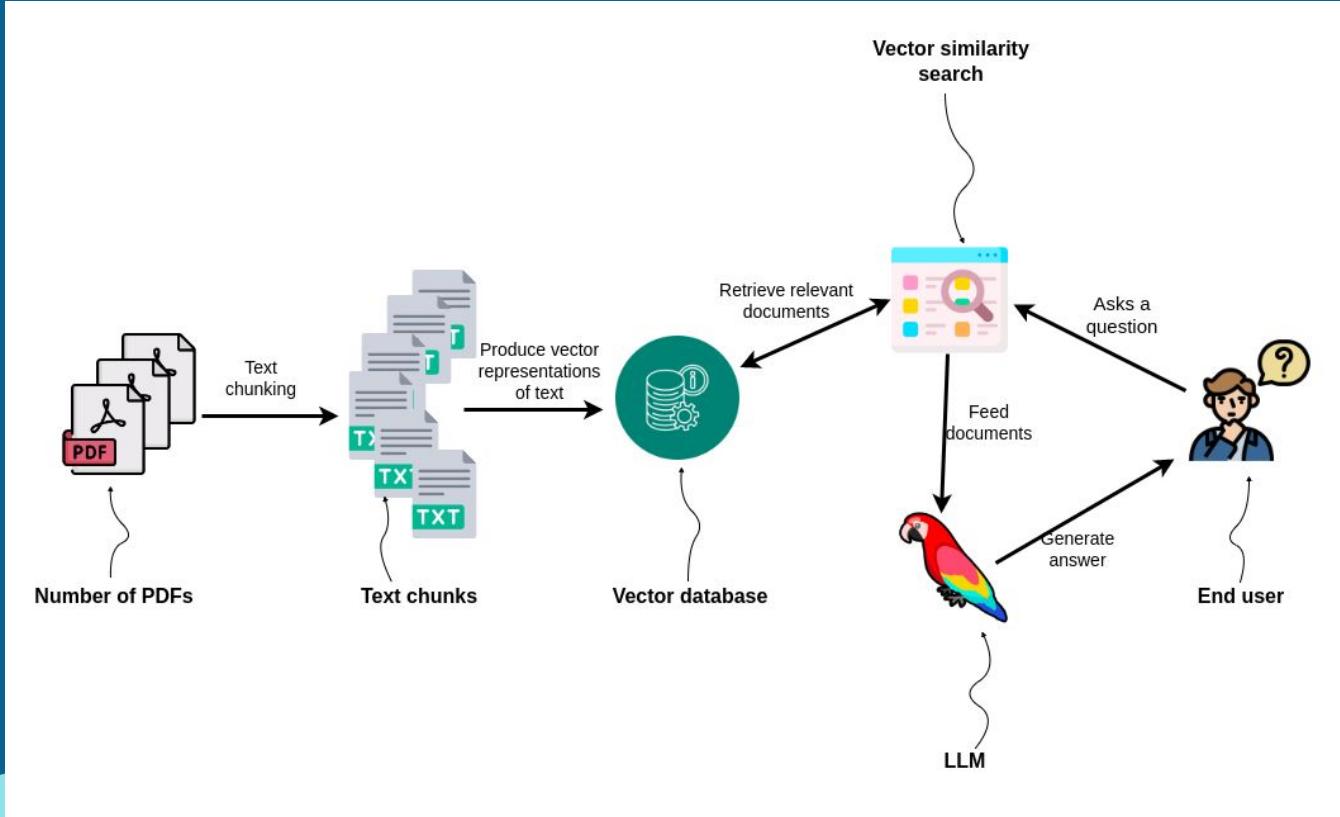
Reduce hallucinations  
with verified data

Provide domain-specific,  
relevant, responses

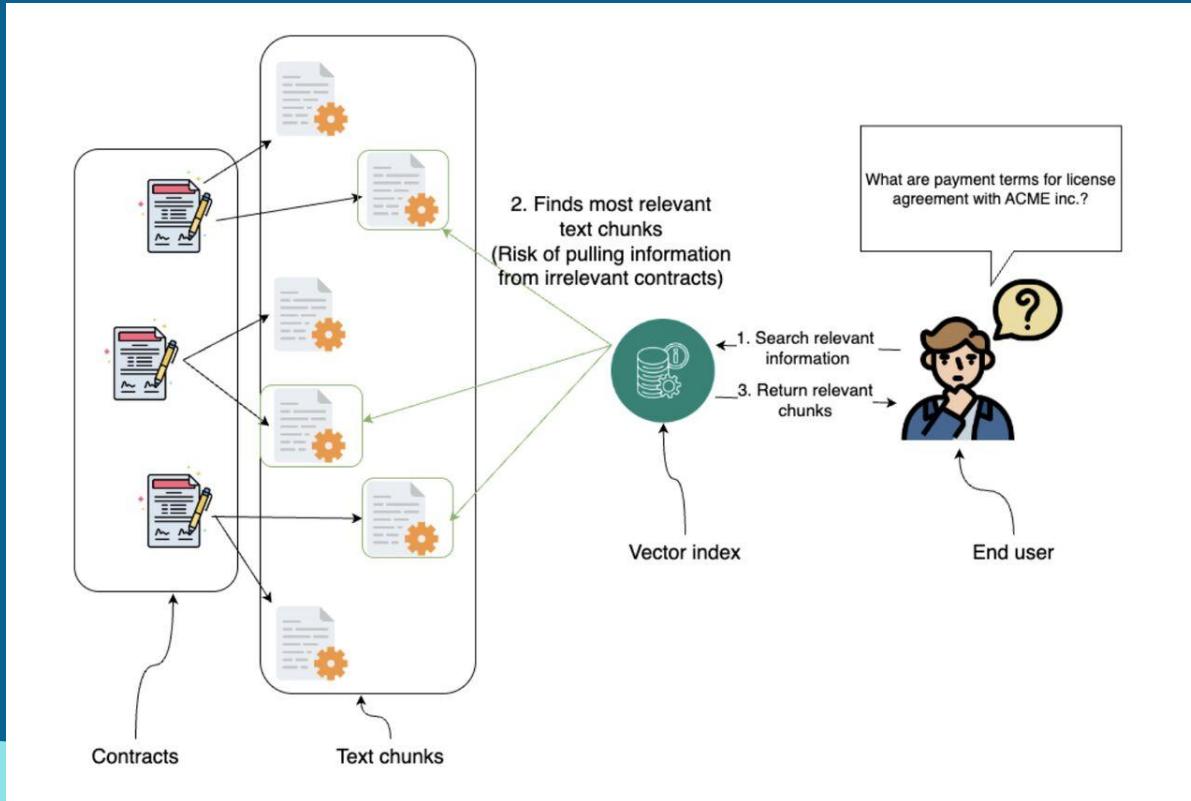
Enable traceability back  
to sources



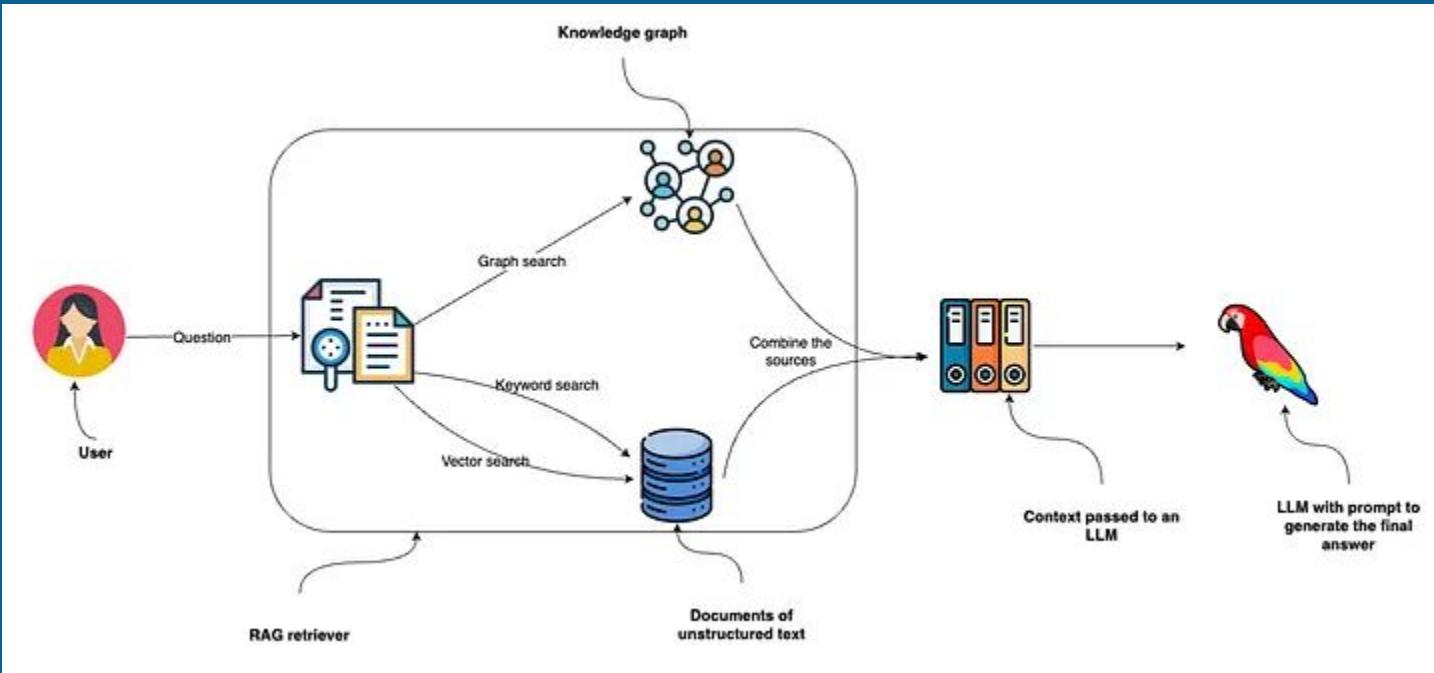
# Vector RAG



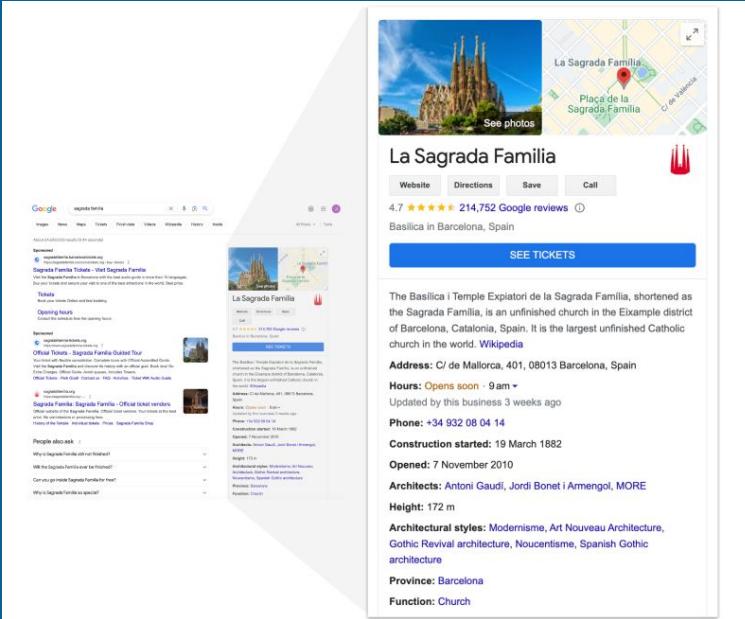
# Why Vector RAG alone might fail miserably?



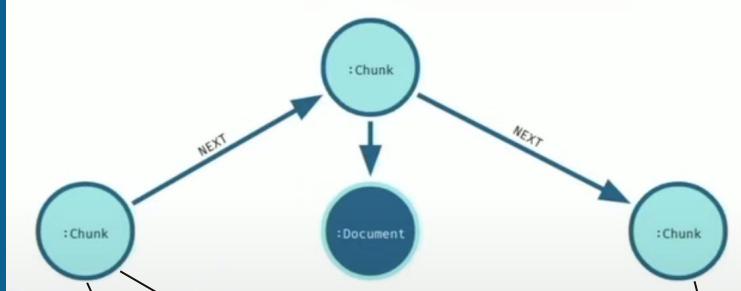
# GraphRAG



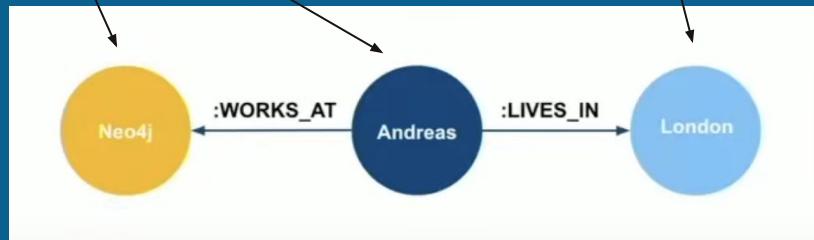
# Knowledge Graphs



Document or Lexical Graph



:MENTIONS



Domain or Entity Graph

# Anatomy of an RFP Document

## AWS RFP

### Intro

#### About the Company

Content

#### Financial Result

Content

### Objectives

Content

### Proposal

#### Subsection 1

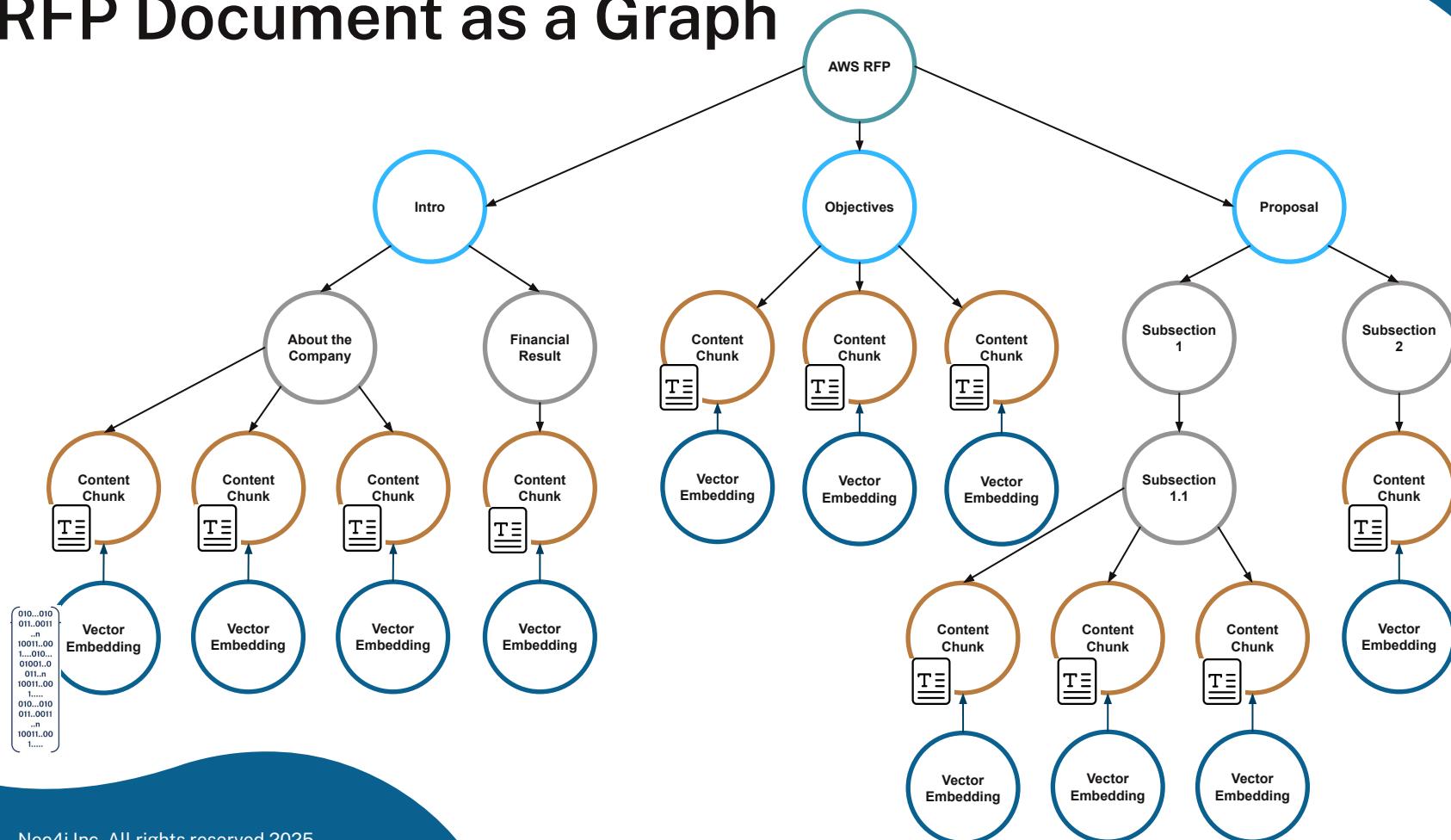
##### Subsection 1.1

Content

#### Subsection 2

Content

# RFP Document as a Graph



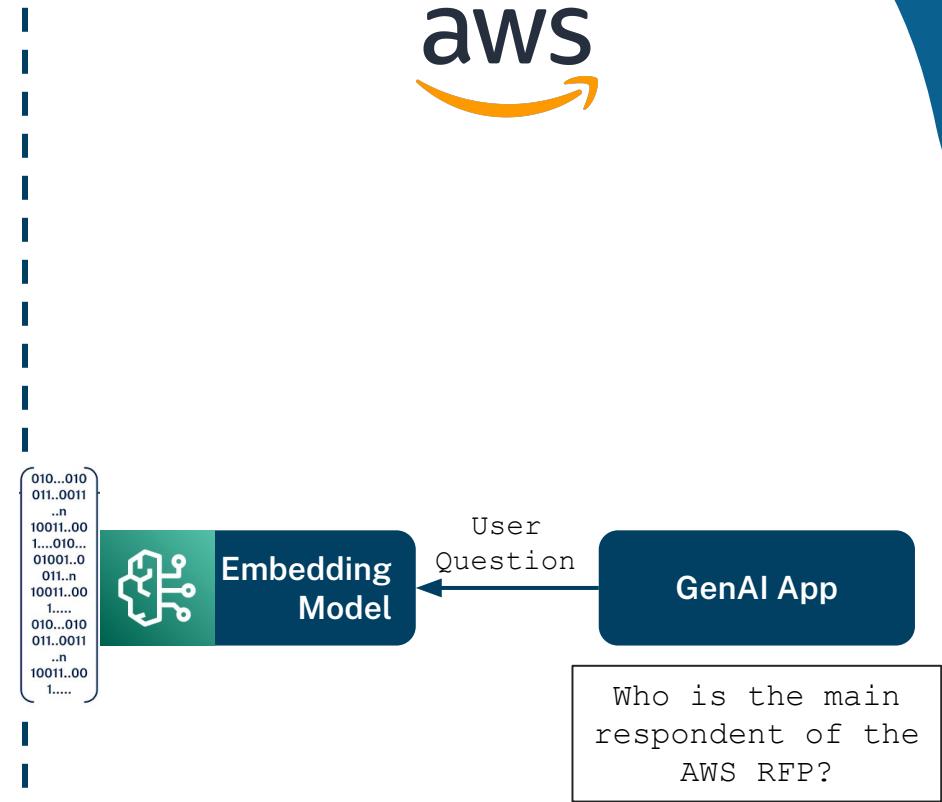


# Accurate, Contextual and Explainable

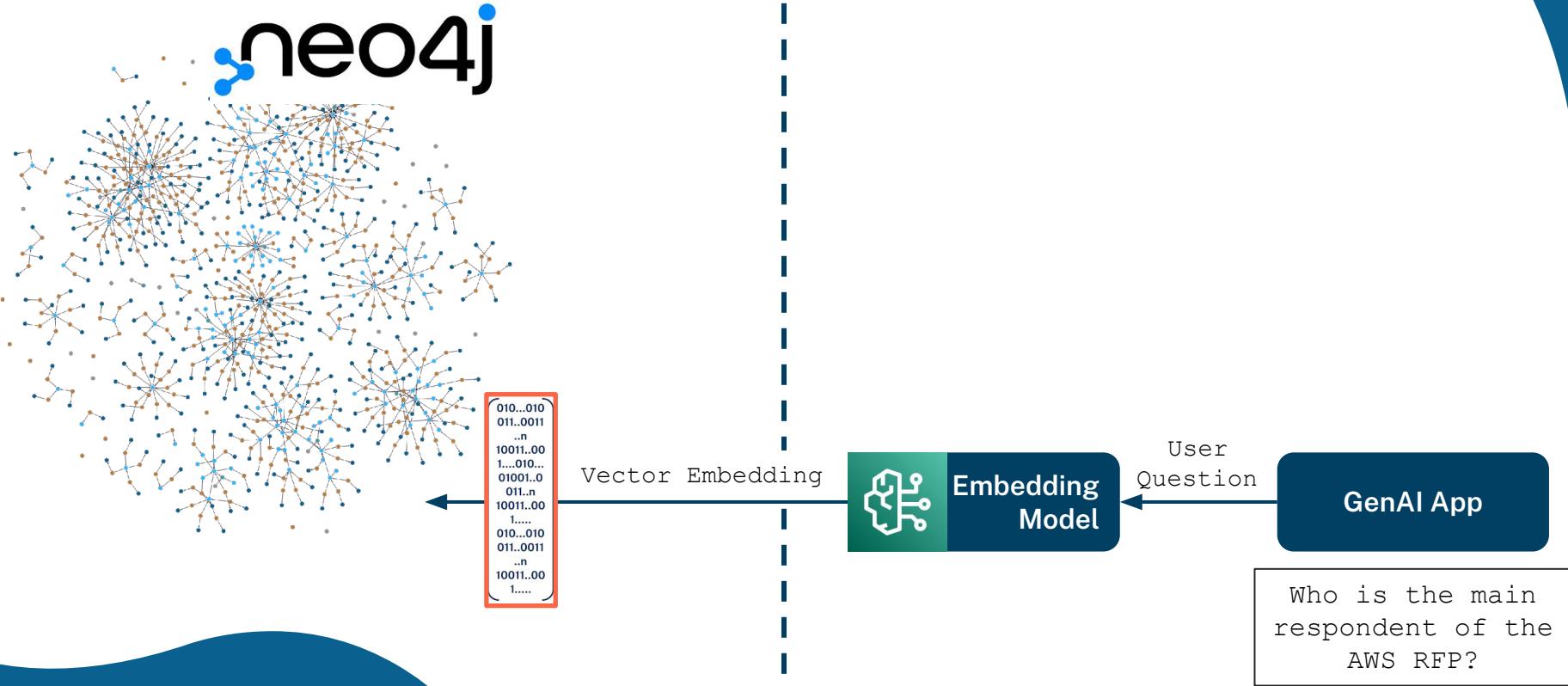
Who is the main respondent  
of the AWS RFP?

GenAI App

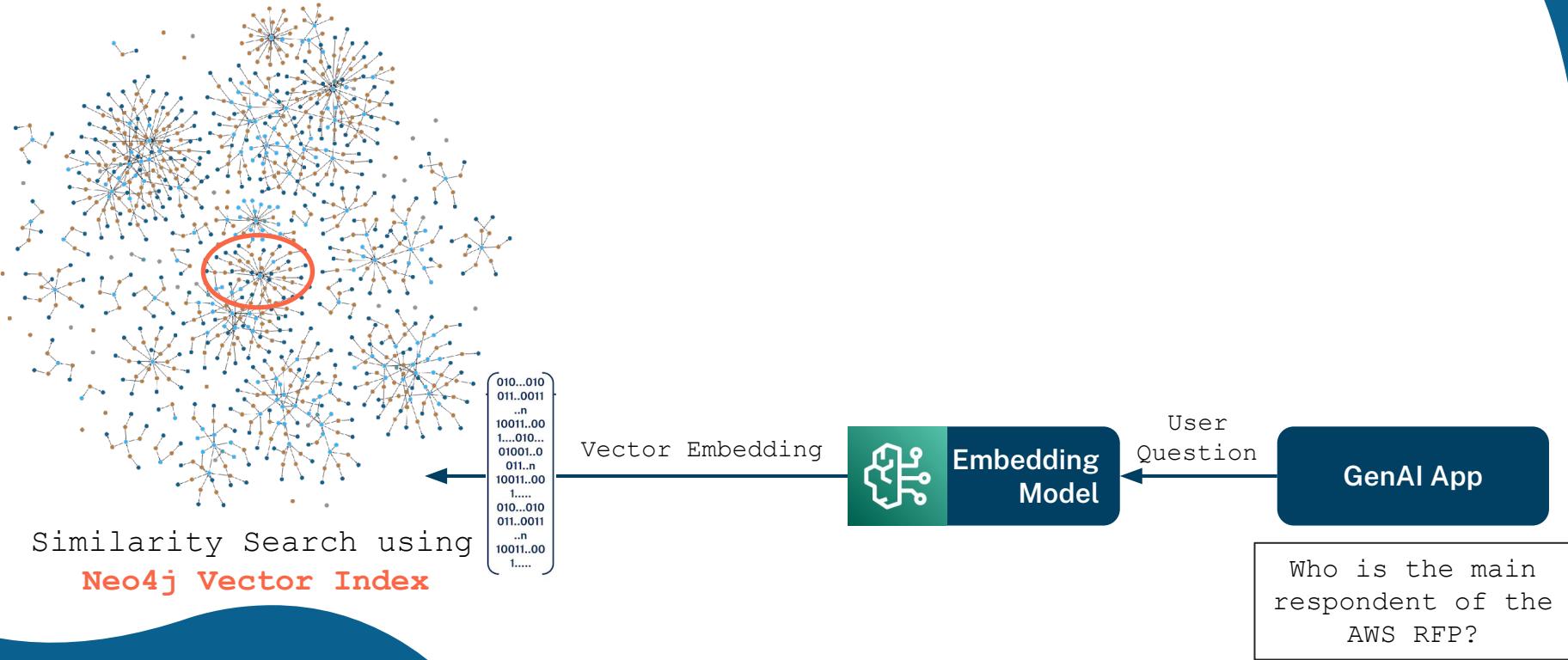
# Accurate, Contextual and Explainable



# neo4j Accurate, Contextual and Explainable

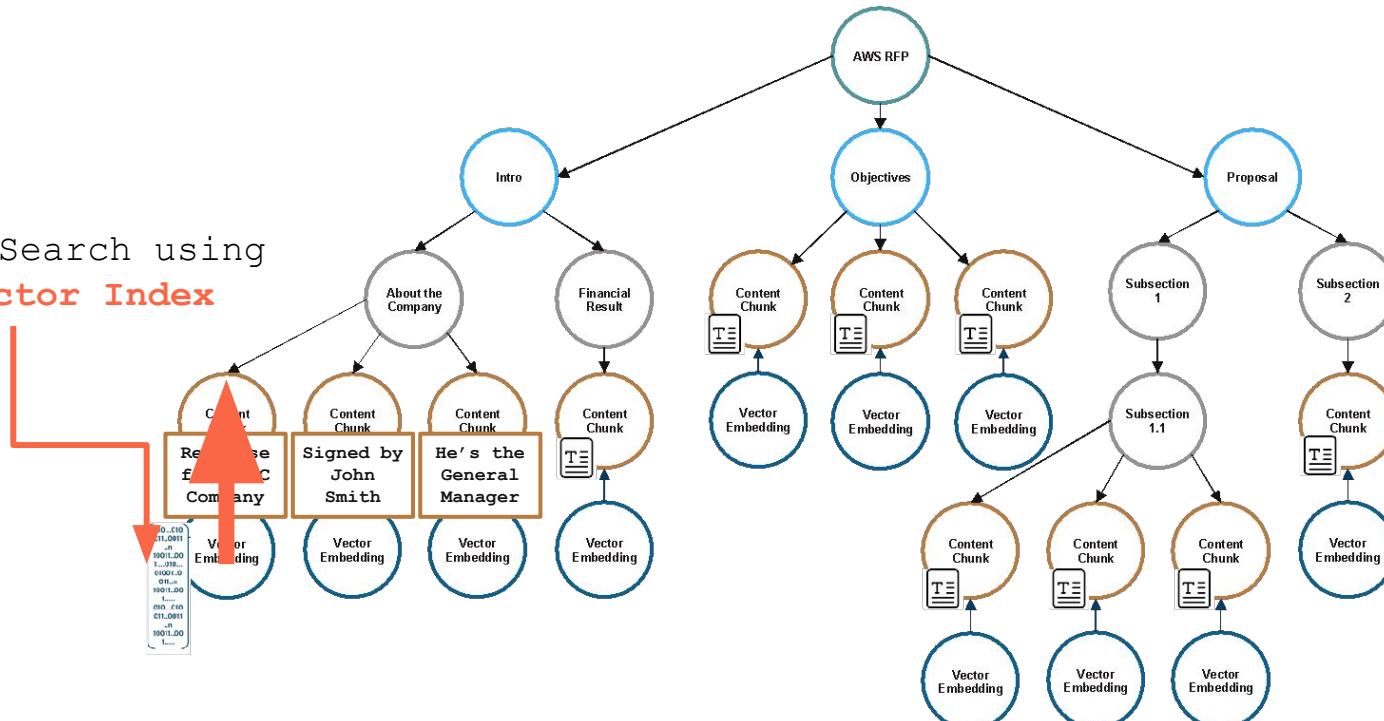


# Accurate, Contextual and Explainable



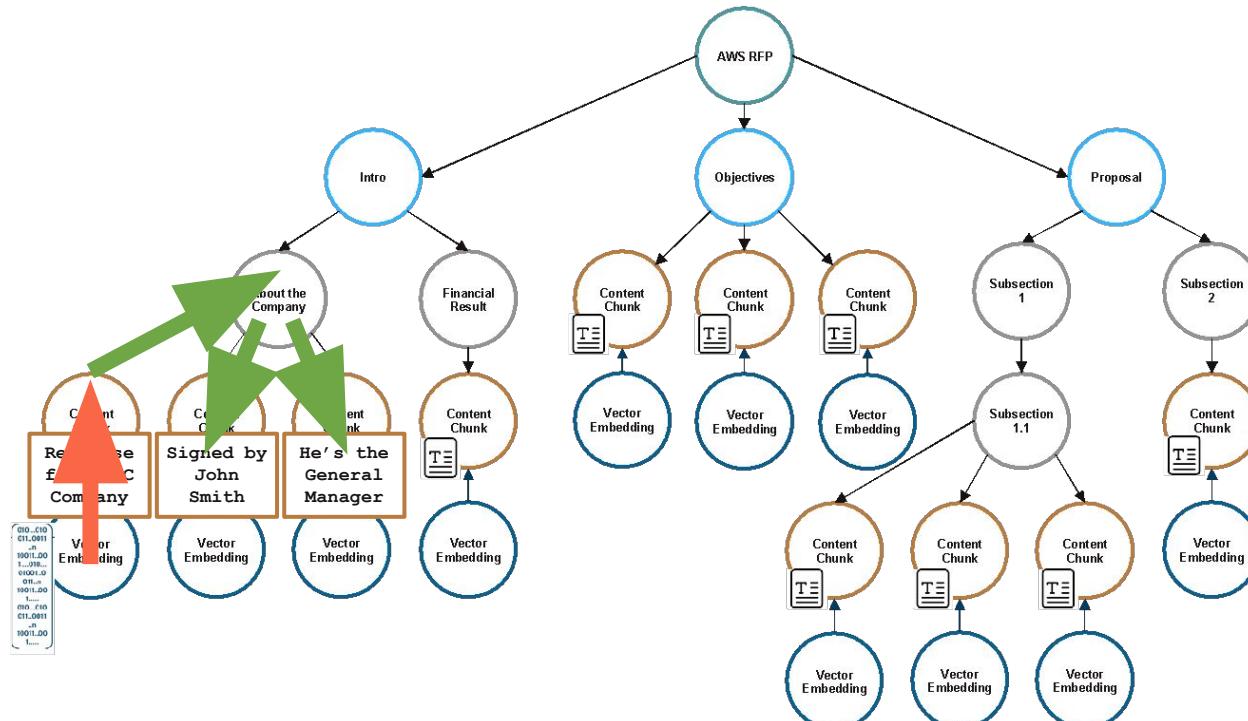
# Accurate, Contextual and Explainable

Similarity Search using  
**Neo4j Vector Index**



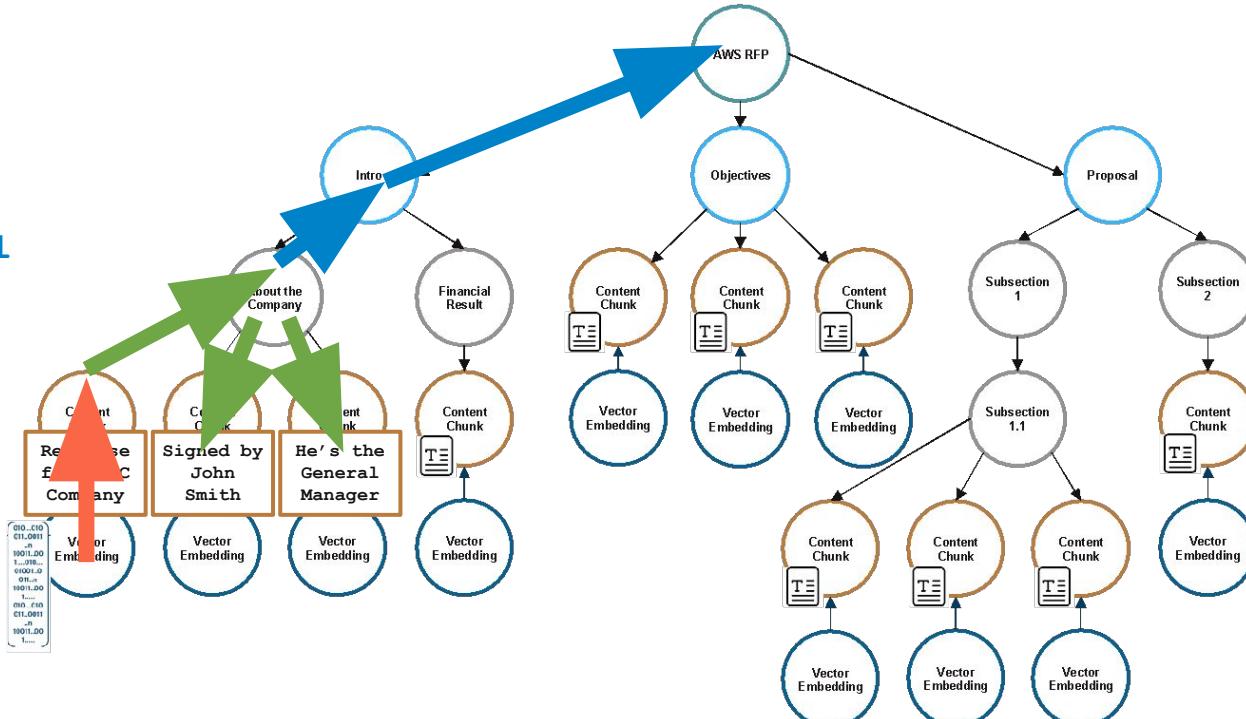
# • Accurate, Contextual and Explainable

# Contextual Knowledge Retrieval within Neo4j KG



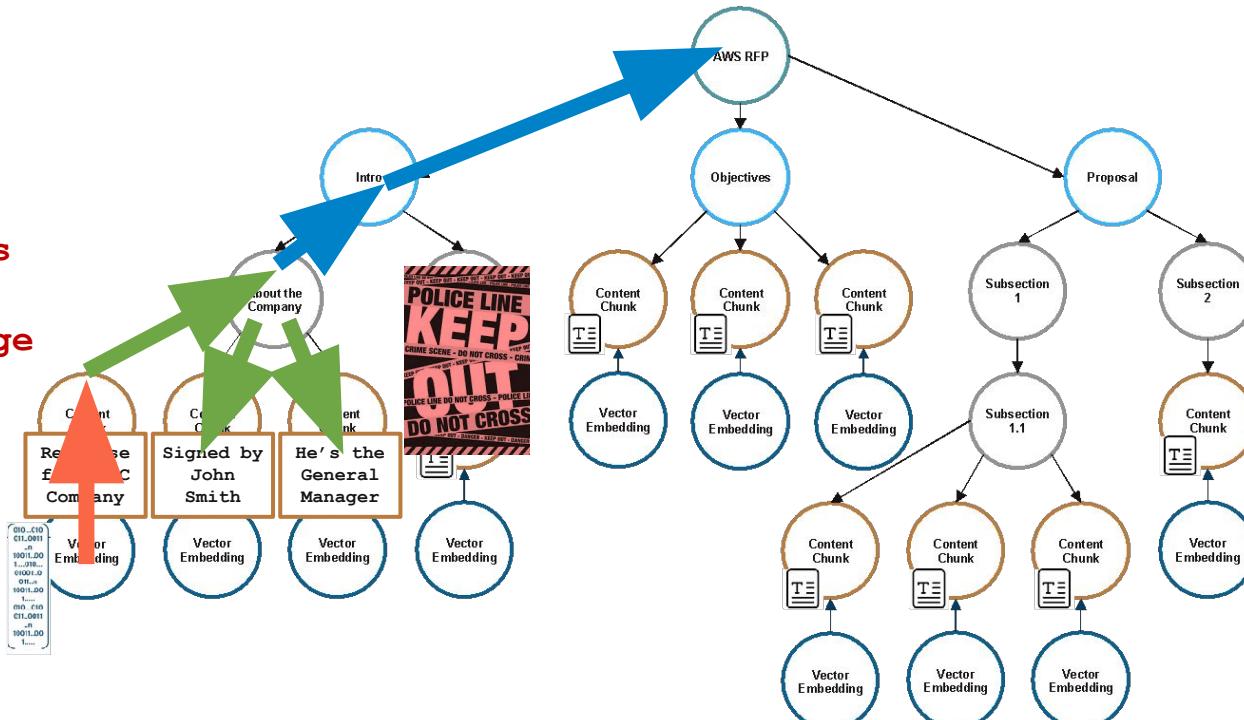
# Accurate, Contextual and Explainable

Knowledge Retrieval  
to aid in  
Explainability

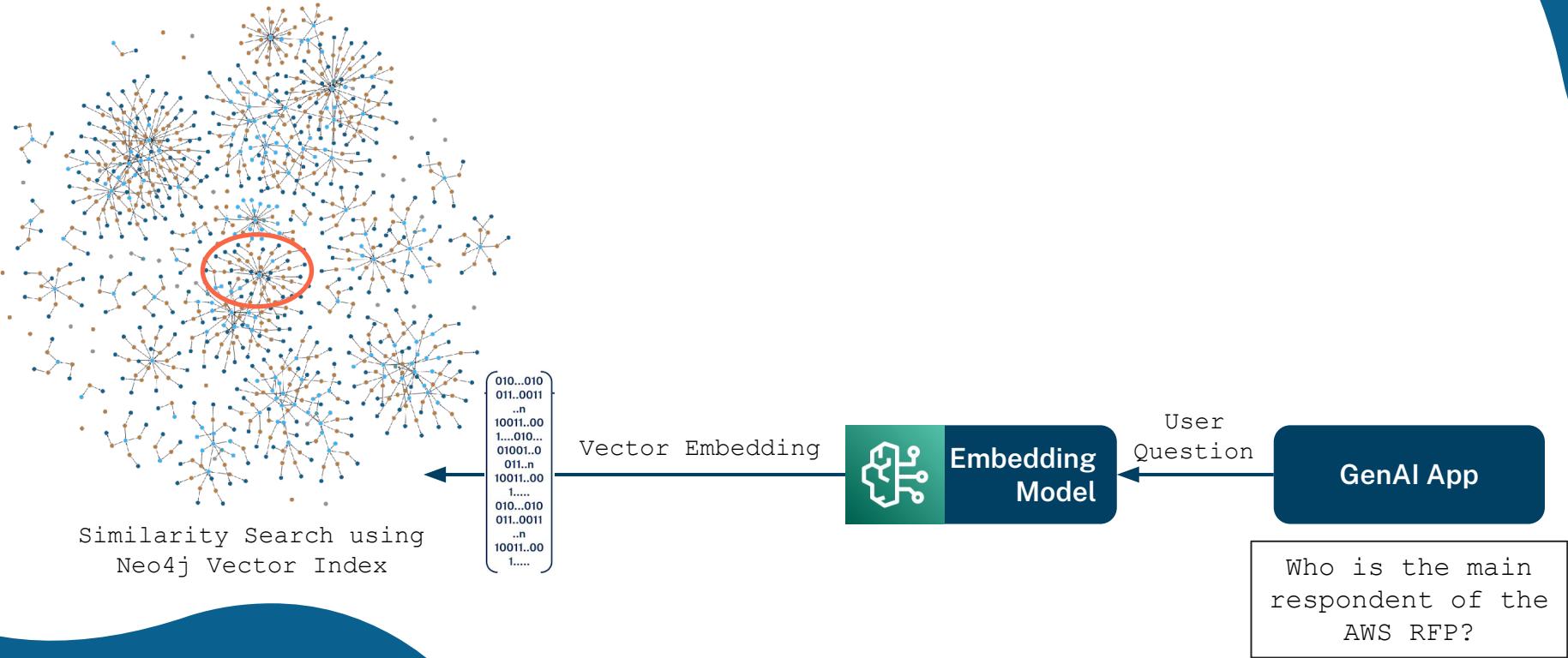


# Accurate, Contextual and Explainable

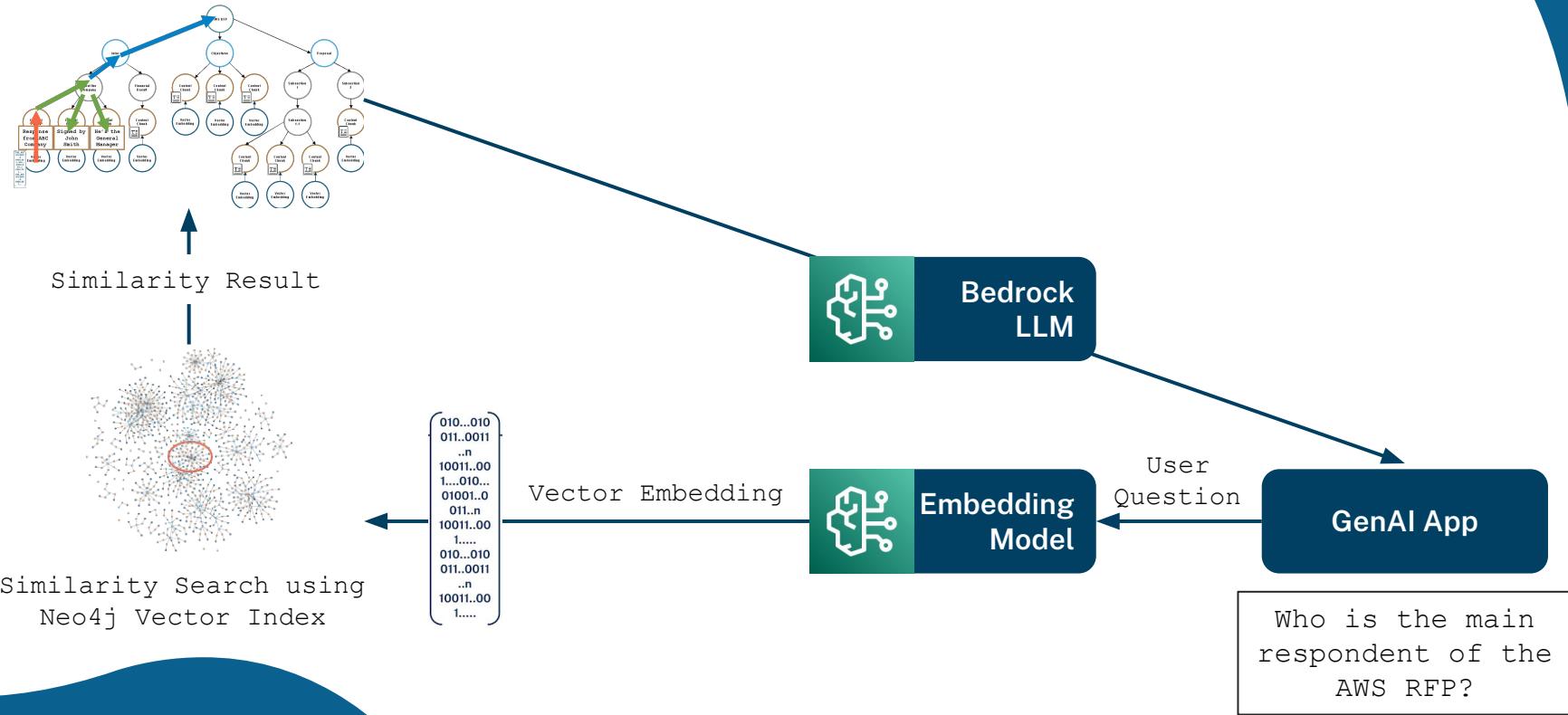
Fine Grained Access Control to prevent unwarranted Knowledge Retrieval



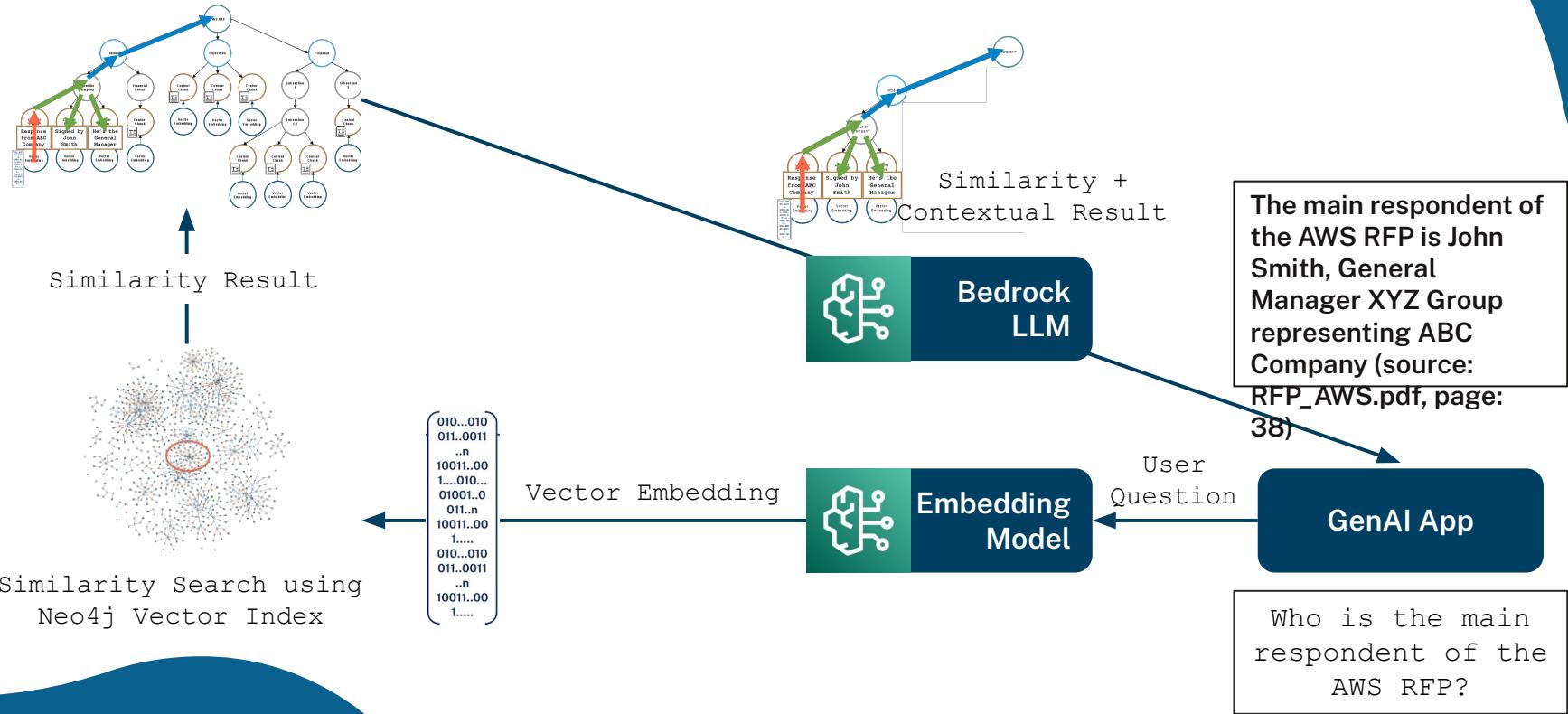
# Accurate, Contextual and Explainable



# Accurate, Contextual and Explainable



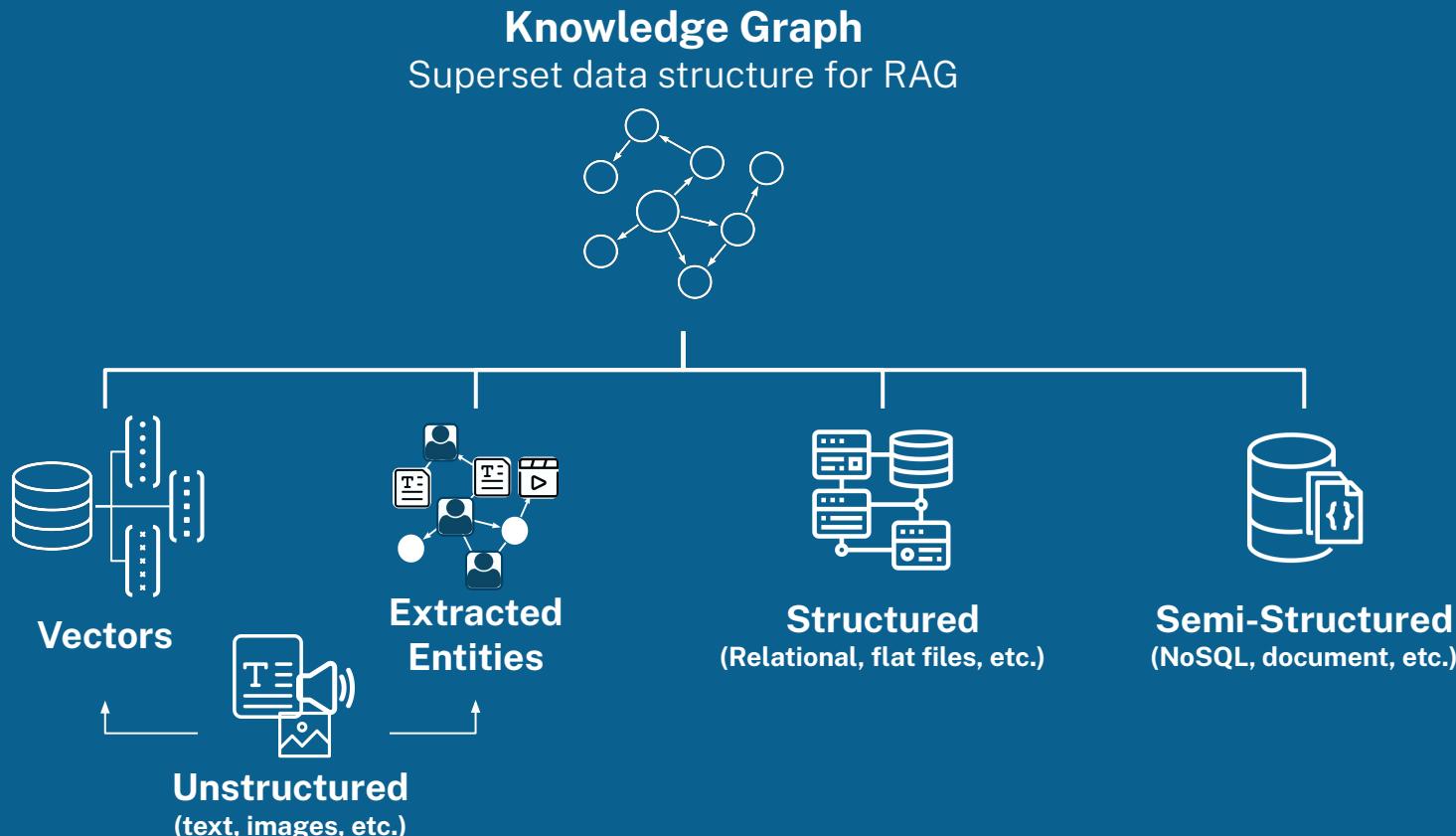
# Accurate, Contextual and Explainable



# Seven Graphs in an Enterprise



# What to Use as the Data Source for RAG?



*Blog*

# The GraphRAG Manifesto: Adding Knowledge to GenAI.



**Philip Rathle**

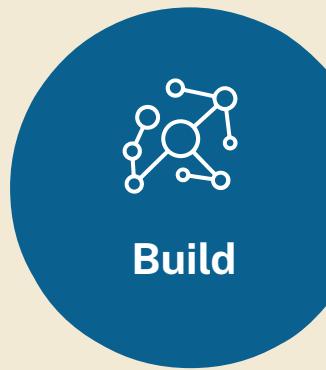
Chief Technology Officer, Neo4j



[neo4j.com/blog/genai/graphrag-manifesto](https://neo4j.com/blog/genai/graphrag-manifesto)



## GraphRAG Ecosystem



Create knowledge graphs  
from unstructured data



Graph-powered natural  
language search



LLM framework integrations  
with graphs

# **LLM Graph Builder**

# LLM Graph Builder Tool to the rescue

## 3 Simple Steps

1

Connect to Neo4j



2

Upload Files

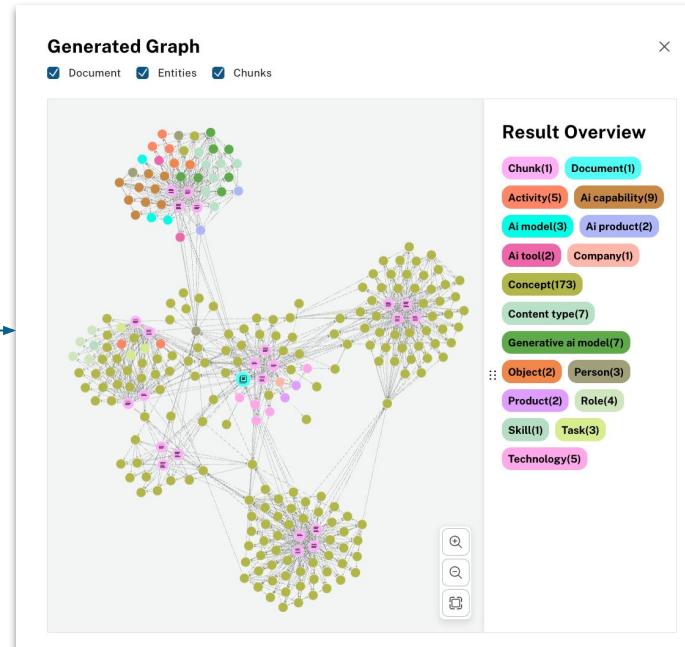
pdf, YouTube,  
cloud storage,  
wikipedia

3

Generate Graph



## View & Explore Your Graph



## Power GraphRAG

Welcome to the Neo4j Knowledge Graph Chat. You can ask questions related to documents which have been completely processed.

6/3/2024 11:44:58 AM



What can Generative AI do?  
6/3/2024 12:05:58 PM

Generative AI can perform a wide range of tasks, including language translation, text generation, image synthesis, music composition, and even video creation. It has the ability to generate new content based on patterns and examples it has learned from training data.

6/3/2024 12:06:18 PM

# LLM Graph Builder Application

Interactive application to construct knowledge graphs from PDF, youtube transcripts etc.

Hosted on

[llm-graph-builder.neo4jlabs.com](https://llm-graph-builder.neo4jlabs.com)

Documentation

[neo4j.com/labs/genai-ecosystem/llm-graph-builder](https://neo4j.com/labs/genai-ecosystem/llm-graph-builder)

The screenshot displays the LLM Graph Builder application interface. At the top, there's a sidebar with icons for 'Drag & Drop or browse' (Documents, Images, Unstructured text), 'Web-Sources', 'Amazon S3', and 'GCS'. Below this is a table titled 'Neo4j connection' showing 25 results:

Name	Status	Upload Status	Size (KB)	Source	Type	Model	Nodes
06.pdf	Completed	Uploaded	738.41	local file	PDF	Openai-gpt-4o	6623
12-pages-8.p...	Completed	Uploaded	255.06	local file	PDF	Openai-gpt-4o	2050
12-pages-7.pdf	Completed	Uploaded	294.51	local file	PDF	Openai-gpt-4o	2113
12-pages-5.p...	Completed	Uploaded	329.77	local file	PDF	Openai-gpt-4o	2487
12-pages-5.p...	Completed	Uploaded	326.59	local file	PDF	Openai-gpt-4o	2155
12-pages-4.p...	Completed	Uploaded	323.13	local file	PDF	Openai-gpt-4o	2392
12-pages-3.p...	Completed	Uploaded	326.27	local file	PDF	Openai-gpt-4o	1837
12-pages-2.p...	Completed	Uploaded	322.89	local file	PDF	Openai-gpt-4o	1751
12-pages-1.pdf	Completed	Uploaded	329.71	local file	PDF	Openai-gpt-4o	2396
09.pdf	Completed	Uploaded	1490.69	local file	PDF	Openai-gpt-4o	3181

Below the table is a large, complex knowledge graph visualization. The graph consists of numerous nodes (represented by colored circles) and directed edges (arrows) connecting them. Nodes include various entities like Google, Bombardier, Patrick Pichette, and others. A search bar at the top left says 'Show me a graph'. To the right of the graph, there are several text-based interactions:

- 'What is the connection from Google to Bombardier?' (Answer: Patrick Pichette)
- 'The connection from Google to Bombardier is that Patrick Pichette, who was the CFO of Google, accepted a position on the board of directors for Bombardier Inc. in 2013.'
- 'What does Bombardier do?' (Answer: Canadian multinational)
- 'Bombardier Inc. is a Canadian multinational'

At the bottom right, there are 'Submit' and 'Cancel' buttons.

# Open Source Project

[github.com/neo4j-labs/llm-graph-builder](https://github.com/neo4j-labs/llm-graph-builder)

- React Front End
  - connect to Neo4j
  - load local PDF, S3 URL, YT Video
  - Wikipedia Enrichment
  - GraphRAG Chat
- Python FastAPI Back End
  - store data in neo4j
  - chunking
  - create embedding (Emb Model)
  - entity extraction (LLM, Diffbot)
  - kNN graph
- Docker(Compose) images

The screenshot shows the GitHub repository page for 'llm-graph-builder'. The repository has 25 branches and 0 tags. The main branch is selected. The repository was last updated 2 weeks ago. It contains 240 commits from 'prakriti-solankey'. The repository description is 'Neo4j graph construction from unstructured data'. It includes links for Readme, Apache-2.0 license, Activity, Custom properties, 7 stars, 2 watching, 7 forks, and Report repository. There are sections for Releases (no releases published), Packages (no packages published, Publish your first package), and Contributors (6 contributors). The Languages section shows TypeScript (44.7%), Python (27.5%), Jupyter Notebook (25.4%), CSS (1.1%), Dockerfile (0.8%), HTML (0.4%), and JavaScript (0.3%). The repository has 2 forks and 7 stars.

# GraphRAG Python package

End-to-end workflows for faster, simpler, and more effective GenAI-KG development, supported by Neo4j



transform documents into  
GenAI-ready knowledge  
graphs with vectors

Easily implement powerful  
knowledge graph retrievers  
using graph traversals and  
vector search and hybrid  
search

Combine entire RAG process  
with retrieval, prompt & LLM  
using just a few lines of code

# GraphRAG Python Package

***pip install neo4j-graphrag***

Neo4j versions supported:

- Neo4j >=5.18.1
- Neo4j Aura >=5.18.0

Python versions supported:

- Python 3.12
- Python 3.11
- Python 3.10
- Python 3.9

The screenshot shows the GitHub project page for `neo4j-graphrag`. At the top, there's a sidebar with navigation links like 'Contents', 'Introduction', 'User Guide: RAG', 'User Guide: Knowledge Graph Builder', 'User Guide: Pipeline', 'API Documentation', and 'Types'. Below that is a 'Quick search' bar. The main content area has a header 'GraphRAG for Python' with a note about it being a renamed continuation of `neo4j-genai`. It lists 'Neo4j versions supported' (>=5.18.1, Neo4j Aura >=5.18.0) and 'Python versions supported' (3.12, 3.11, 3.10, 3.9). A 'Topics' section includes links to 'User Guide: RAG' and 'User Guide: Knowledge Graph Builder'. The central part of the page features a large blue banner with the package name 'neo4j-graphrag 1.4.2' and a 'pip install neo4j-graphrag' button. Below the banner, the description reads 'Python package to allow easy integration to Neo4j's GraphRAG features'. On the left, there's a 'Navigation' sidebar with 'Project description' (selected), 'Release history', 'Download files', and 'Verified details' (with a green checkmark). On the right, the 'Project description' section contains the heading 'Neo4j GraphRAG Package for Python' and a detailed description of the package's purpose and benefits. At the bottom, there are sections for 'Documentation' and 'Project links'.

# **GraphRAG Python Package**

# Integrate with the GenAI Ecosystem



**Integrate Neo4j with leading LLM open-source frameworks** such as LangChain and LlamaIndex

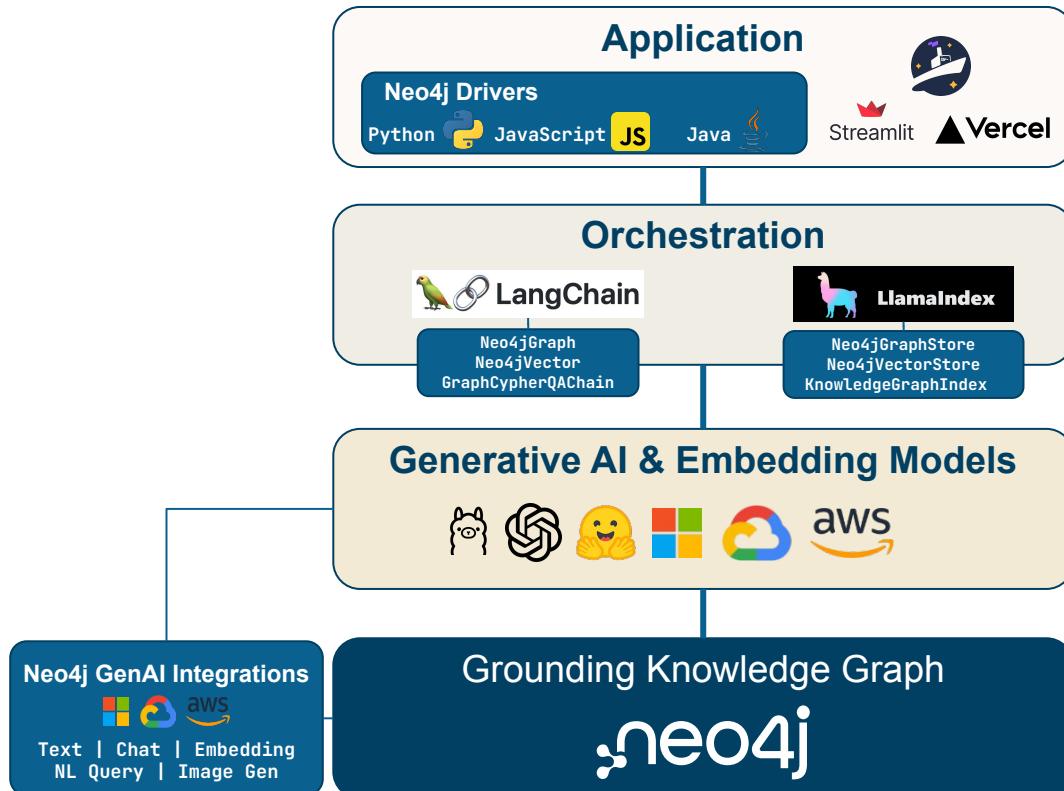


**Call LLM APIs natively** via Cypher using our GenAI procedures or open-source APOC library

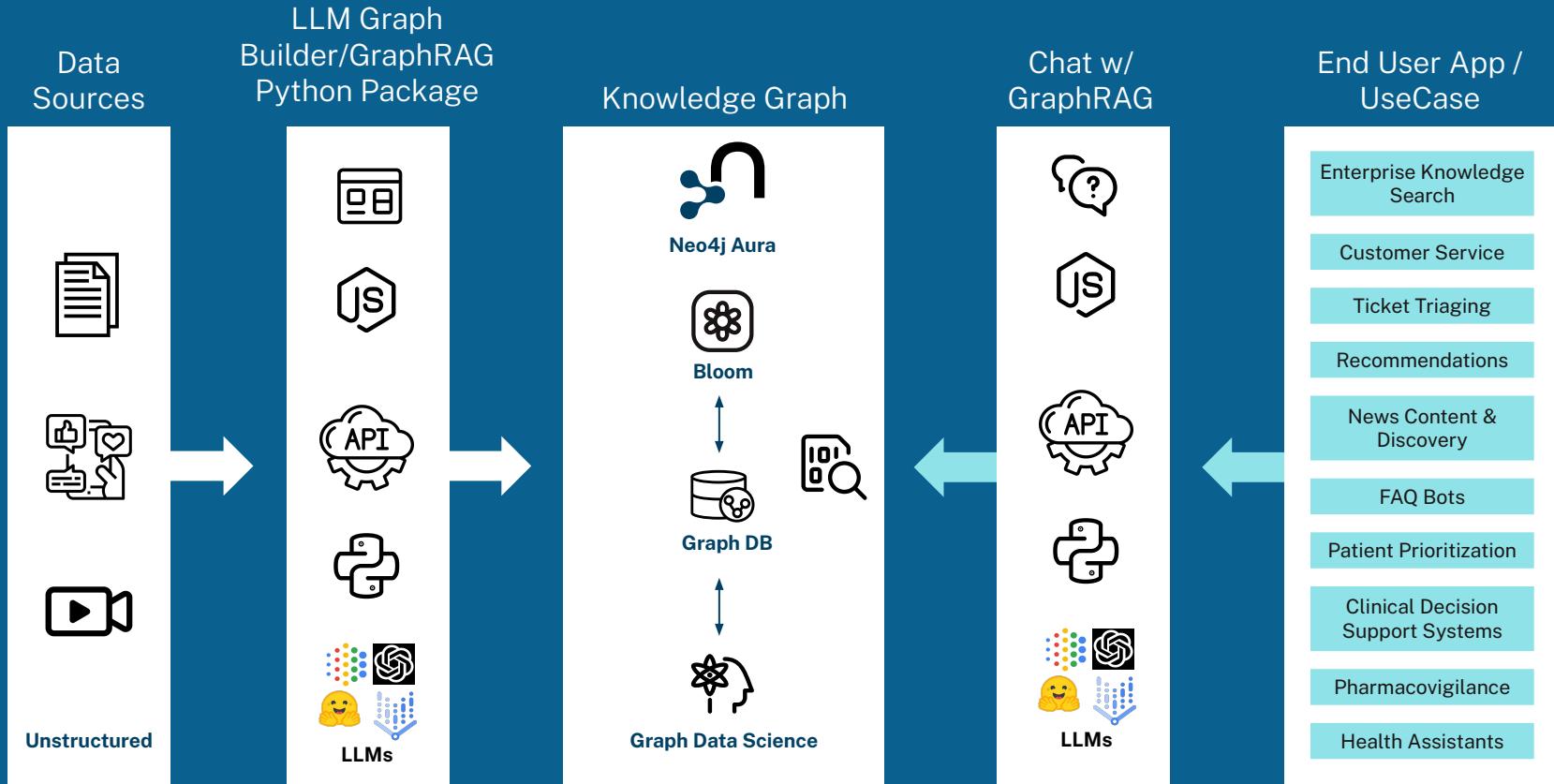


**Agnostic LLM orchestration** connecting graphs to OpenAI, AWS Bedrock, GCP Vertex AI, Azure, Anthropic, Hugging Face, and other proprietary and open source foundation models

## GenAI Stack



# GenAI Reference Architecture



# Resources

# Resources & Next Steps



## Code

[github.com/neo4j-product-examples/graphrag-examples](https://github.com/neo4j-product-examples/graphrag-examples)



## GenAI Ecosystem & Free Learning Resources

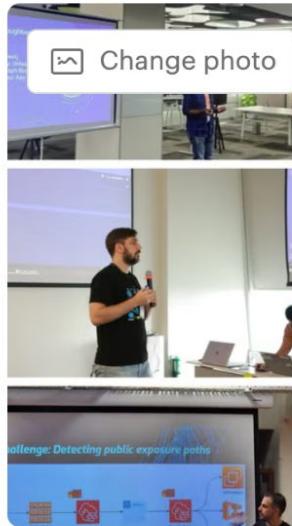
Webpage: [neo4j.com/genai/](https://neo4j.com/genai/)

Documentation: [neo4j.com/labs/genai-ecosystem/](https://neo4j.com/labs/genai-ecosystem/)



## Get Started with Neo4j - Aura Free & Sandbox

[neo4j.com/cloud/aura-free/](https://neo4j.com/cloud/aura-free/) | [neo4j.com/sandbox/](https://neo4j.com/sandbox/)



Part of **Neo4j MeetUp - 31 groups** ⓘ



# Graph Database Bengaluru

4.5 ★★★★★ 207 ratings

📍 Bengaluru, India

👤 6,121 members · Public group ⓘ

👤 Organized by **Neo4j** and 3 others

✉️ Contact members



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## What we're about

Welcome to the **Graph Database Bengaluru User Group**, a group for anyone interested in exploring the intersection of graphs, artificial intelligence,

[Read more](#)

## Organizers



**Neo4j and 3 others**  
[Message](#)

## Members (6,121)

[See all](#)



What is Neo4j?



Learn more with



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- **Hands-on Courses**  
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Drivers and Graph Data Science
- **Curated Learning Paths** catering  
for everyone from beginners to experts
- **Free Certifications**

[graphacademy.neo4j.com](https://graphacademy.neo4j.com)



[graphacademy.neo4j.com](https://graphacademy.neo4j.com)



Back for its seventh year! The online conference for **developers and data pros** ready to learn the **latest graph best practices**.

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November 6, 2025

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Submit by June 15

#### **EVENT FORMAT**

Live sessions from community and Neo4j experts - **24 hours** of technical talks **across all timezones**

#### **THEMES**

##### **Applications**

Libraries, Frameworks, and Platforms

##### **AI Engineering**

GenAI, Knowledge Graphs, and RAG

##### **Data Intelligence**

ML, Graph Data Science, and Models

##### **Graphs**

Visualization, Data Integrations, and Tips & Tricks

##### **Architecture**

Frameworks, Data Platforms, Clouds and Beyond



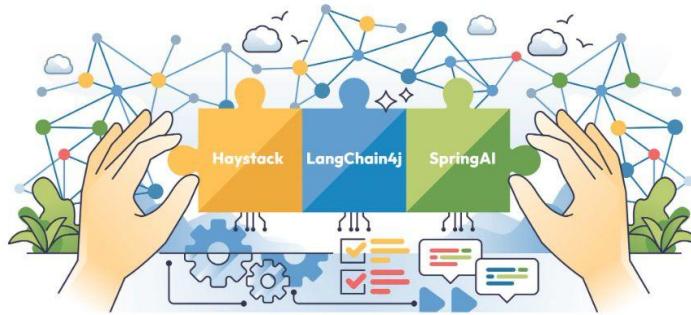
[neo4j.com/nodes-2025](https://neo4j.com/nodes-2025)



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EXPERT INSIGHT

# Building Neo4j-Powered Applications with LLMs



Create LLM-driven search and recommendations applications with Haystack, LangChain4j, and Spring AI

Forewords by

**Dr. Jim Webber**

Chief Scientist, Neo4j

**Dr. Julian Risch**

Team Lead (Open Source Engineering), deepset



Ravindranatha Anthapur | Siddhant Agarwal

**packt**

# Thank you!

Siddhant Agarwal (@sidagarwal04)  
siddhant.agarwal@neo4j.com



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