



When GenAI meets Mythology

From Ancient Epic to Modern Marvel

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

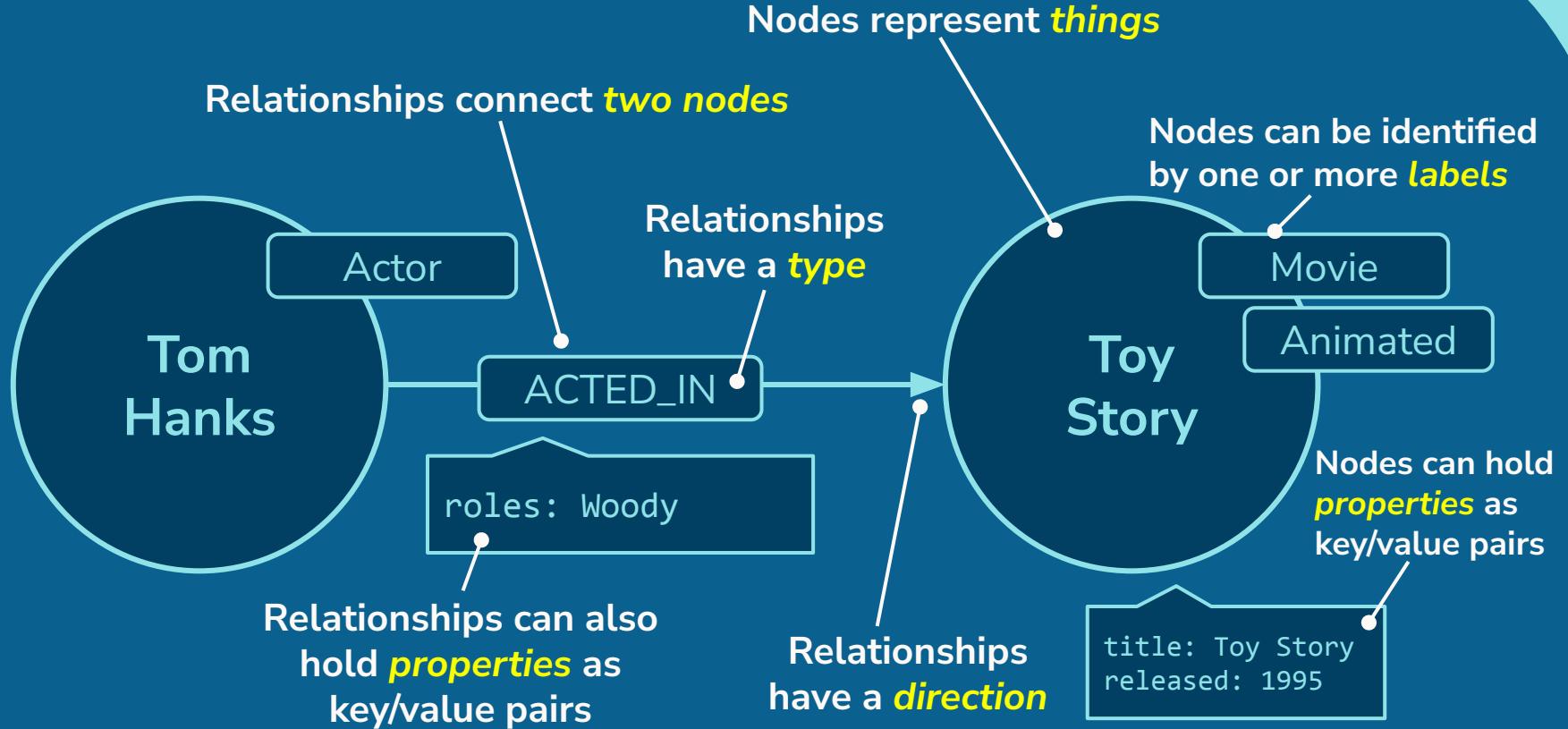
GDG and GDG Cloud Bengaluru Organizer



Scan me

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

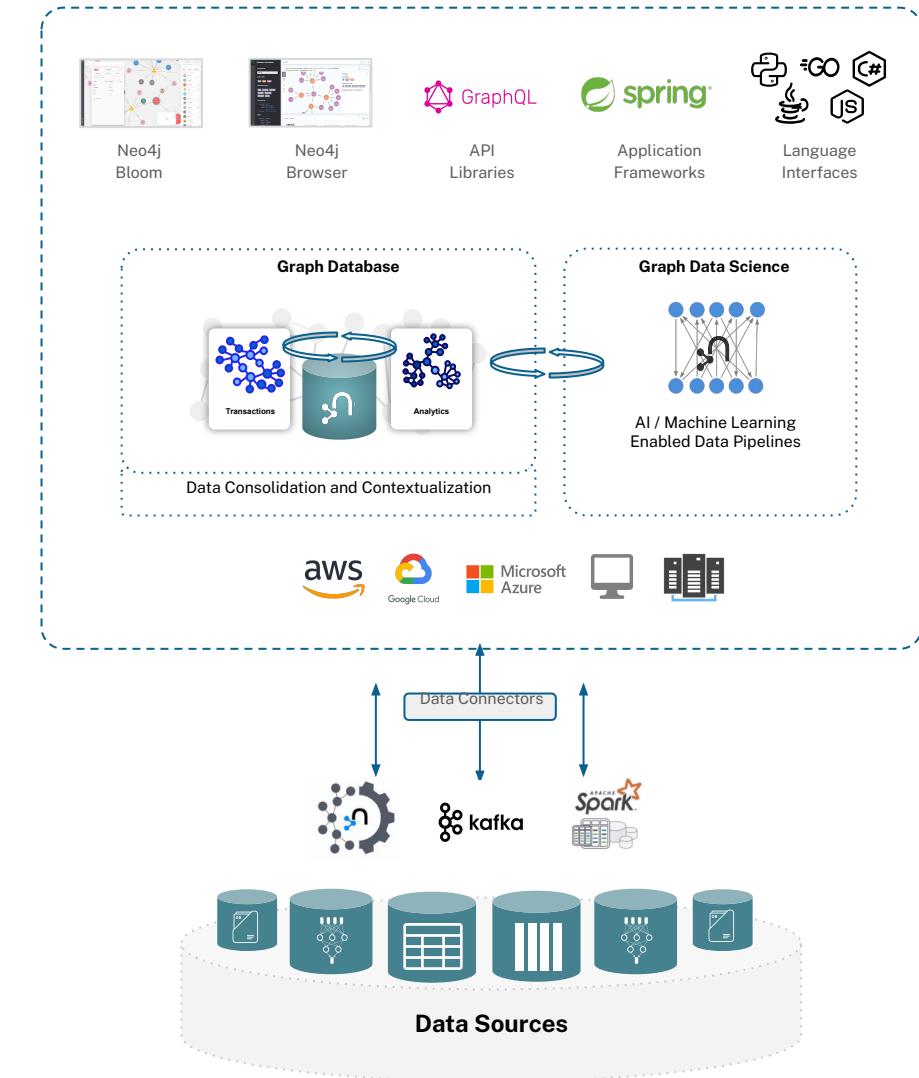
Cypher & openCypher; Ongoing leadership and standards work (GQL) to establish lingua franca for graphs.

Ecosystem & Integrations

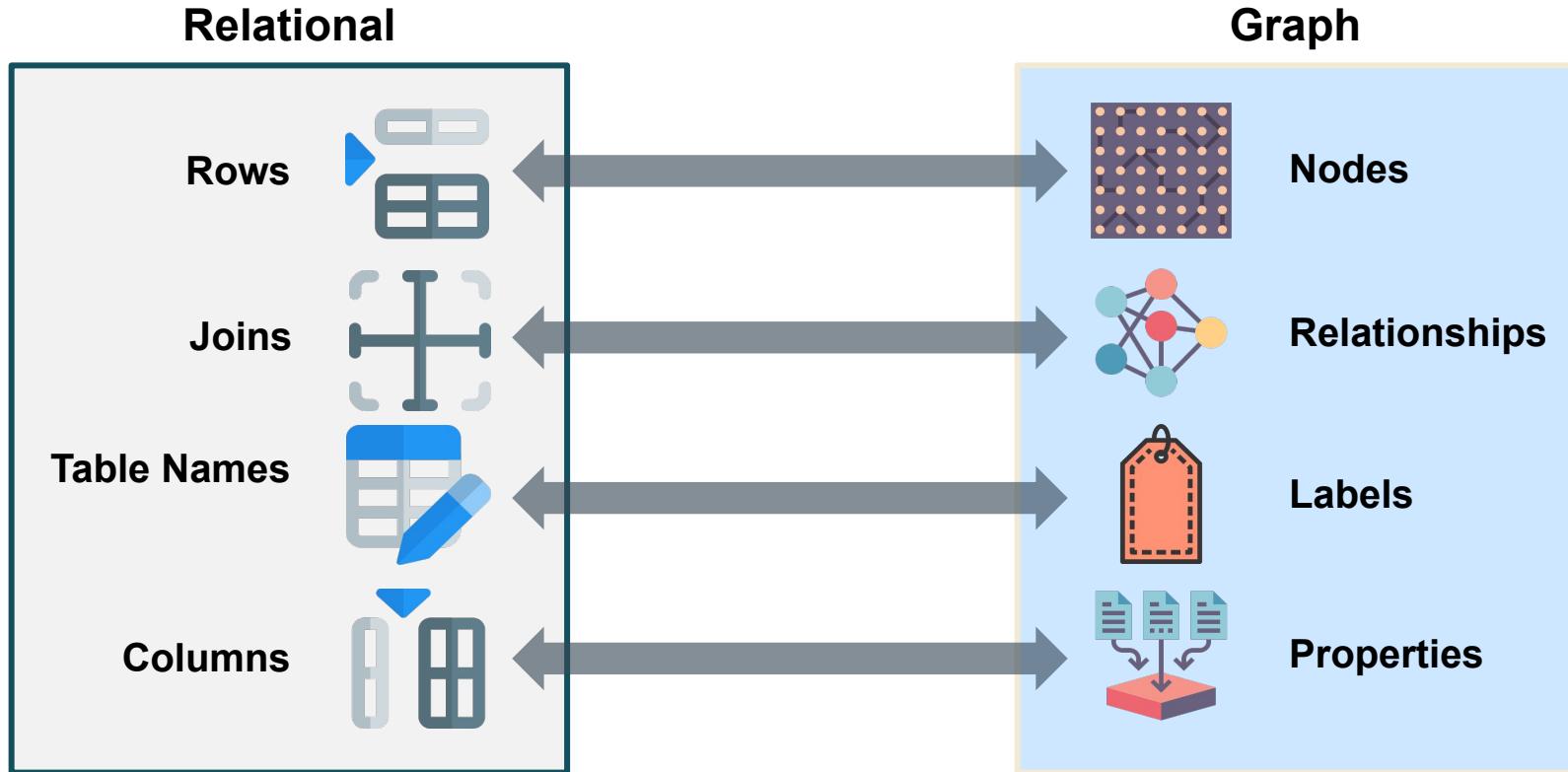
Rich ecosystem of tech and integration partners. Ingestion tools (JDBC, Kafka, Spark, BI Tools, etc.) for bulk and streaming needs.

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



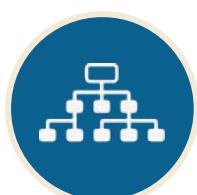
Real-Time
Recommendations



Fraud
Detection



Network &
IT Operations



Master Data
Management



Risk &
Compliance



Identity & Access
Management





How many **characters** are there in Mahabharata?



How many **relationships** are there in Mahabharata?

Mahabharata: A Monumental Epic of Characters and Connections

- 1 **100,000 verses** with over **1.8 million words**
- 2 **200 significant characters**
(and countless secondary figures)
- 3 A **dense web of relationships**

Dense web of relationships

1

Familial relationships: Father-son, siblings, etc.

2

Marital alliances: Marriages for political alliance and family continuity

3

Teacher-student: Relationships such as those between Drona and his disciples

4

Adversarial relationships: Rivalries and enmities



neo4j

Part 1: Graphing the Epic

Son	Father	Son2	Mother	Husband	Wife	Brothers1_1	Brothers1_2	Brothers2_1	Brothers2_2
Devavrata	Shantanu	Devavrata	Ganga	Shantanu	Ganga	Pandu	Dhritarashtra	Bhima	Arjuna
Bhishma	Shantanu	Bhishma	Ganga	Shantanu	Satyavati	Pandu	Vidura	Bhima	Yudhisthira
Vichitravirya	Shantanu	Vichitravirya	Satyavati	Vichitravirya	Ambalika	Dhritarashtra	Pandu	Bhima	Nakula
Chitrangada	Shantanu	Chitrangada	Satyavati	Vichitravirya	Ambika	Dhritarashtra	Vidura	Bhima	Sahadeva
Dhritarashtra	Vichitravirya	Dhritarashtra	Ambika	Dhritarashtra	Gandhari	Vidura	Pandu	Arjuna	Bhima
Pandu	Vichitravirya	Pandu	Ambalika	Pandu	Kunti	Vidura	Dhritarashtra	Arjuna	Yudhisthira
Vidura	Vichitravirya	Bhima	Kunti	Pandu	Madri			Arjuna	Nakula
Yudhisthira	Pandu	Arjuna	Kunti	Arjuna	Subhadra			Arjuna	Sahadeva
Bhima	Pandu	Yudhisthira	Kunti	Yudhisthira	Draupadi			Yudhisthira	Bhima
Arjuna	Pandu	Nakula	Madri	Bhima	Draupadi			Yudhisthira	Arjuna
Nakula	Pandu	Sahadeva	Madri	Arjuna	Draupadi			Yudhisthira	Nakula
Sahadeva	Pandu	Abhimanyu	Subhadra	Nakula	Draupadi			Yudhisthira	Sahadeva
Abhimanyu	Arjuna	Prativindya	Draupadi	Sahadeva	Draupadi			Nakula	Bhima
Prativindya	Yudhisthira	Sutasoma	Draupadi					Nakula	Arjuna
Sutasoma	Bhima	Surakarman	Draupadi					Nakula	Yudhisthira
Surakirti	Arjuna	Surakirti	Draupadi					Nakula	Sahadeva
Ghatotkacha	Bhima	Satanika	Draupadi					Sahadeva	Bhima
Babhruvahana	Arjuna	Babhruvahana	Chitrangada					Sahadeva	Arjuna
Duryodhana	Dhritarashtra	Duryodhana	Gandhari					Sahadeva	Yudhisthira
Duhshasana	Dhritarashtra	Duhshasana	Gandhari					Sahadeva	Nakula
		Karna	Kunti						

Graphing the Epic

Data Gathering

Character lists, family trees, and detailed descriptions from the epic itself.

Defining Relationships

The real magic began with defining the relationships between characters. Family bonds, alliances, rivalries, etc.

1

2

3

4

Character Creation

Each character becomes a node populated with name, gender, title, etc.

Populating the Graph

With nodes and edges in place, populate the graph with all the characters and their connections with meticulous attention to detail.

Graphing the Epic

```
CREATE CONSTRAINT IF NOT EXISTS FOR (p:Person) REQUIRE (p.name) IS UNIQUE;  
CREATE INDEX IF NOT EXISTS FOR (p:Person) ON (p.gender);  
  
CREATE (Brahma:Person {name: 'Brahma', gender: 'Male'})  
CREATE (Marichi:Person {name: 'Marichi', gender: 'Male'})  
CREATE (Brahma)-[:FATHER_OF]->(Marichi)  
CREATE (Marichi)-[:SON_OF]->(Brahma)  
CREATE (Kala:Person {name: 'Kala', gender: 'Female'})  
CREATE (Marichi)-[:HUSBAND_OF]->(Kala)  
CREATE (Kala)-[:WIFE_OF]->(Marichi)  
CREATE (Kashyapa:Person {name: 'Kashyapa', gender: 'Male', type: 'sage'})  
CREATE (Marichi)-[:FATHER_OF]->(Kashyapa)  
CREATE (Kala)-[:MOTHER_OF]->(Kashyapa)  
CREATE (Kashyapa)-[:SON_OF]->(Marichi)  
CREATE (Kashyapa)-[:SON_OF]->(Kala)  
....
```

Database information

Nodes (191)

Person

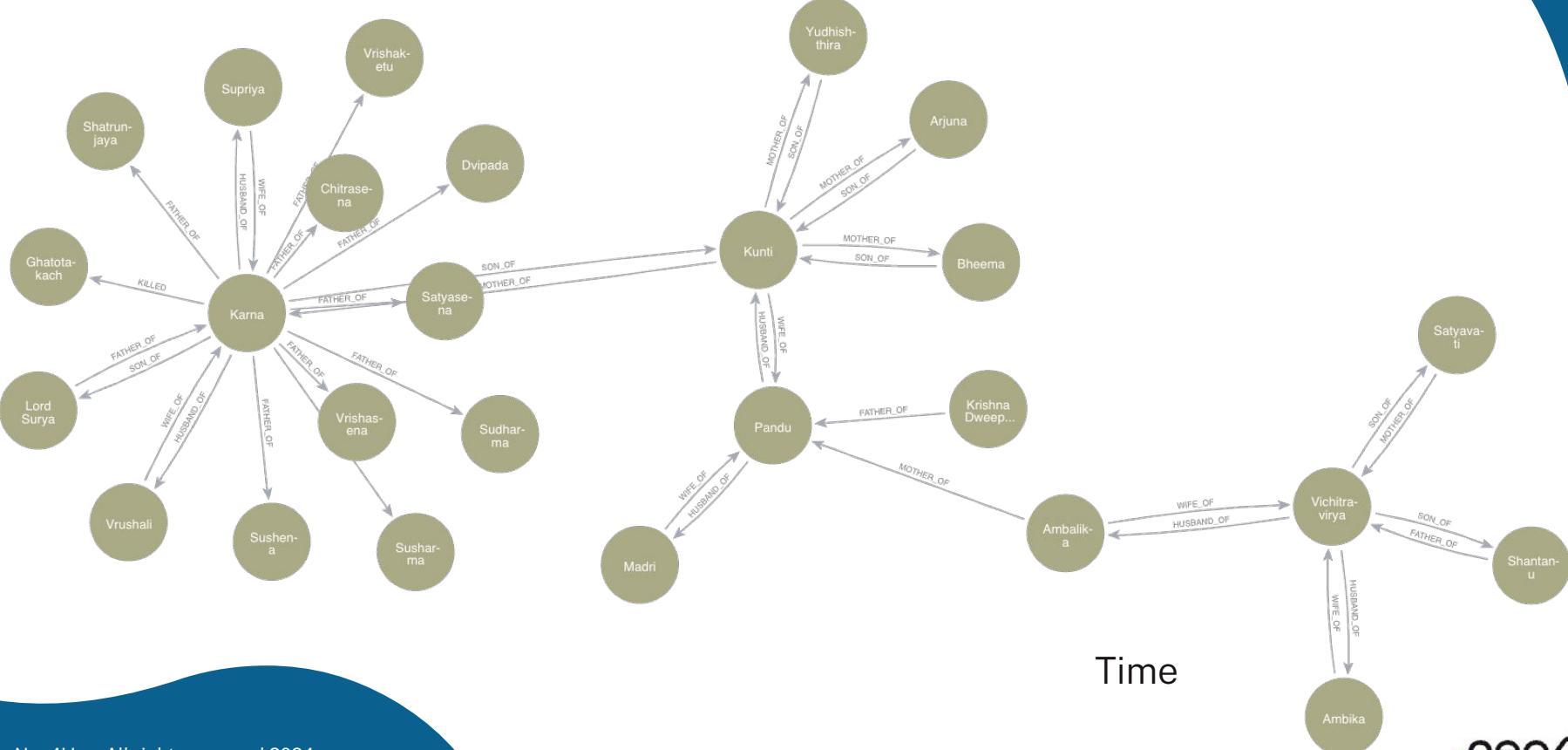
Relationships (579)

DAUGHTER_OF FATHER_OF HUSBAND_OF
KILLED MOTHER_OF SON_OF WIFE_OF

Property keys

count data dynasty gender health
id marital_status name nickname
nodes number_of_children relationships
style title type visualisation

Graphing the Epic



neo4j

Part 2: Bringing the Epic to Life

Reading from Neo4j

```
// Find the parents of Lord Kashyapa
```

```
MATCH (kashyapa:Person)-[:SON_OF]->(m:Person)
```

```
WHERE kashyapa.name = "Kashyapa"
```

```
RETURN m
```

Mahabharata Chatbot v1

input

Who is the father of Karna?

Clear

Submit

output 0

Who killed Susharma?

Nakula

Who is the father of Karna?

Lord Surya



Part 3: GraphRAG Meets the Mahabharata

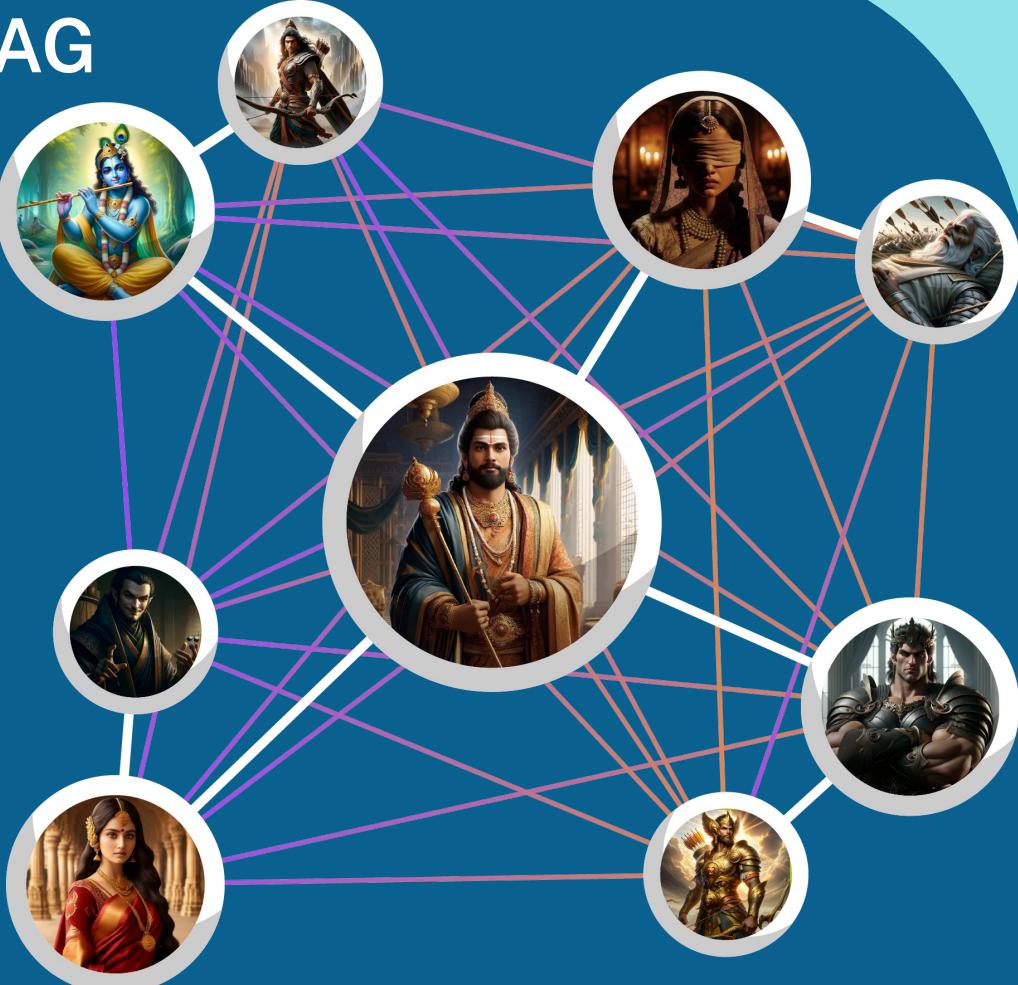
Demystifying GraphRAG

18 Books/Parvas

=

18 PDFs

(avg. 300 pages/pdf)



Demystifying GraphRAG

Total Pages:

$18 \text{ PDFs} \times 300 \text{ pages/PDF} = \mathbf{5400 \text{ pages}}$

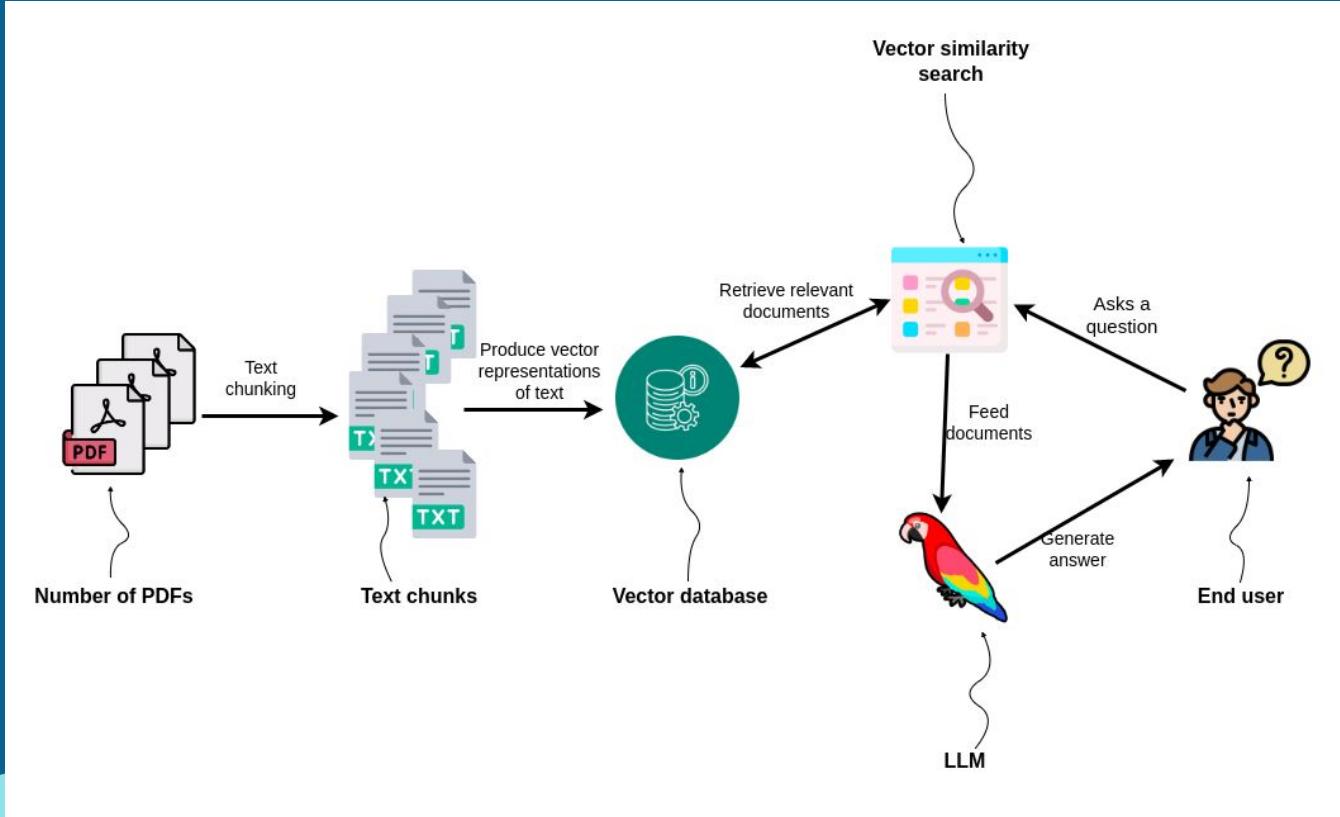
Total Characters:

$5400 \text{ pages} \times 2000 \text{ characters/page} = \mathbf{\sim 10.8 \text{ million characters}}$

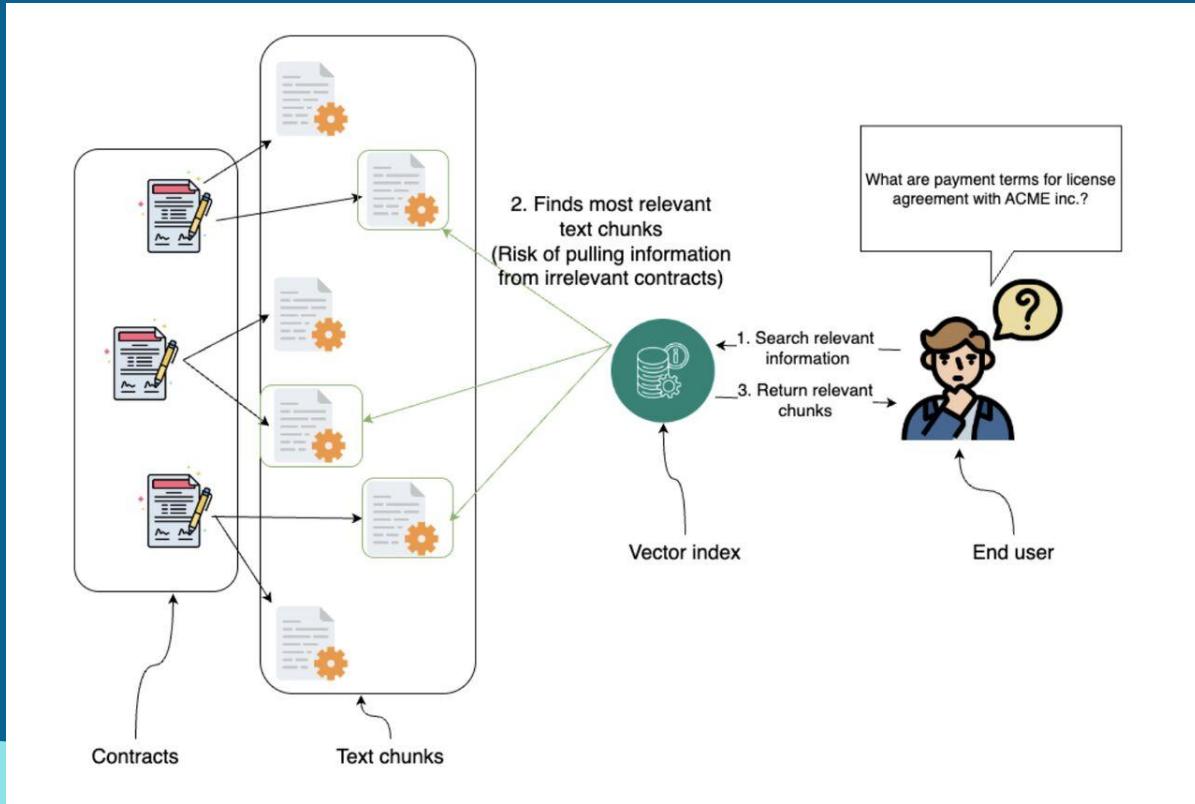
Total Tokens:

$10,800,000 \text{ characters} \div 4 \text{ characters/token} = \mathbf{\sim 2.7 \text{ million tokens}}$

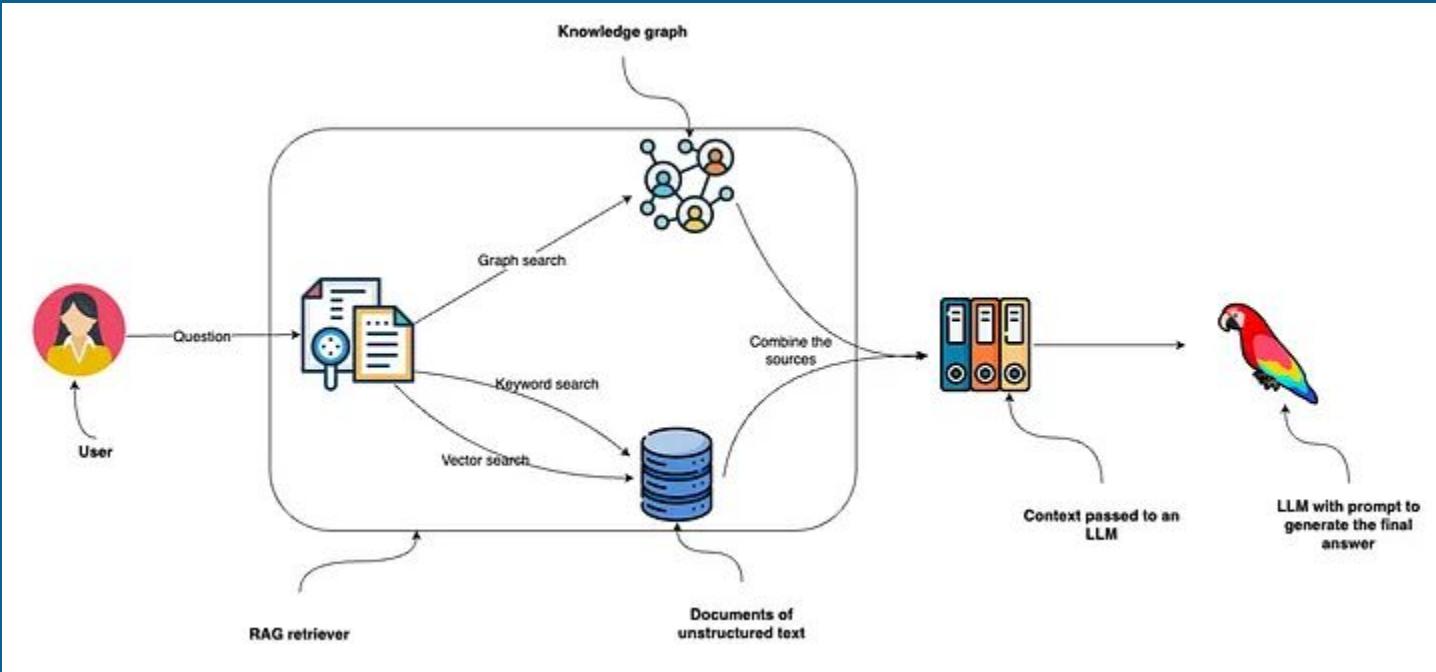
Vector RAG



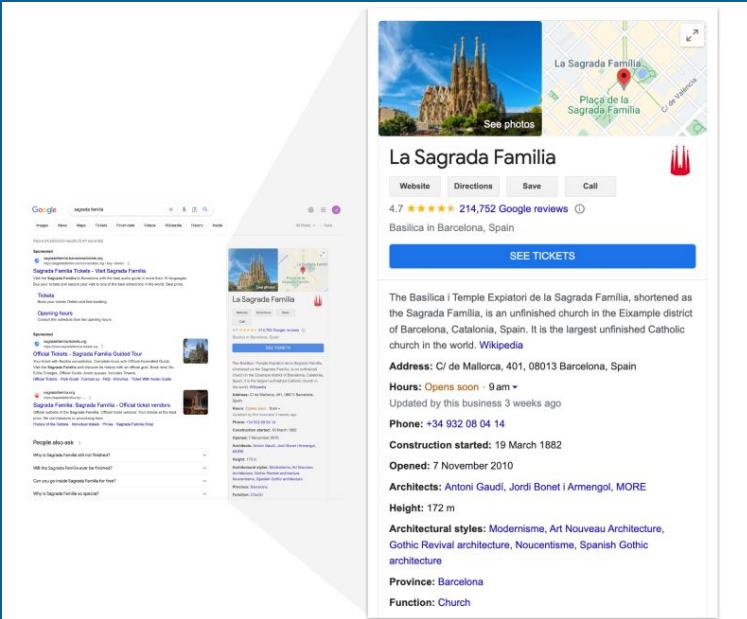
Why Vector RAG alone might fail miserably?



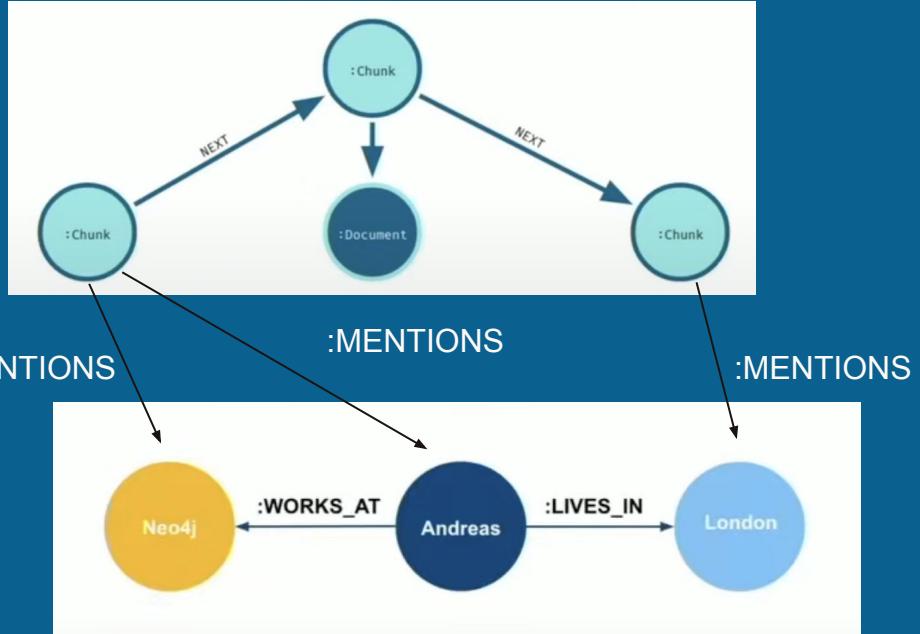
GraphRAG



Knowledge Graphs



Document or Lexical Graph



Domain or Entity Graph

Anatomy of an RFP Document

AWS RFP

Intro

About the Company

Content

Financial Result

Content

Objectives

Content

Proposal

Subsection 1

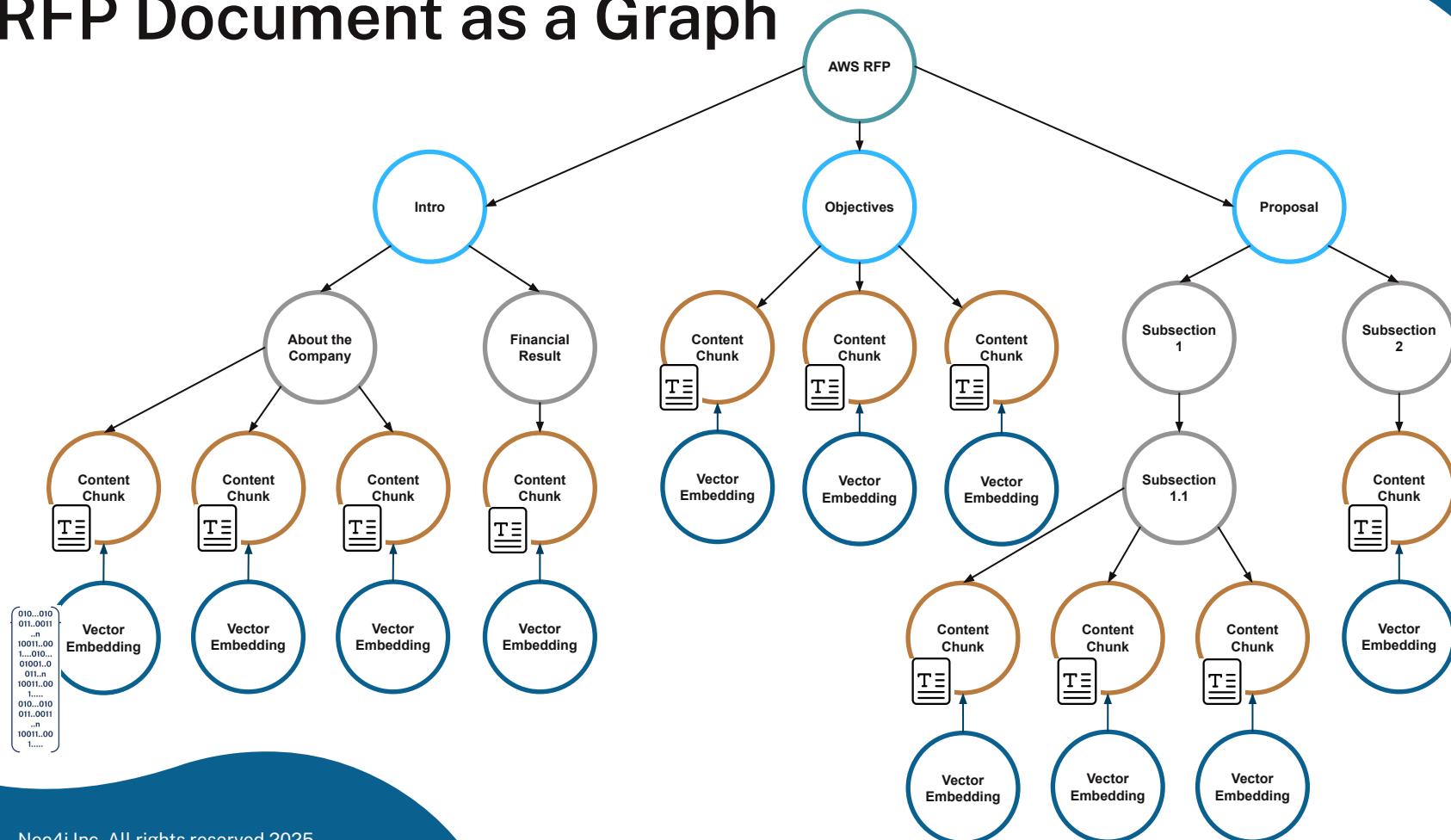
Subsection 1.1

Content

Subsection 2

Content

RFP Document as a Graph



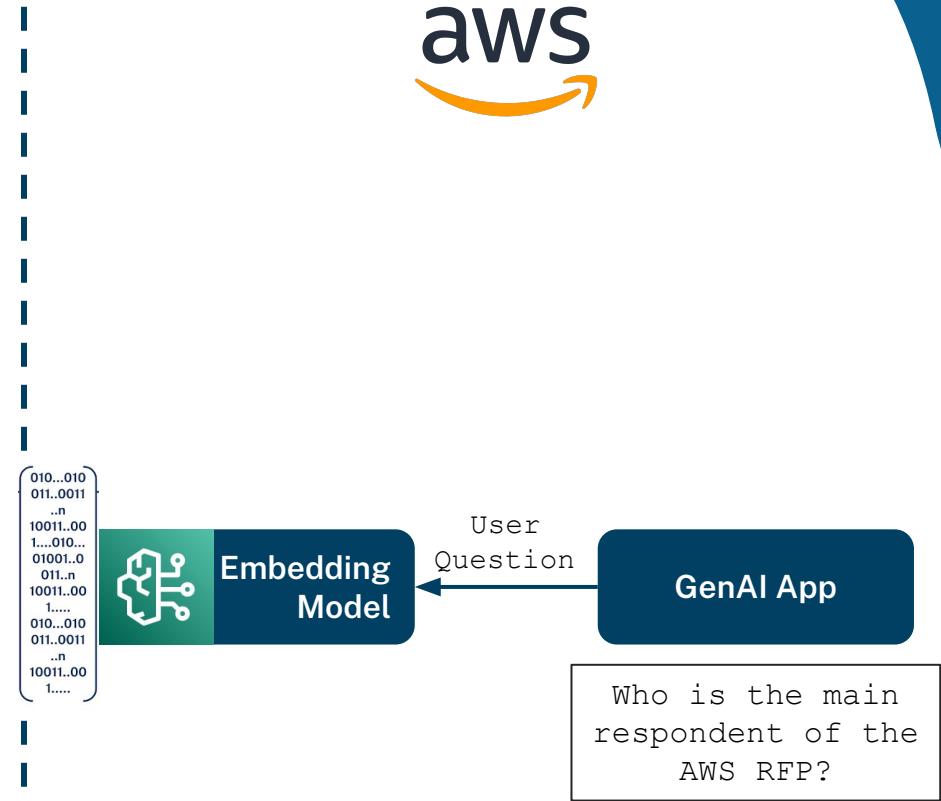


Accurate, Contextual and Explainable

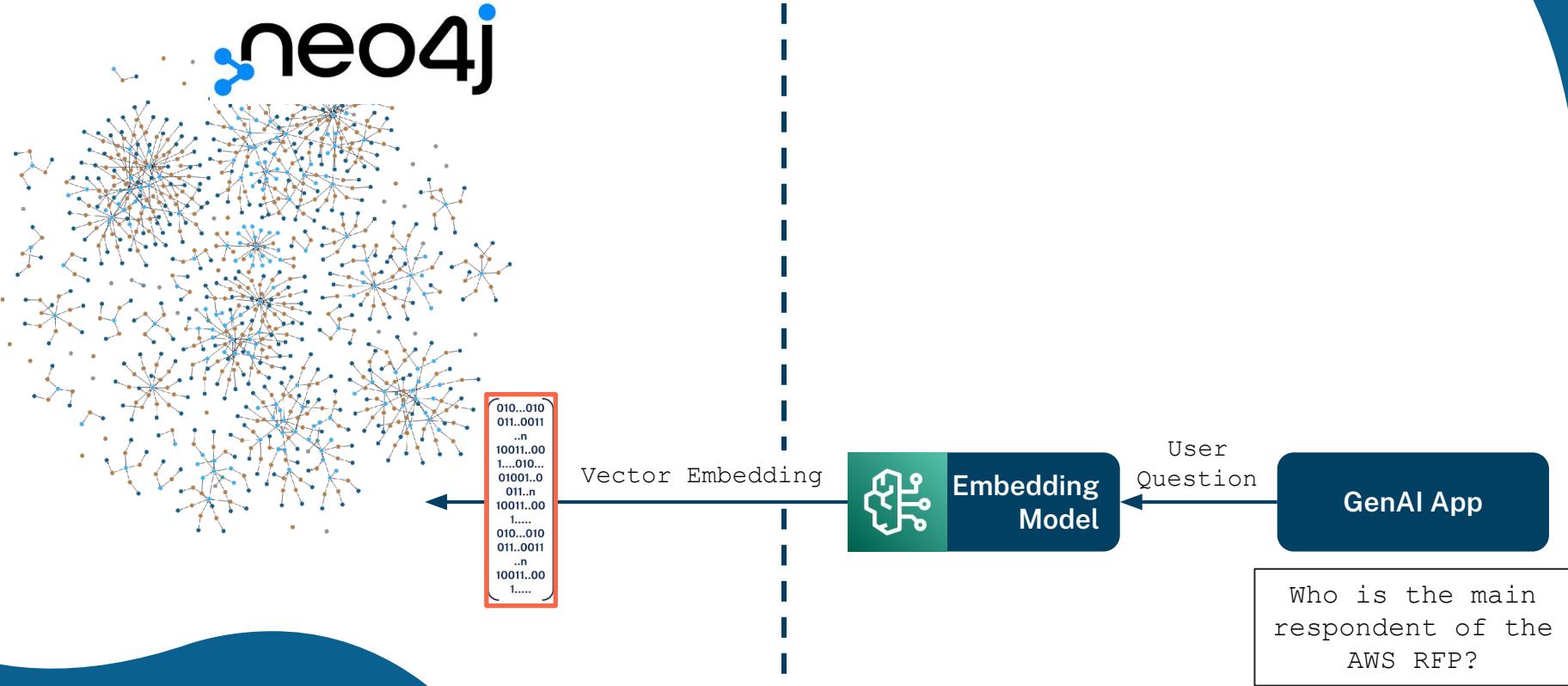
Who is the main respondent
of the AWS RFP?

GenAI App

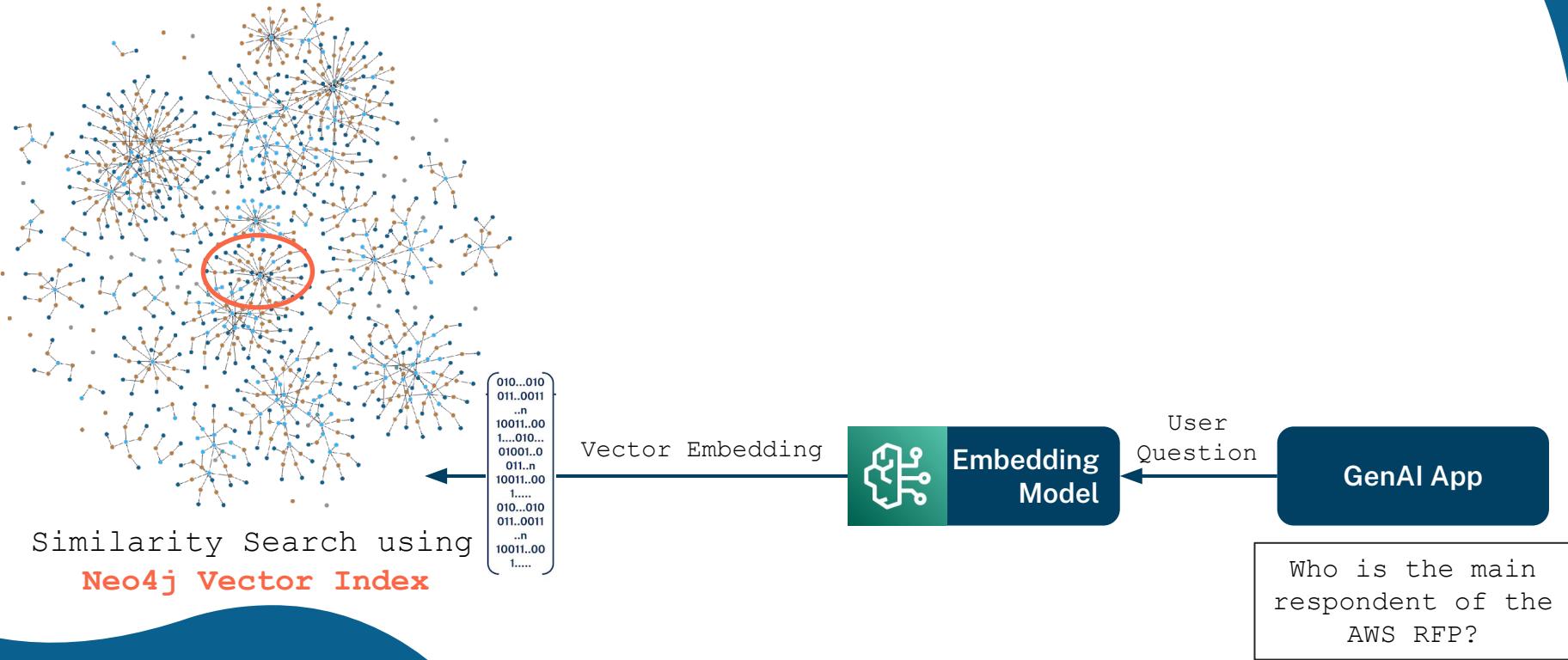
Accurate, Contextual and Explainable



neo4j Accurate, Contextual and Explainable



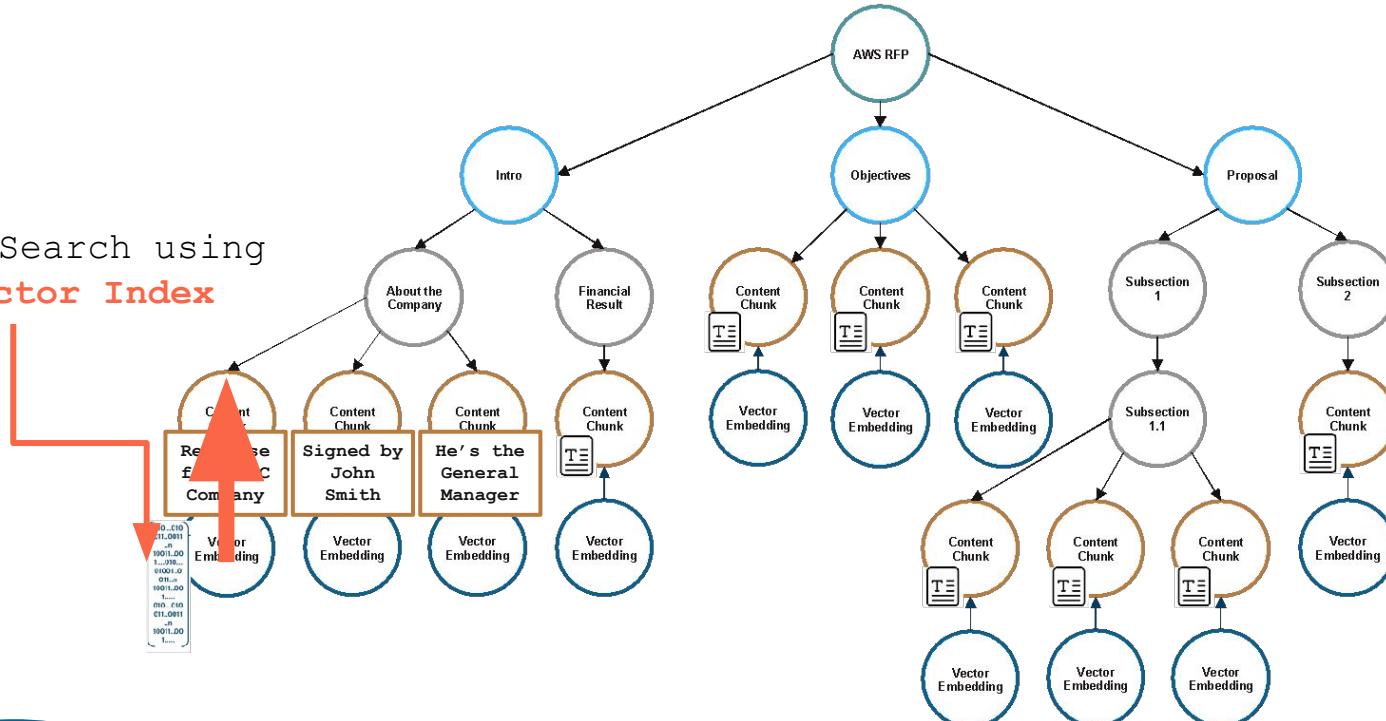
Accurate, Contextual and Explainable



Similarity Search using
Neo4j Vector Index

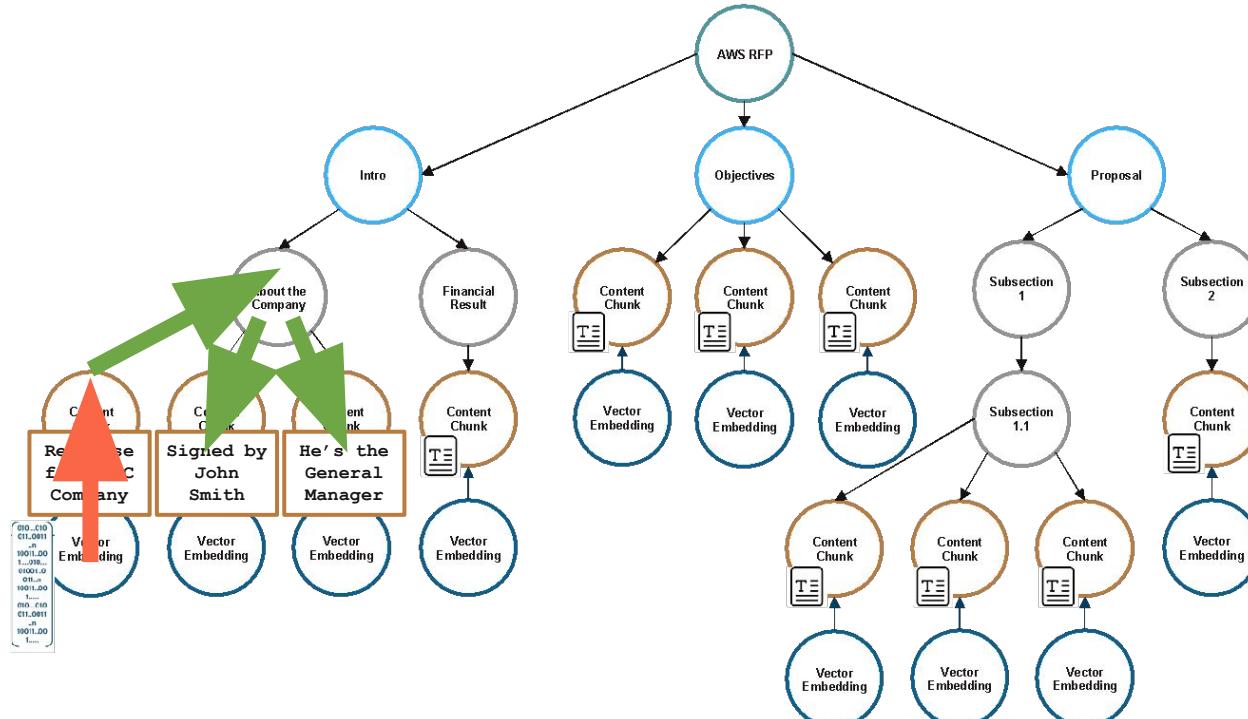
Accurate, Contextual and Explainable

Similarity Search using
Neo4j Vector Index



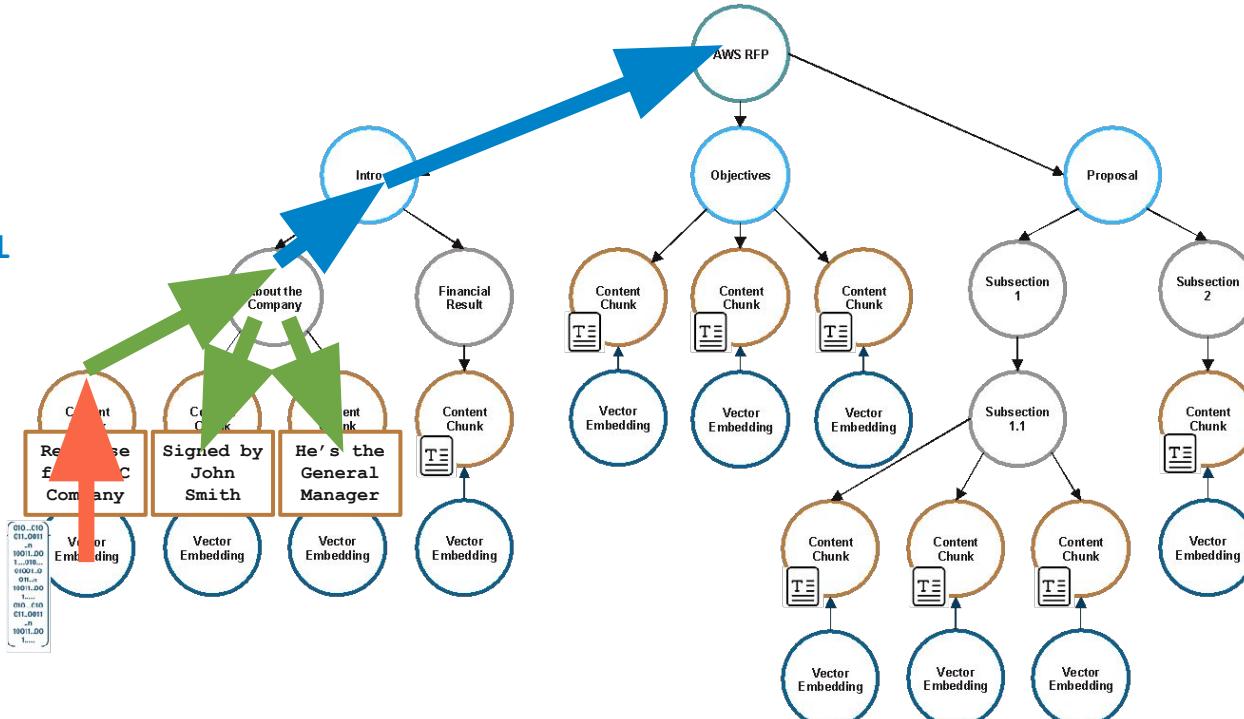
Accurate, Contextual and Explainable

Contextual
Knowledge Retrieval
within Neo4j KG



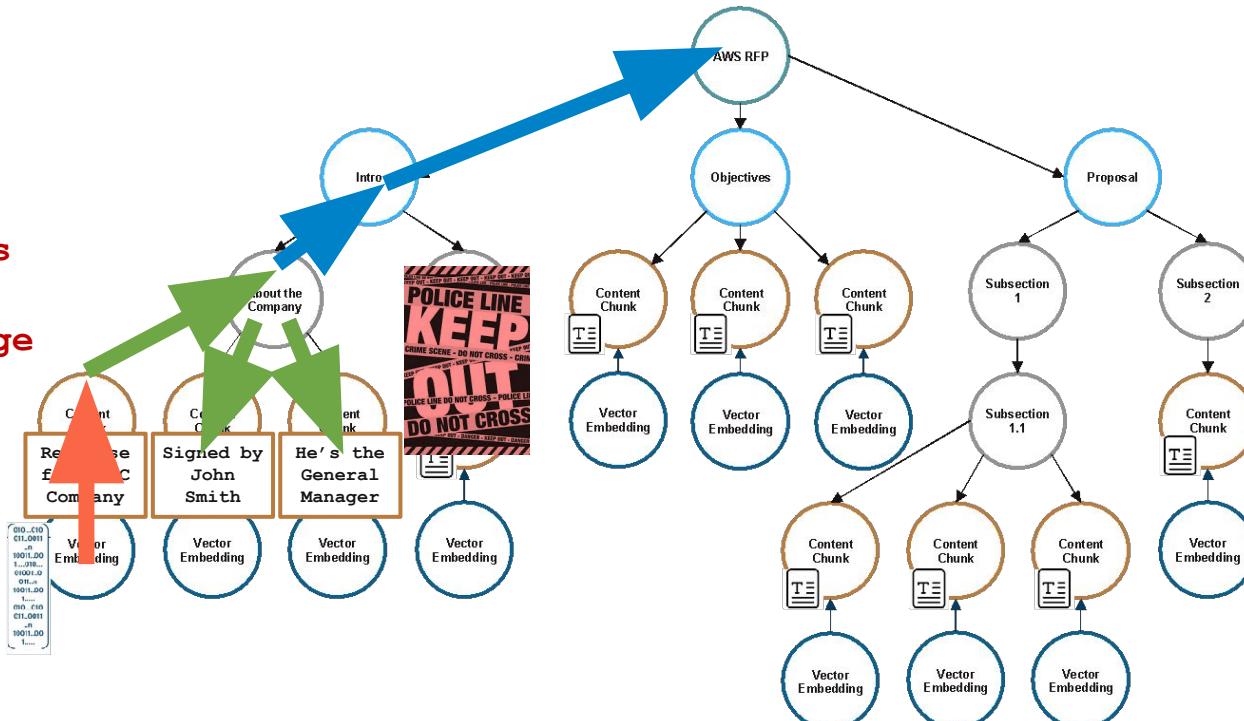
Accurate, Contextual and Explainable

Knowledge Retrieval
to aid in
Explainability

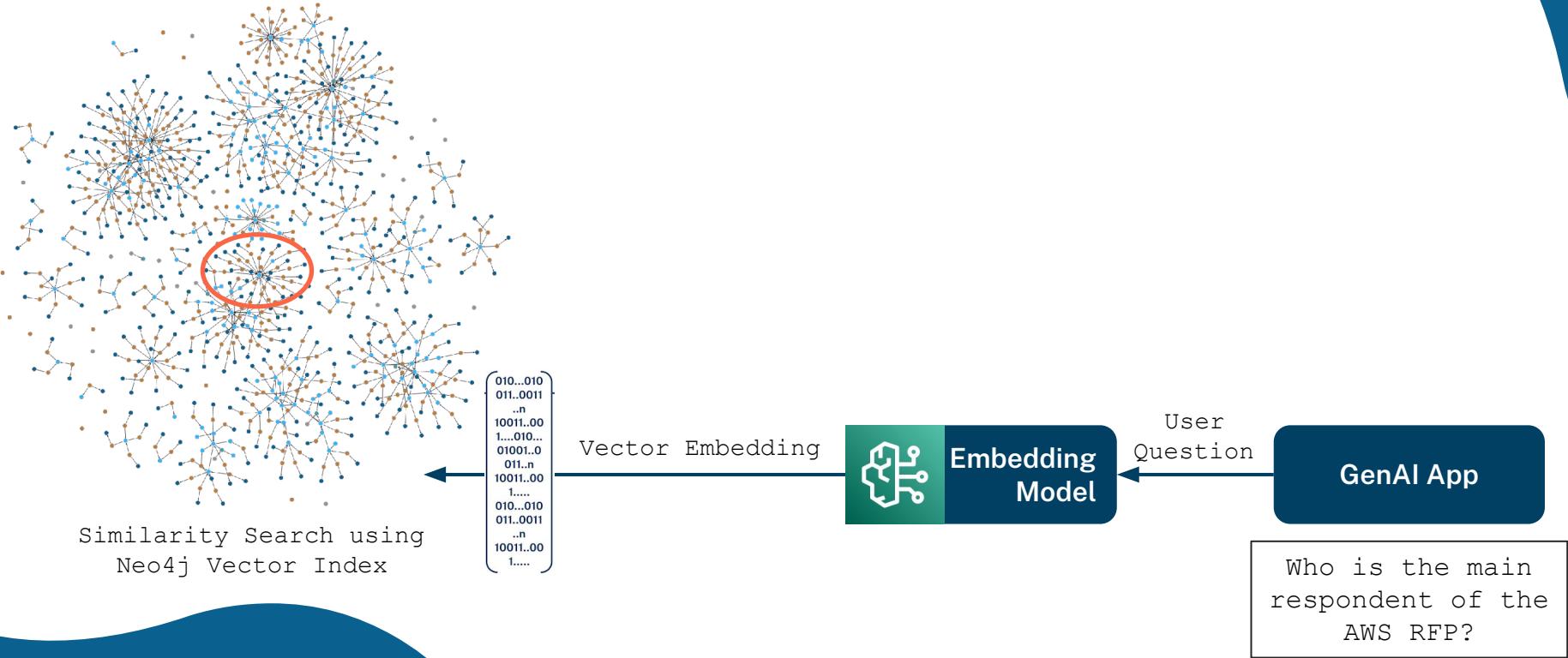


Accurate, Contextual and Explainable

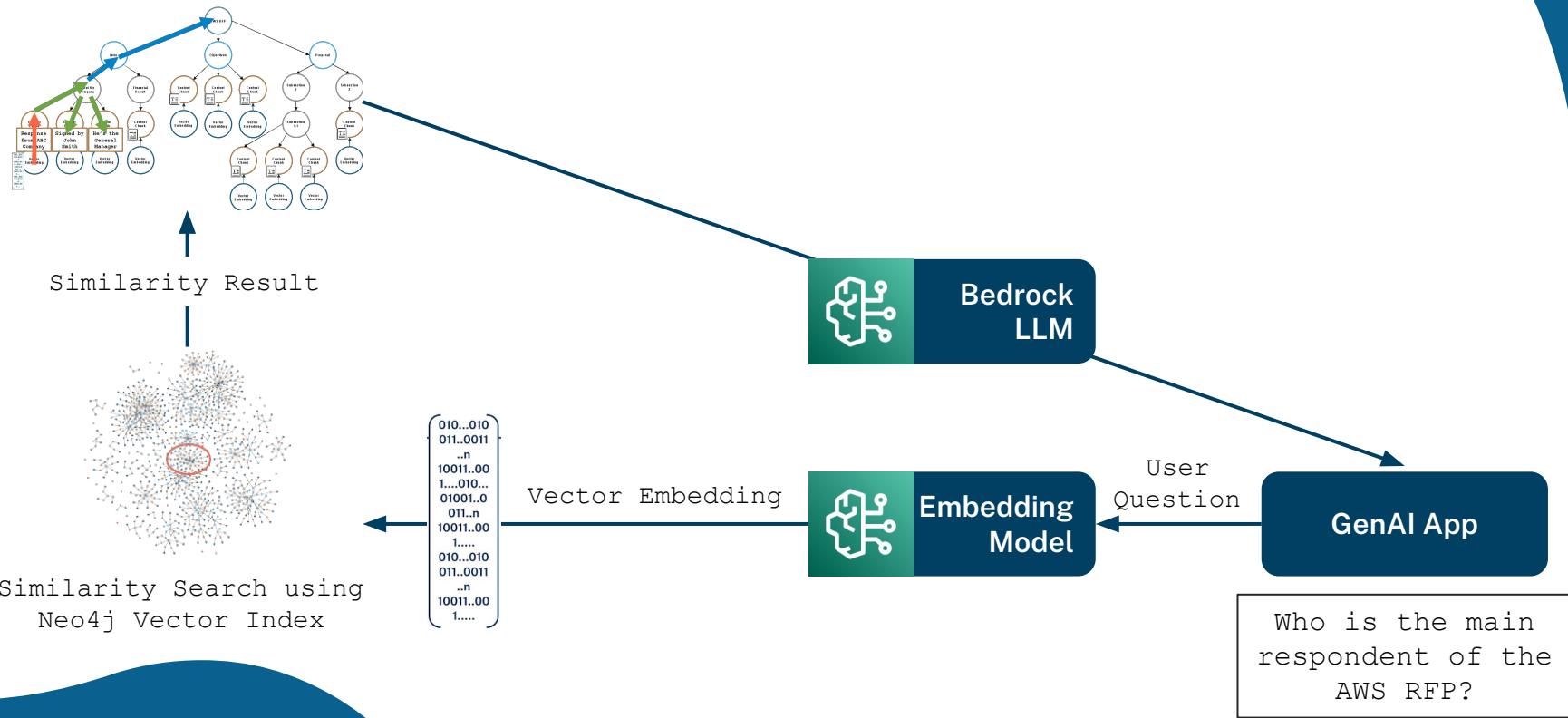
Fine Grained Access Control to prevent unwarranted Knowledge Retrieval



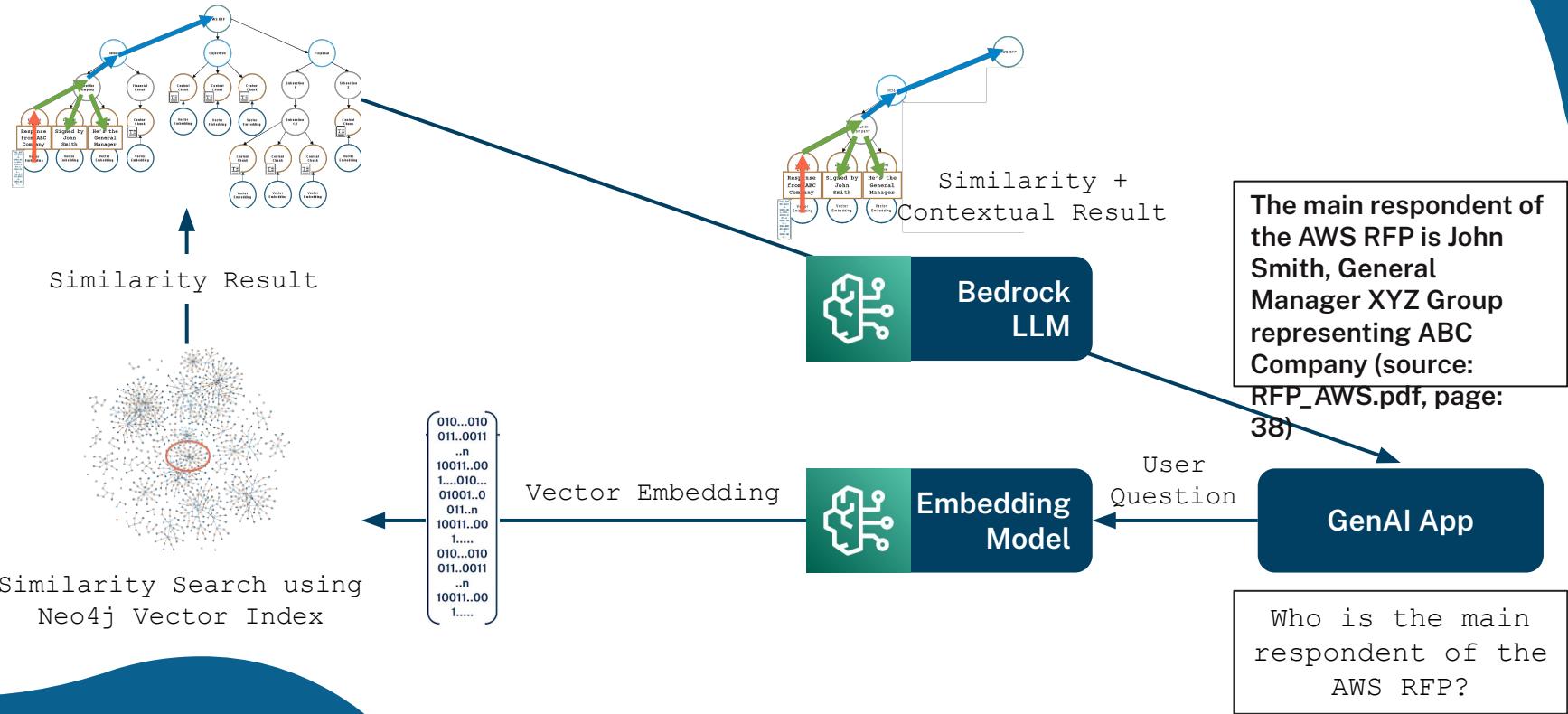
Accurate, Contextual and Explainable



Accurate, Contextual and Explainable



Accurate, Contextual and Explainable



LLM Graph Builder Tool to the rescue

3 Simple Steps

1

Connect to Neo4j



2

Upload Files

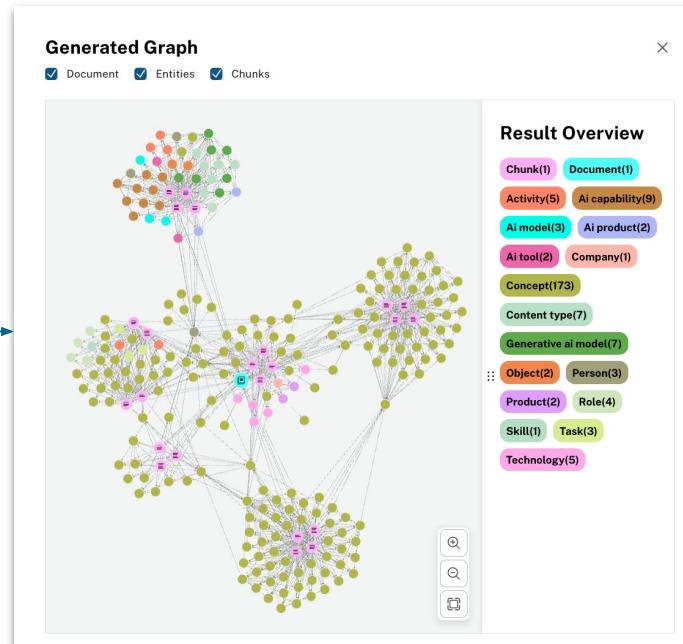
pdf, YouTube,
cloud storage,
wikipedia

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





Drag & Drop
or [browse](#)
Documents, Images,
Unstructured text

Web Sources

Amazon S3

 GCS

Neo4j connection

neo4j+s://f1510916.databases.neo4j.io:7687

♦ No Graph Schema configured

<input type="checkbox"/>	Name	Status	Upload Status	Size (KB)	Source	Type	Model	Nodes	Relations
<input type="checkbox"/>	06.pdf	Completed	Uploaded	738.41	local file	PDF	Openai-gpt-4o	6623	5687
<input type="checkbox"/>	12-pages-8.p...	Completed	Uploaded	255.06	local file	PDF	Openai-gpt-4o	2050	1356
<input type="checkbox"/>	12-pages-7.pdf	Completed	Uploaded	294.51	local file	PDF	Openai-gpt-4o	2113	1639
<input type="checkbox"/>	12-pages-6.p...	Completed	Uploaded	329.77	local file	PDF	Openai-gpt-4o	2487	2210
<input type="checkbox"/>	12-pages-5.p...	Completed	Uploaded	326.59	local file	PDF	Openai-gpt-4o	2155	2007
<input type="checkbox"/>	12-pages-4.p...	Completed	Uploaded	323.13	local file	PDF	Openai-gpt-4o	2332	2306
<input type="checkbox"/>	12-pages-3.p...	Completed	Uploaded	326.27	local file	PDF	Openai-gpt-4o	1837	1686
<input type="checkbox"/>	12-pages-2.p...	Completed	Uploaded	322.89	local file	PDF	Openai-gpt-4o	1751	1656
<input type="checkbox"/>	12-pages-1.pdf	Completed	Uploaded	329.71	local file	PDF	Openai-gpt-4o	2396	2108
<input type="checkbox"/>	03.pdf	Completed	Uploaded	1439.40	local file	PDF	Openai-gpt-4o	10844	9386

Showing 1-10 of 25 results

1 2 3 >

LLM Models

Openai gpt ...

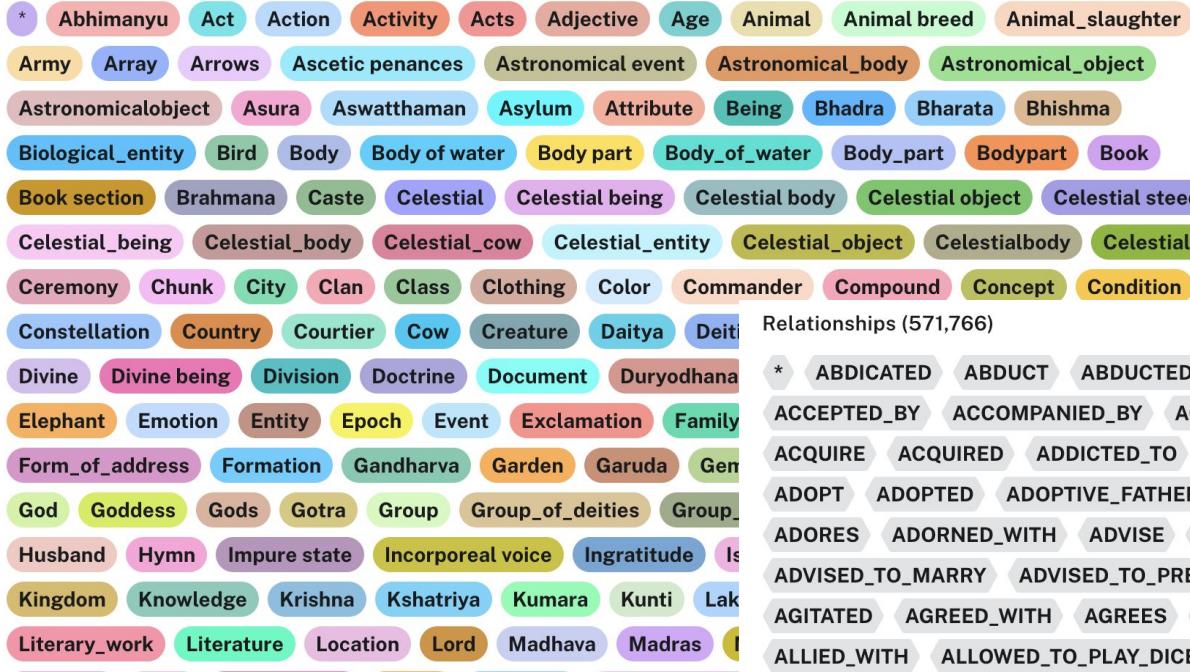
LLM Model used for Extraction & Chat

Generate Graph

Preview Graph

E

Nodes (51,372)



51K+ Nodes

500K+ Relationships

* ABDICATED ABDUCT ABDUCTED ABIDE_IN ABODE ABODE_WITH ABOUT ACCEPTED
ACCEPTED_BY ACCOMPANIED_BY ACCOMPANY ACCUSED ACKNOWLEDGED_AS_S... ACQUAINTED_V...
ACQUIRE ACQUIRED ADDICTED_TO ADDRESS ADDRESSED ADDRESSED_BY ADHERED ADHVARY...
ADOPT ADOPTED ADOPTIVE_FATHER_OF ADOPTIVE_MOTHER_OF ADORE ADORED ADORED_BY
ADORES ADORNED_WITH ADVISE ADVISED ADVISED_BY ADVISED_TO_ADOPT ADVISED_TO_KILL
ADVISED_TO_MARRY ADVISED_TO_PRESERVE AFFECT AFFECTED_BY AFFLICTED AFFLICTED_BY_DEA...
AGITATED AGREED_WITH AGREES AIDED ALARMED ALIAS ALLAYED_THIRST ALLIANCE ALLIE...
ALLIED_WITH ALLOWED_TO_PLAY_DICE ALSO_KNOWN_AS AMONG ANCESTOR ANGRY_AT
ANNIHILATED ANSWERED ANSWERED_ABOUT ANSWERS ANXIETY APOLOGIZED APPEARANCE
APPEASED APPOINT_SPIRITUAL_G... APPOINTED APPOINTED_BY APPROACHED APPROACHED_BY
APPROVED ARE ARRIVAL ARRIVE_AT ARRIVED_WITH ASCENDED ASCENDED_TO ASCERTAINED
ASKED ASKED_ABOUT ASKED_ASSISTANCE ASKED_BY ASKED_COMMANDS ASKED_EARRINGS_AN...
ASKED_FOR_EARRINGS ASKED_FOR_HONORARI... ASKED_HEALTH ASKED_IDENTITY ASKED_TO_SAVE
ASKS ASKS_ABOUT ASKS_FOR_HELP ASKS_INFORMATION_F... ASSEMBLED_TOGETHER ASSIGNED
ASSIGNED_TASK ASSISTED ASSISTED_BY ASSOCIATED_WITH ASSUMED_FORM ASYLUM_OF ATE
ATTACHED ATTACKED ATTAIN_TO ATTEMPTED_TO_KILL ATTEMPTED_TO_TAKE ATTEND ATTEND_U...

neo4j

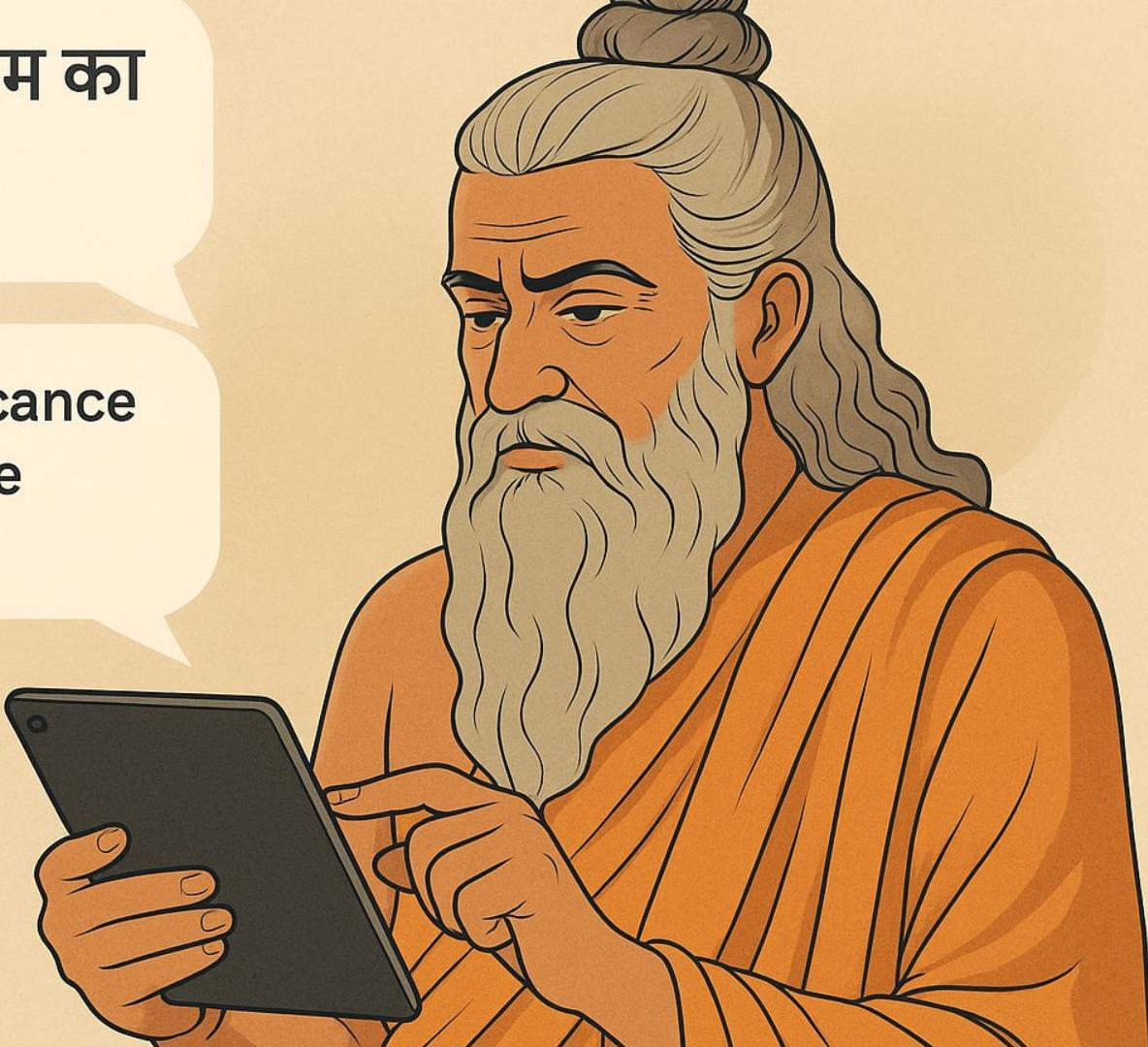
Part 4: Mahabharata 2.0

महाभारत में स्वधर्म का
क्या महत्व है?

What is the significance
of svadharma in the
Mahabharata?



claude



DEMO TIME



Mahabharata GraphRAG Chatbot

<https://mb-aisage.netlify.app/>

 Mahabharata Chatbot
Powered By Neo4j & Google Vertex AI

 Chatbot

Type a message...

 Examples

Who killed Ghatotkach? | Who are the parents of Karna? | Who are the kids of Kunti? | Who are the siblings of Karna?

Tell me the names of top 5 characters in Mahabharata. | Why did the Mahabharata war happen?

Who killed Karna, and why? | Why did the Pandavas have to go live in the forest for 12 years?

How did the Pandavas receive knowledge from sages and saintly persons during their time in the forest?

   Siddhant Agarwal



The Mahabharata, an ancient Indian epic, explores duty, love, and vengeance amidst complex relationships. It asks whether righteousness or darkness will prevail, offering timeless wisdom through its legendary tale. Dive in and discover the timeless wisdom of the Mahabharata!

This tool may display inaccurate info, double-check its responses.

LLM Graph Builder Application

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

Hosted on

llm-graph-builder.neo4jlabs.com

Documentation

neo4j.com/labs/genai-ecosystem/llm-graph-builder

The screenshot shows the Neo4j interface with a table titled "Neo4j connection". The table lists 25 results, each corresponding to a file that has been uploaded. The columns include Name, Status, Upload Status, Size (KB), Source, Type, Model, and Nodes. The files are categorized by source: local file (19 entries), PDF (19 entries), OpenAI-gpt-4o (10 entries), and Amazon S3 (1 entry). The total number of nodes extracted is 6623.

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

The screenshot shows a complex, colorful knowledge graph visualization. The graph consists of numerous nodes (represented by colored circles) and directed edges (arrows) connecting them. A prominent central node is highlighted in purple. The nodes are color-coded into several clusters: purple, blue, green, brown, red, and grey. A search bar at the top left contains the query "Show me a graph". On the right side, there is a sidebar with a question-and-answer interface. The first question is "What is the connection from Google to Bombardier?", followed by the answer: "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." Below this, another question is "What does Bombardier do?", with the answer: "Bombardier Inc. is a Canadian multinational". At the bottom right, there is a "Submit" button.

Open Source Project

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 'main'. 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 sections for Readme, Apache-2.0 license, Activity, Custom properties, 7 stars, 2 watching, 7 forks, Report repository, Releases (no releases), Packages (no packages), and Contributors (6). 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 'Knowledge Graph Builder App' section describes the application's purpose: converting PDF documents into a knowledge graph stored in Neo4j using OpenAI's GPT/Diffbot LLM. It mentions the use of Langchain framework and Docker Compose for building and starting components.

GraphRAG Python Package

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`. The top navigation bar includes links for `User Guide: RAG`, `User Guide: Knowledge Graph Builder`, `User Guide: Pipeline`, and `API Documentation`. The sidebar contains sections for `Contents`, `Introduction` (highlighted), `User Guide: RAG`, `User Guide: Knowledge Graph Builder`, `User Guide: Pipeline`, `API Documentation`, and `Topics`. A `Quick search` bar is also present. The main content area features a heading for `GraphRAG for Python`, a note about the package being a renamed continuation of `neo4j-genai`, and lists of supported Neo4j and Python versions. The `Topics` section includes links to the `User Guide: RAG` and `User Guide: Knowledge Graph Builder`. The project summary at the bottom states: "The official Neo4j GraphRAG package for Python enables developers to build graph retrieval (`GraphRAG`) applications using the power of Neo4j and Python. As a first-party library, it offers a fast and high-performance solution, with the added assurance of long-term support and maintenance." It also mentions verified details and documentation.

Resources

Resources & Next Steps



Code

github.com/neo4j-product-examples/graphrag-examples



GenAI Ecosystem & Free Learning Resources

Webpage: neo4j.com/genai/

Documentation: neo4j.com/labs/genai-ecosystem/



Get Started with Neo4j - Aura Free & Sandbox

neo4j.com/cloud/aura-free/ | neo4j.com/sandbox/

Learn more with



- **Completely Free**
- **Hands-on Courses**
teaching Neo4j Fundamentals, Cypher,
Drivers and Graph Data Science
- **Curated Learning Paths** catering
for everyone from beginners to experts
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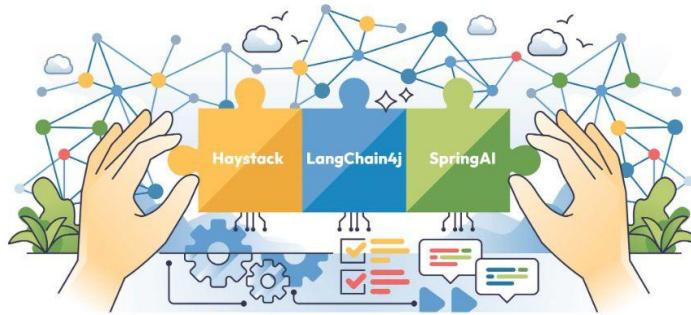
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Thank you!

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