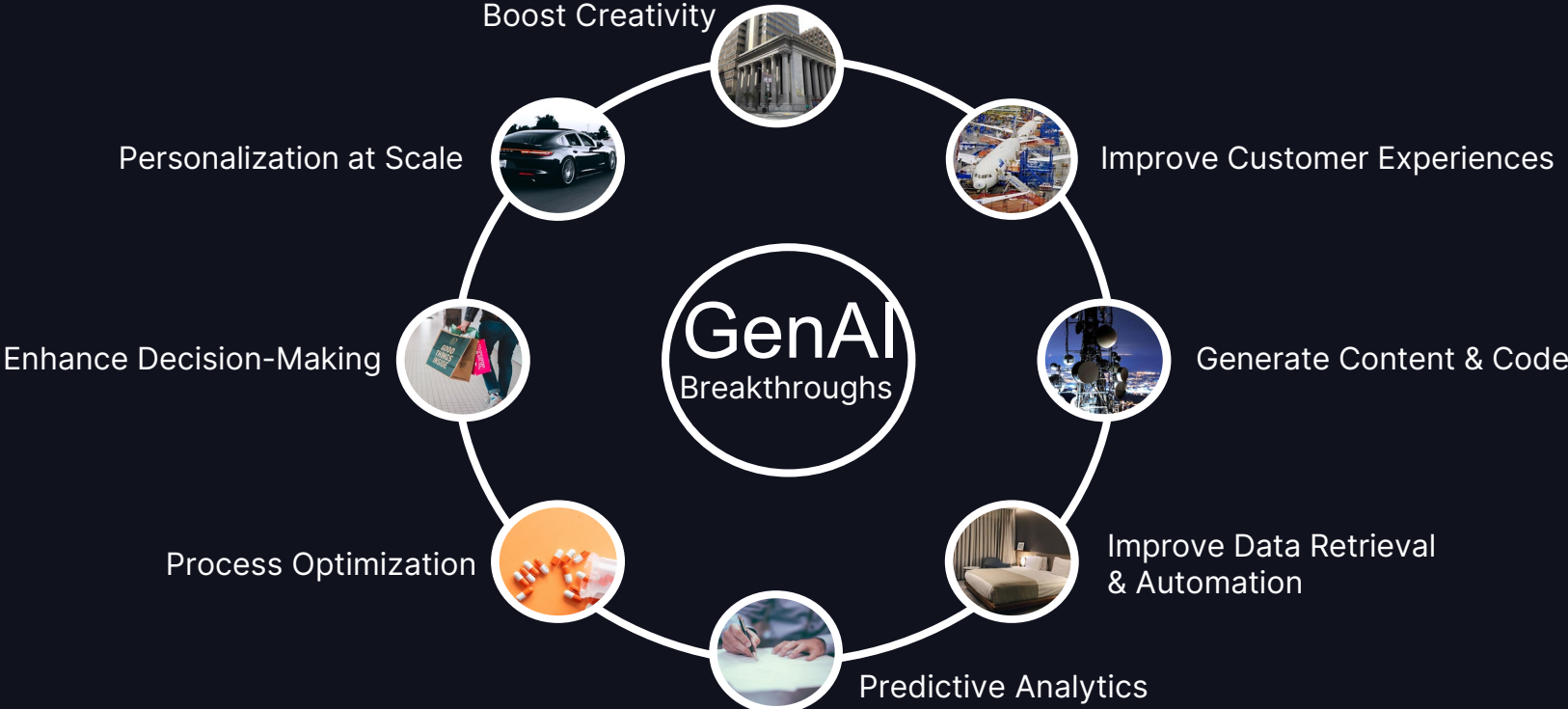


ACCELERATING GENAI INTO PRODUCTION WITH NEO4J AND DATABRICKS

Stu Moore Snr Product Manager

GENAI BREAKTHROUGHS

WHY WE ARE ALL HERE



LACK OF ENTERPRISE DOMAIN KNOWLEDGE

AI Chatbot misinformed a traveller- who was left out of pocket



- Chatbot gave Traveller incorrect advice
- British Columbia Civil Resolution Tribunal ruled payout of \$812.02
- Est. common sense principal your business is responsible if you use AI

PROBLEMS IN THE LEGAL PROFESSION

Become problems for you!



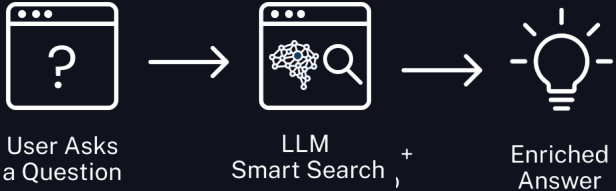
- In UK, individual lost case against HMRC because AI made up case law
- In NZ, ChatGPT incorrectly described the property dispute between Honey Bees Preschool and the landlord as a problem with "beehives"
- EU starting to regulate

RETRIEVAL AUGMENTED GENERATION (RAG)

GENERATIVE AI APPLICATION

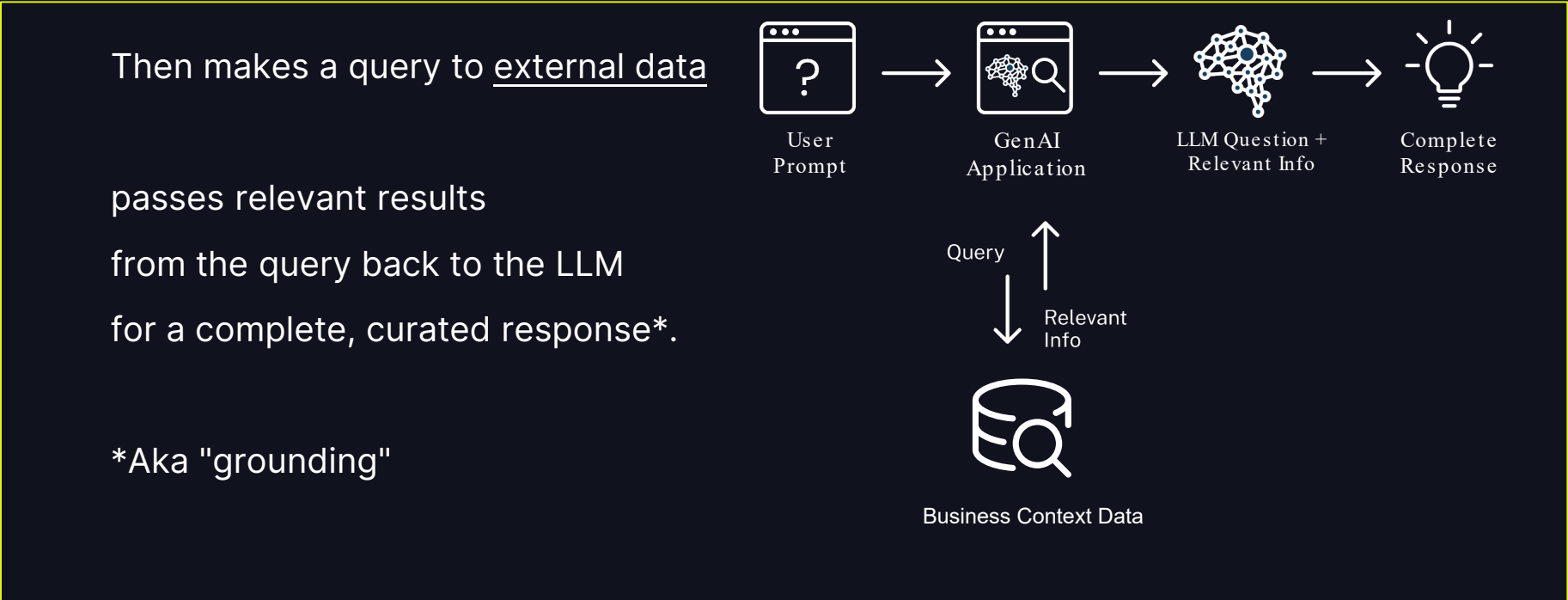
uses an LLM to provide responses to user prompts

E.g. ChatGPT



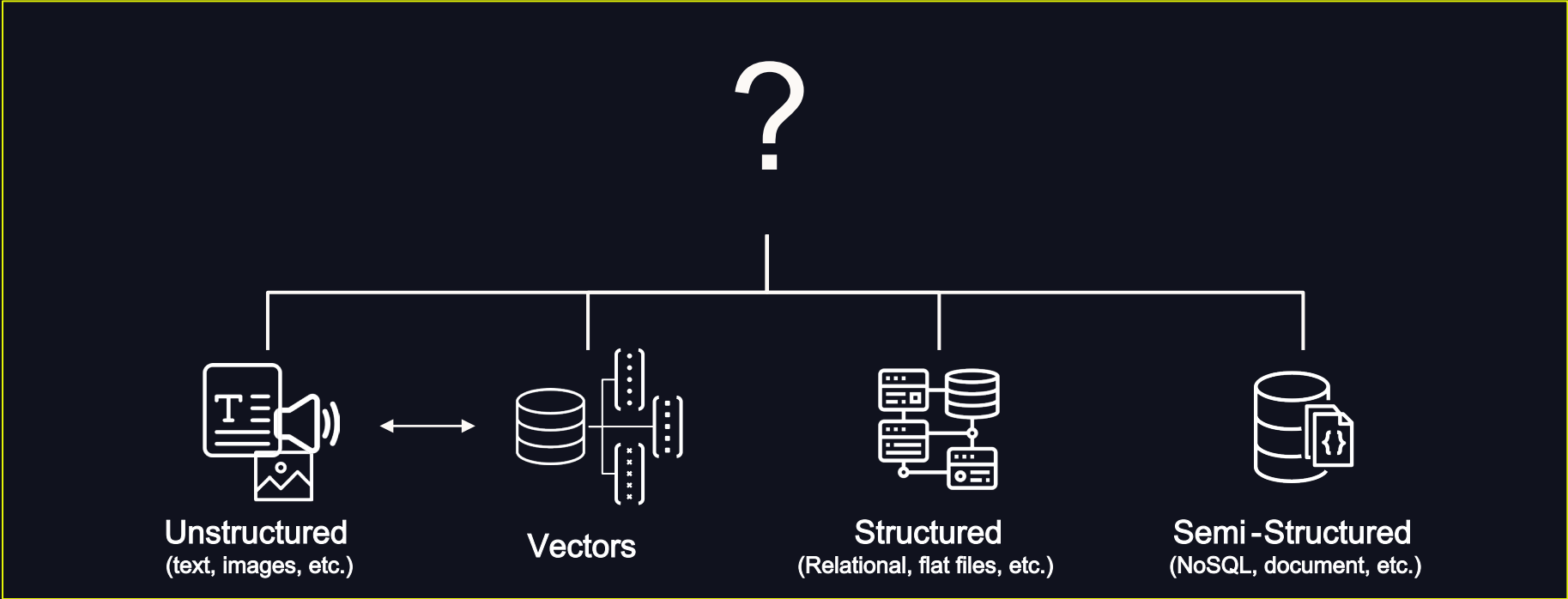
GENERATIVE AI APPLICATION

RAG augments the LLM by intercepting a user's prompt



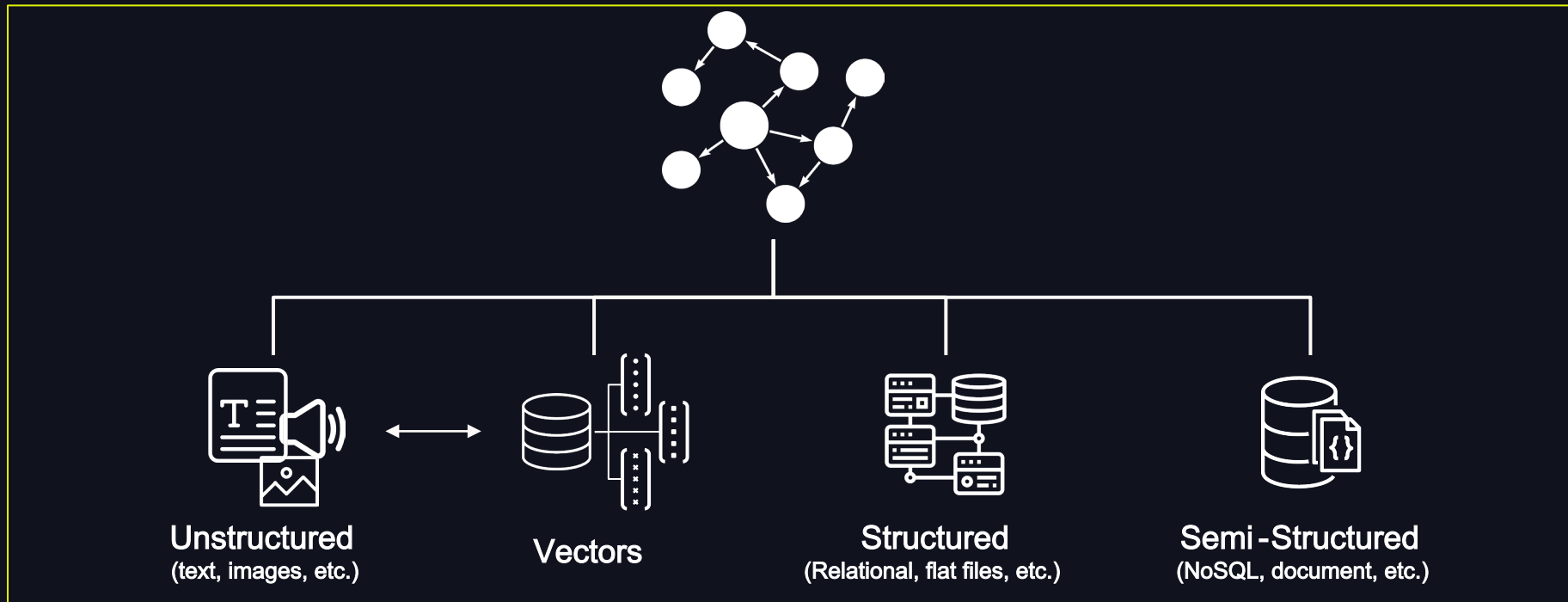
HOW BEST TO GROUND DECISIONS

using all the data you have stored in Databricks?



WITH A GRAPH AND GRAPH RAG?

Knowledge Graph a superset data structure for RAG



FINDING HIDDEN PATTERNS IN DATABRICKS

A history of solving graph based use cases for Databricks customers



85 Joint Customers

- AstraZenaca
- Elsevier
- Walmart (confirm)
- Novartis



Across 5+ Verticals

- Energy Industry
- Financial
- Healthcare
- Pharmaceutical
- Supply Chain & Logistics



Common Use Cases

- Knowledge Graphs
- Cyber Security
- Social Networks
- Entity Resolution

NEO4J FOR DATABRICKS

Partner Validated Solution



Discover

- Uncover Hidden Patterns in Data Faster
- Match patterns in data
- Find complex or recursive patterns without joins



Enhance Databricks

- Graph inside Notebooks
- Neo4j Connector for Databricks inside your Databricks Notebooks
- Support for Unity Catalog, Delta Tables, Photon & more



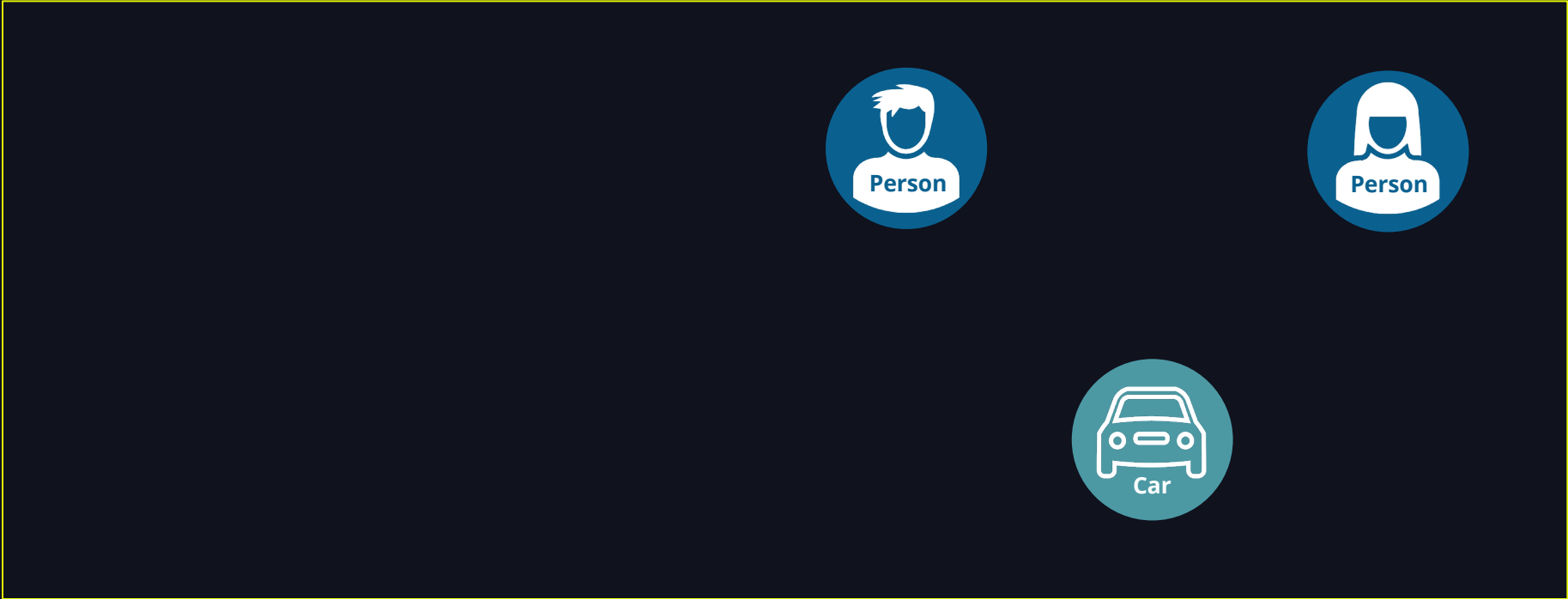
Secure Analytics

- ISO 27001, ISO 20243, GDPR, CCPA, SOC2 Type I and SOC2 Type II, and HIPAA.
- Single Sign-On (SSO) idp, encryption at rest with Customer Managed Encryption Keys, RBAC

GRAPHRAG! WHAT'S THAT?

NEO4J GRAPH COMPONENTS

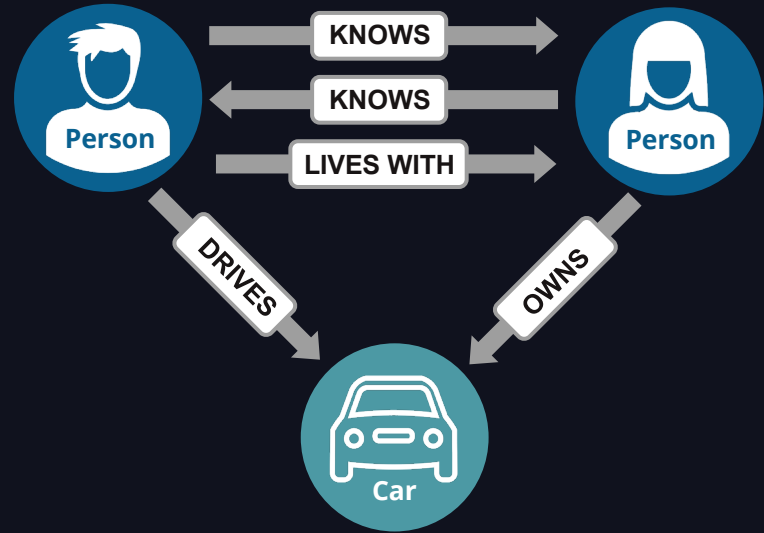
Nodes represent entities in the graph



NEO4J GRAPH COMPONENTS

Relationships represent associations or interactions between nodes

- Nodes represent entities in the graph



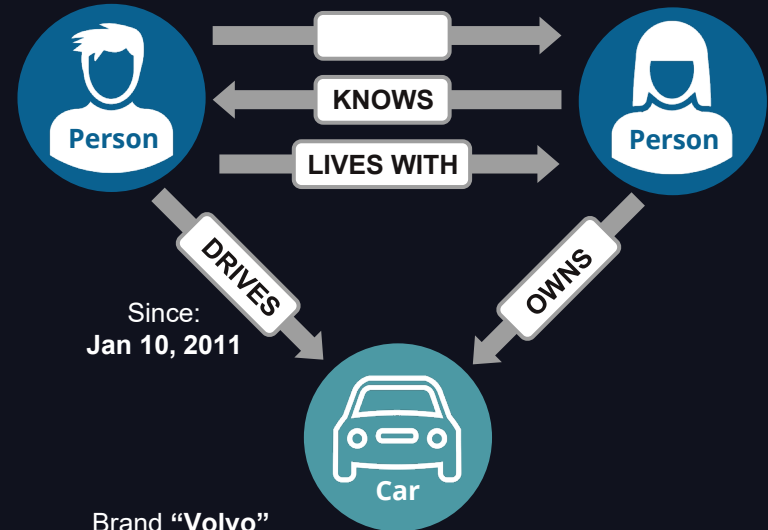
NEO4J GRAPH COMPONENTS

Relationships represent associations or interactions between nodes

Name: "Andre"
Born: May 29, 1970
Twitter: "@dan"

Name: "Mica"
Born: Dec 5, 1975

- Nodes represent entities in the graph
- Relationships represent associations or interactions between nodes



Brand "Volvo"
Model: "V70"
Description: "An executive car manufactured and..."
DescEmbedding: [0.1, -0.3, 0.4, ..., -0.7]
DescSource: "https://en.wikipedia.org/wiki/Volvo_V70"

NEO4J INDEXING AND SEARCH

Neo4j makes search efficient through a variety of indexes including:

- Range: General index for predicates based on equality and range. Numeric, dates, etc.
- Point: Predicts on geospatial points like distance bounding boxes, etc.
- Text: Predicates on strings like contains, ends with, etc.
- FullText: Text search based on tokenization and analyzers
- **Vector: ANN (Approximate Nearest Neighbor) search on vectors**

GRAPHRAG = NEO4J + DATABRICKS



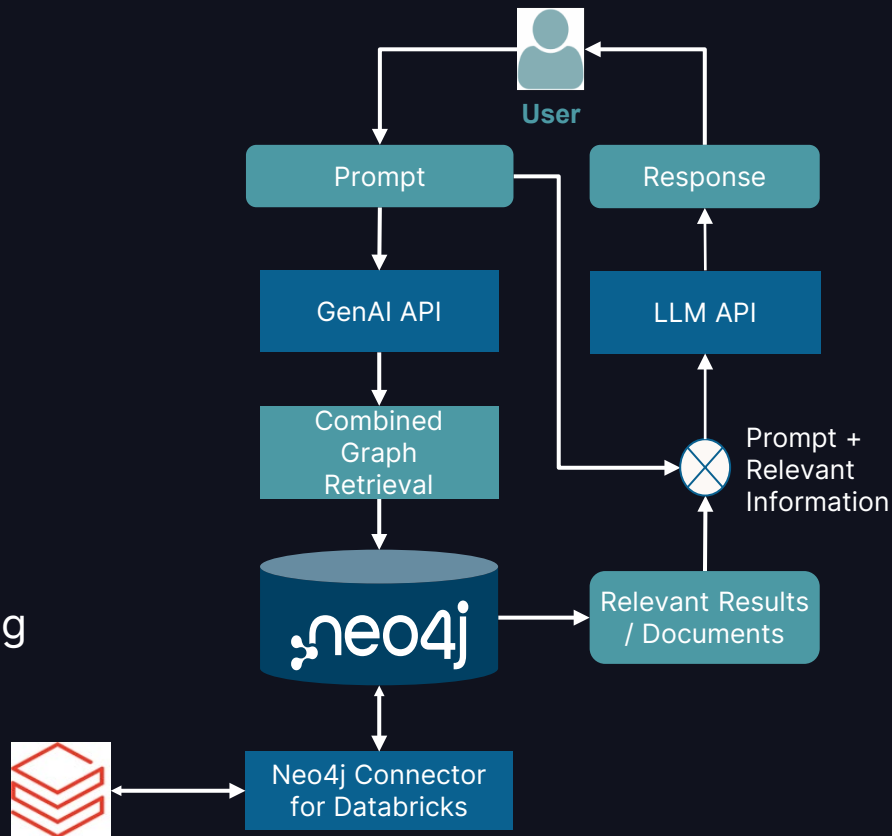
Enhance relevance with more domain context and inferences



Improve explainability with human-readable relationships



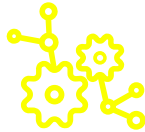
Accelerate GenAI application development with robust tooling and integrations



GRAPHRAG PATTERNS

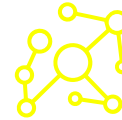
Text2Cypher

Convert natural language prompts to explicit Cypher queries for retrieval



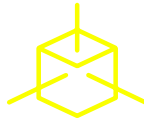
Graph Vectors

Use graph embeddings for retrieval - incorporating both structured and unstructured data in vector similarity search



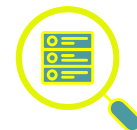
Vector Search with Graph Context

Use graph patterns to retrieve items related to vector search results



Graph Filtering

Use graph patterns and properties to pre/post filter vector search results. Also includes hybrid search



Agents and Multi-Step

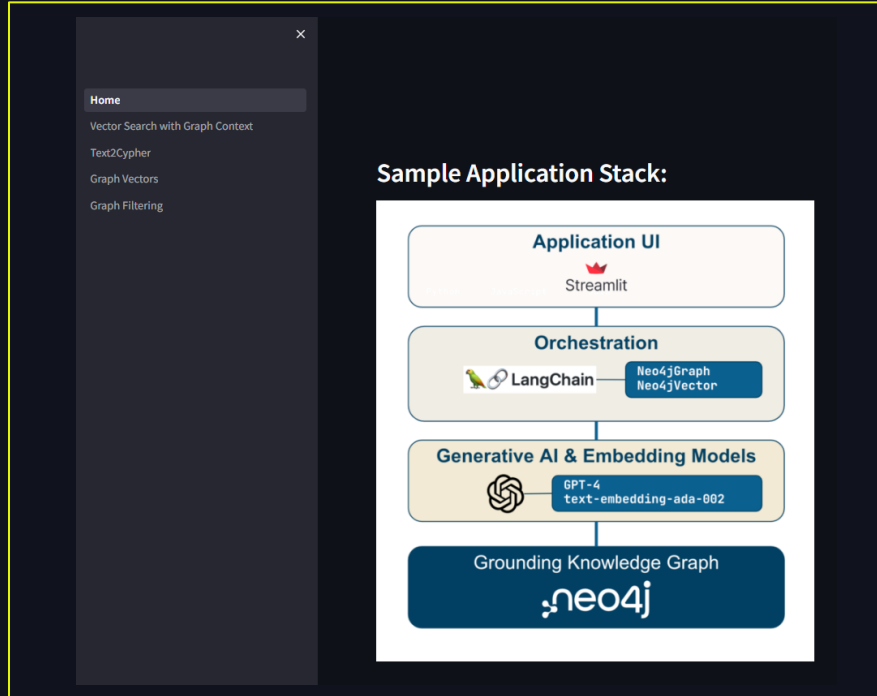
Combine multiple tools and GraphRAG patterns together for intelligent GenAI applications. Leverage corrective GraphRAG , semantic layers, and more

DEMO @ BOOTH #47



DEMO BOOTH #47

Example Streamlit App



Data sources

- Microsoft's Northwind
- Fashion Retailer H&M

In AuraDB and AuraDS

DEMO #47 - WHY YOU NEED GRAPHRAG

What are 3 popular cheeses? - How are you measuring popularity?

Vector Search	Vector Search & Graph Context
<ul style="list-style-type: none">1. Queso Manchego La Pastora2. Raclette Courdavault3. Queso Cabrales <p>Measured by units in stock</p>	<ul style="list-style-type: none">1. Camembert Pierrot2. Raclette Courdavault3. Mozzarella di Giovanni <p>Popularity is measured by the total number of orders for each cheese.</p>

DEMO BOOTH #47

Coming soon - Graph visualization in Databricks

```
cb0:130', 'caption': 'FROM_DEPARTMENT'}, {'id': '5:4b23520d-efdb-46a9-9942-5d3bc65d5cb0:1152931400211497078', 'from': '4:4b23520d-efdb-46a9-9942-5d3bc65d5cb0:13960', 'caption': 'VARIANT_OF'}, {'id': '5:4b23520d-efdb-46a9-9942-5d3bc65d5cb0:1152930300699a9-9942-5d3bc65d5cb0:127', 'to': '4:4b23520d-efdb-46a9-9942-5d3bc65d5cb0:92', 'caption': 'FROM_DEPARTMENT'}, {'id': '5:4b23520d-efdb-46a9-9942-5d3bc65d5cb0:13957', 'caption': 'VARIANT_OF'}]
```

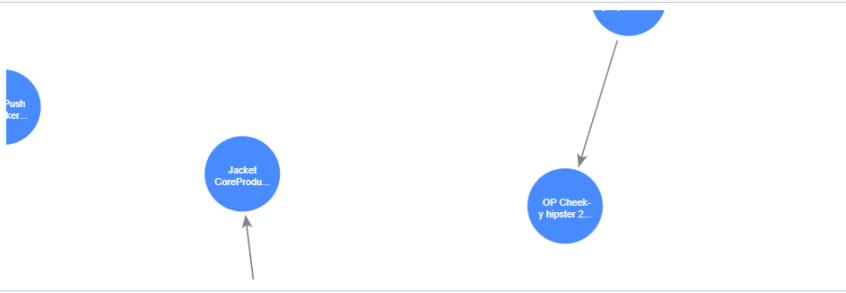
```
from nv1_package.nv1 import NVL

my_nv1 = NVL()

my_nv1

<nv1_package.nv1.NVL at 0x7fe388319ae0>
```

```
my_nv1.render(nodes=nodes, relationships=relationships, options={'useWebGL': False })
```



- Neo4j Visualization Library (NVL)
- Used in Bloom / Browser
- Demo of a prototype for use in Databricks Notebooks

RESOURCES



GET STARTED

Your subtitle here



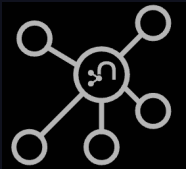
Code github.com/neo4j-product-examples/graphrag-examples

Get connected <https://neo4j.com/docs/spark/current/databricks/>



Get Started with Neo4j - Sandbox (free) & Aura

neo4j.com/sandbox/ | neo4j.com/docs/aura/



GenAI Ecosystem & Free Learning Resources

neo4j.com/labs/genai-ecosystem/

graphacademy.neo4j.com/categories/llms/

FLEXIBLE CLOUD DEPLOYMENT MODELS

Your choice for Neo4j



Graph-as-a-Service

- Fully-managed SaaS
- Consumption-based pricing
- Cloud-native
- Self-service deployment



Cloud Managed Services

- White-glove by Neo4j experts
- Fully customizable deployment model & SLA
- Own data centers or VPC



Self-Hosted

- For private, hybrid & on-prem
- Bring your own license
- You have full control
- Run in any cloud



THANK YOU

