RAGs to reqs

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Making ASVS more accessible through graphs and LLMs

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Agenda

1. Architecture and concepts
2. Demo
3. How we use it
4. Ideas for future development

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What is ASVS?

The OWASP Application Security Verification Standard (ASVS) Project provides a basis for testing web application technical security controls and also provides developers with a list of requirements for secure development.

Many ways to use it

- Secure Coding
- Security Archit
- Guide for auto
  integration tes
- Secure Develo
- Framework for
  secure softwar
- Agile Applicati

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Example

V3.1 Fundamental Session Management Security

#	Description	L1	L2	L3	CWE	NIST §
3.1.1	Verify the application never reveals session tokens in URL parameters.	✓	✓	✓	598	

V3.2 Session Binding

#	Description	L1	L2	L3	CWE	NIST §
3.2.1	Verify the application generates a new session token on user authentication. (C6)	✓	✓	✓	384	7.1
3.2.2	Verify that session tokens possess at least 64 bits of entropy. (C6)	✓	✓	✓	331	7.1
3.2.3	Verify the application only stores session tokens in the browser using secure methods such as appropriately secured cookies (see section 3.4) or HTML 5 session storage.	✓	✓	✓	539	7.1
3.2.4	Verify that session tokens are generated using approved cryptographic algorithms. (C6)		✓	✓	331	7.1

Tailor it!

https://www.infoq.com/presentations/sustainable-security-requirements-asvs/

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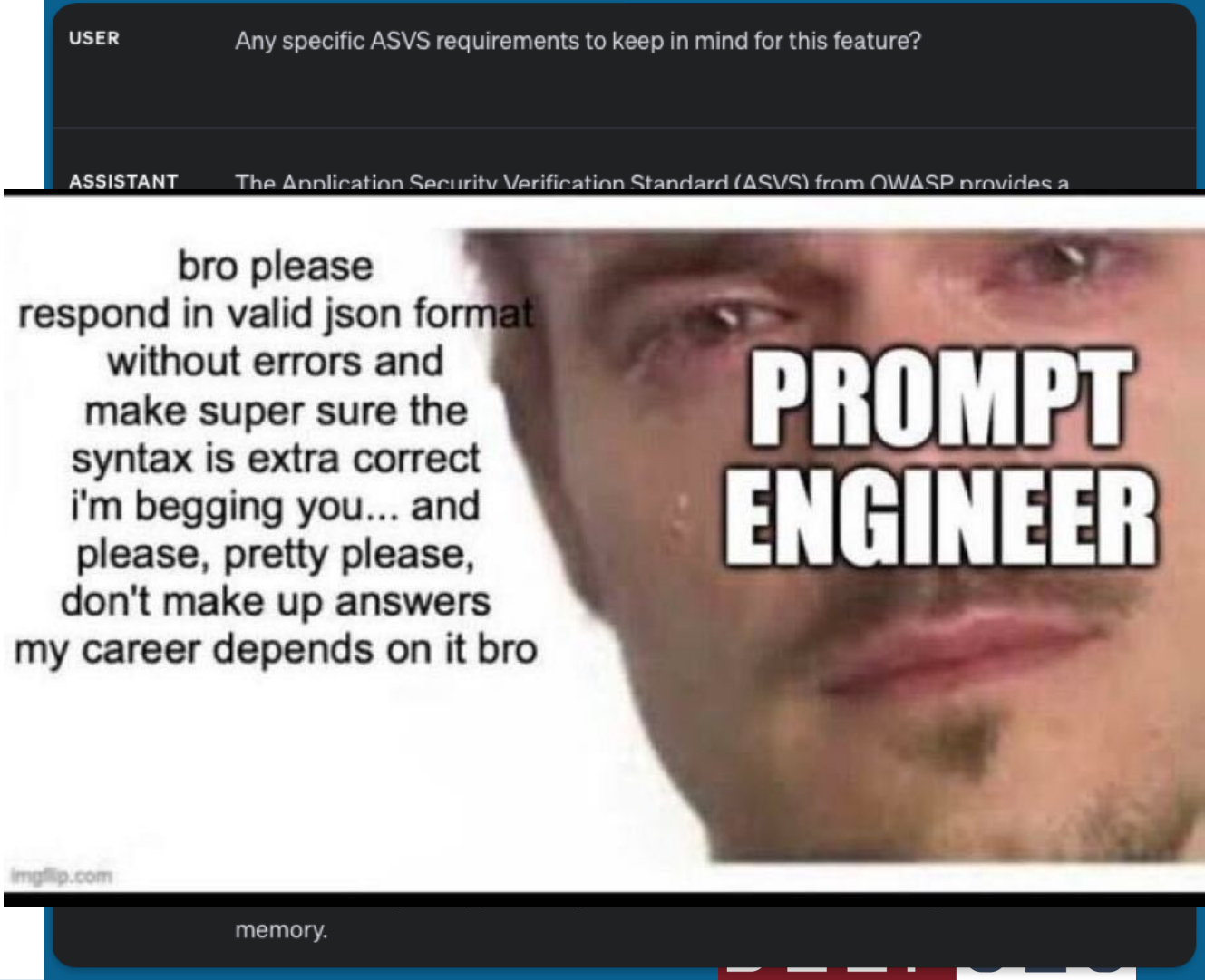
Lies, big lies, and LLMs

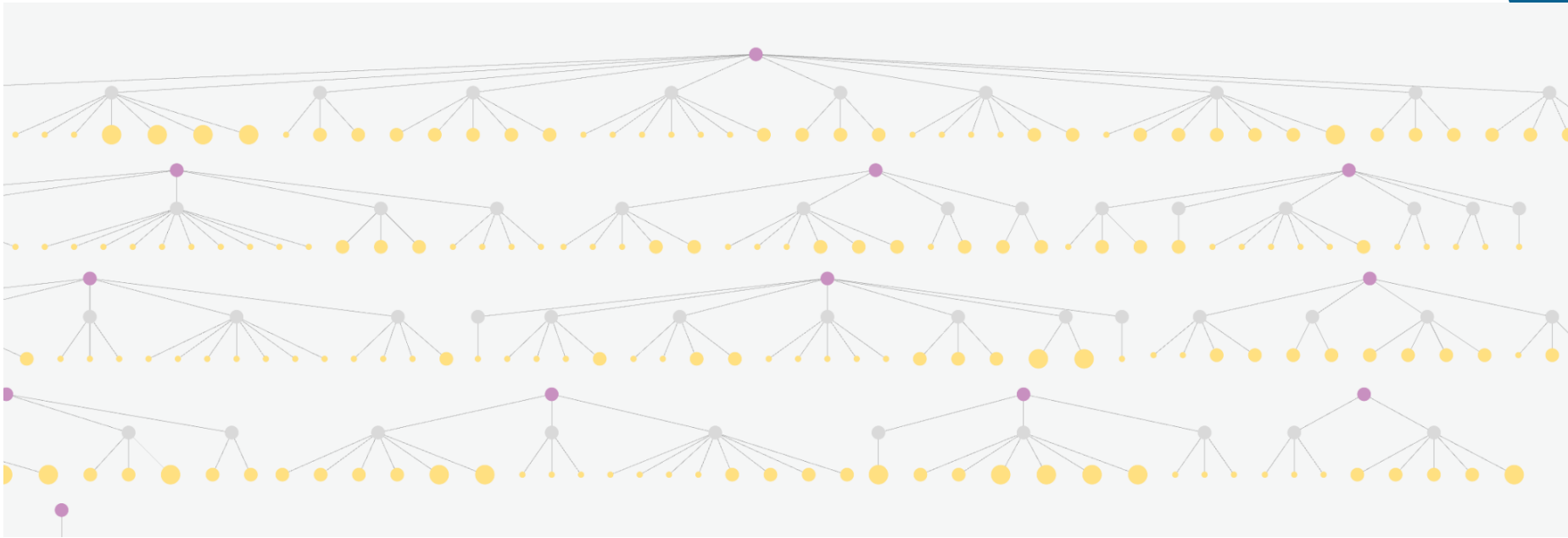


ASVS is “graphy”

Chapter->Section->Requirement

V4 -> V4.1 -> V4.1.1

Hierarchical view



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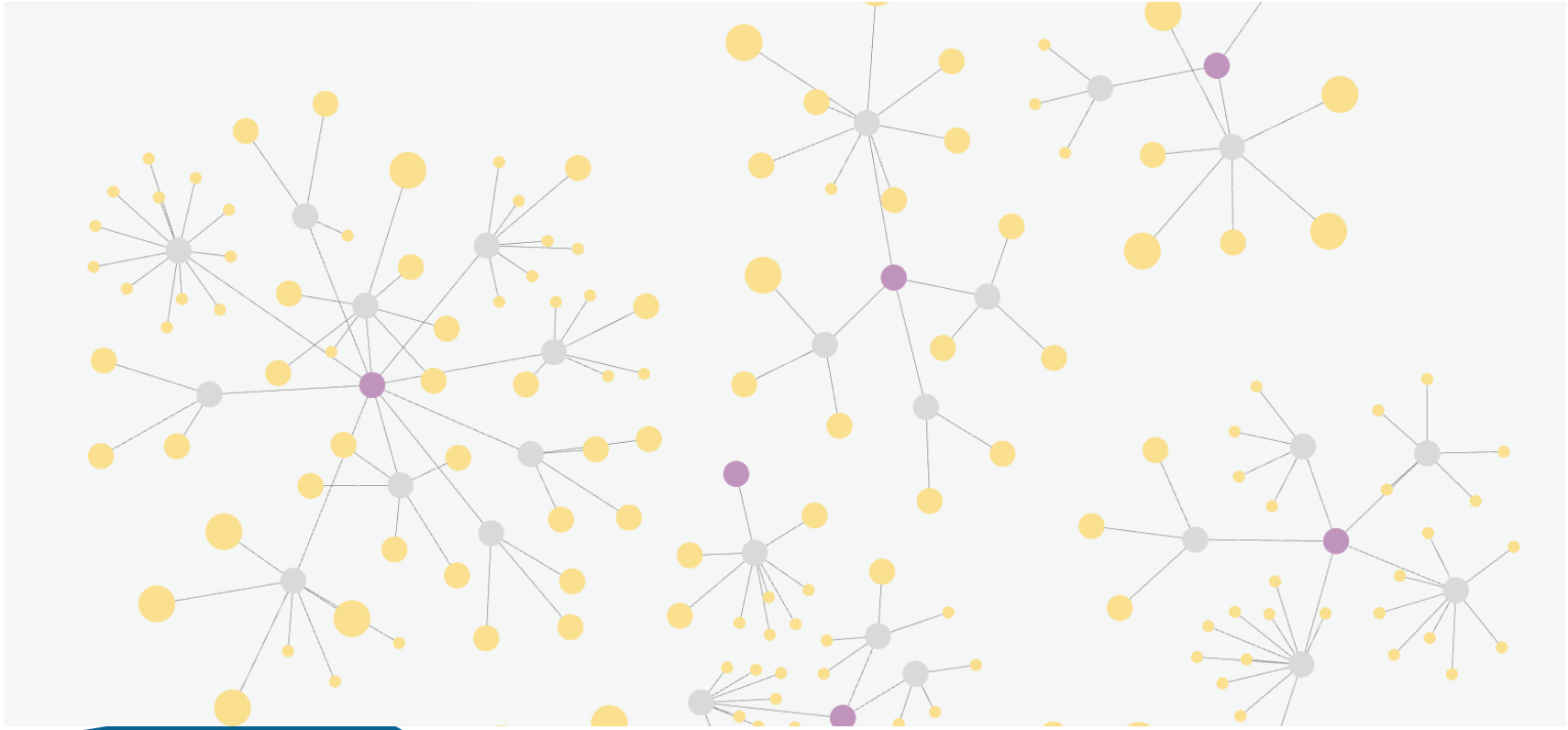
Force-based layout



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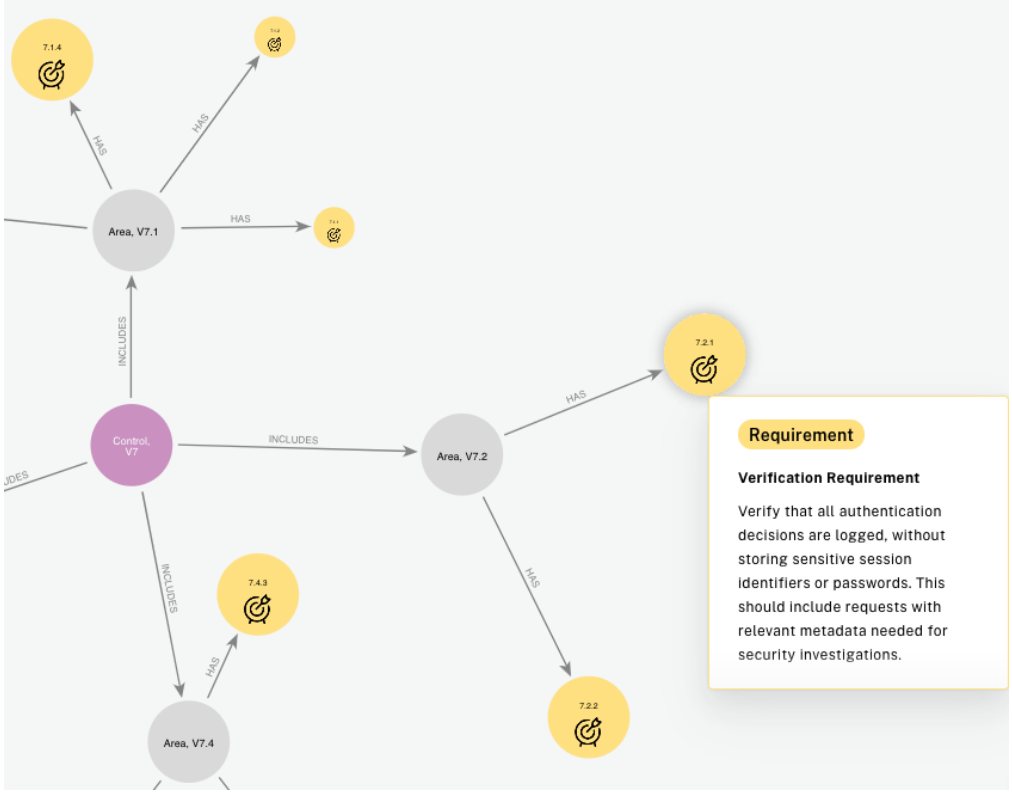
Zoom-in



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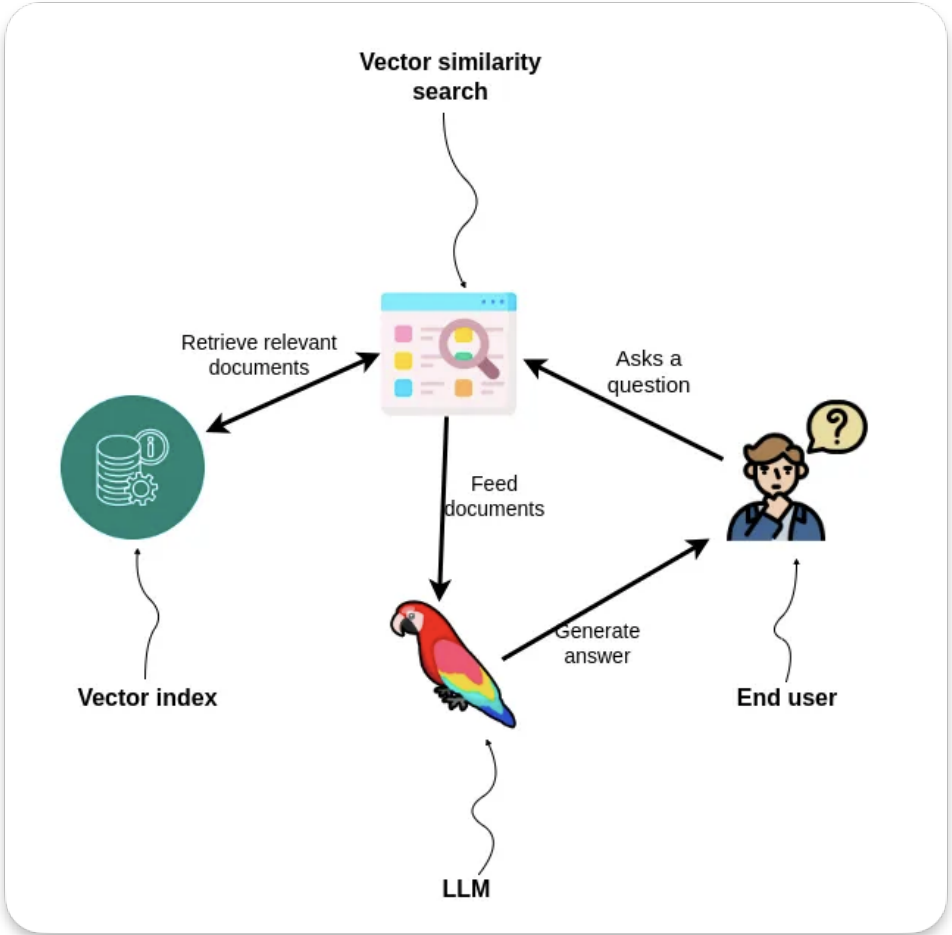
Architecture



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Demo

All the tools you need for this are free: https://github.com/neo4j-examples/appsec-asvs-bot

(except for OpenAI subscription)

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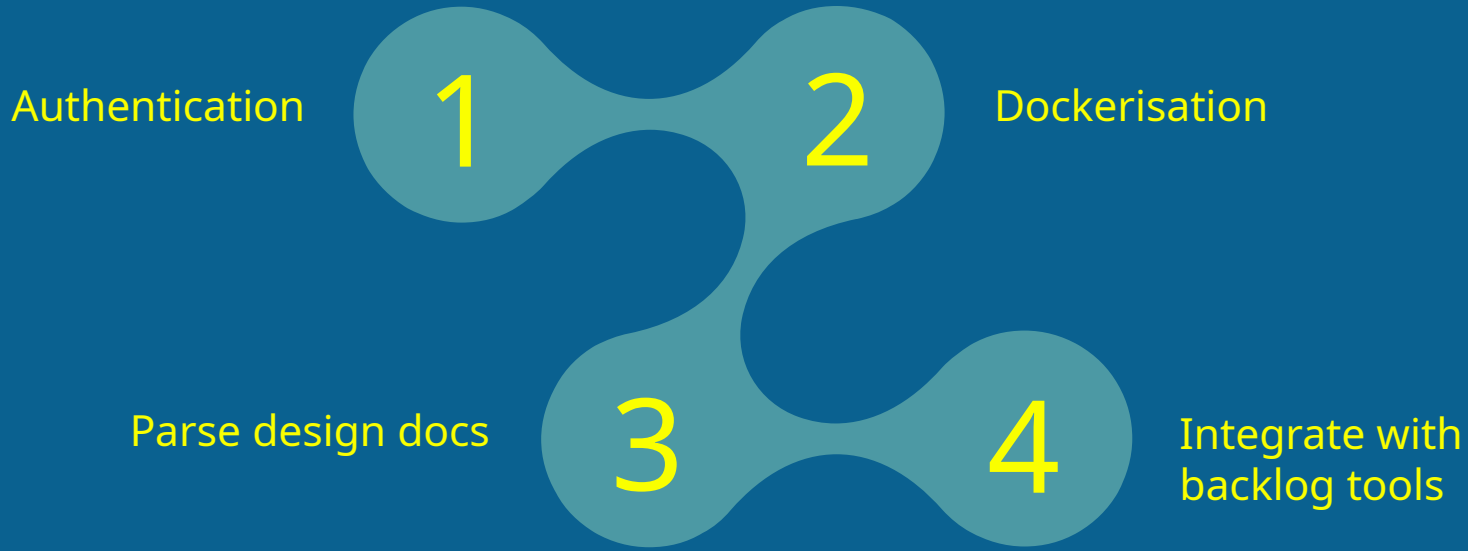
Ideas for further development



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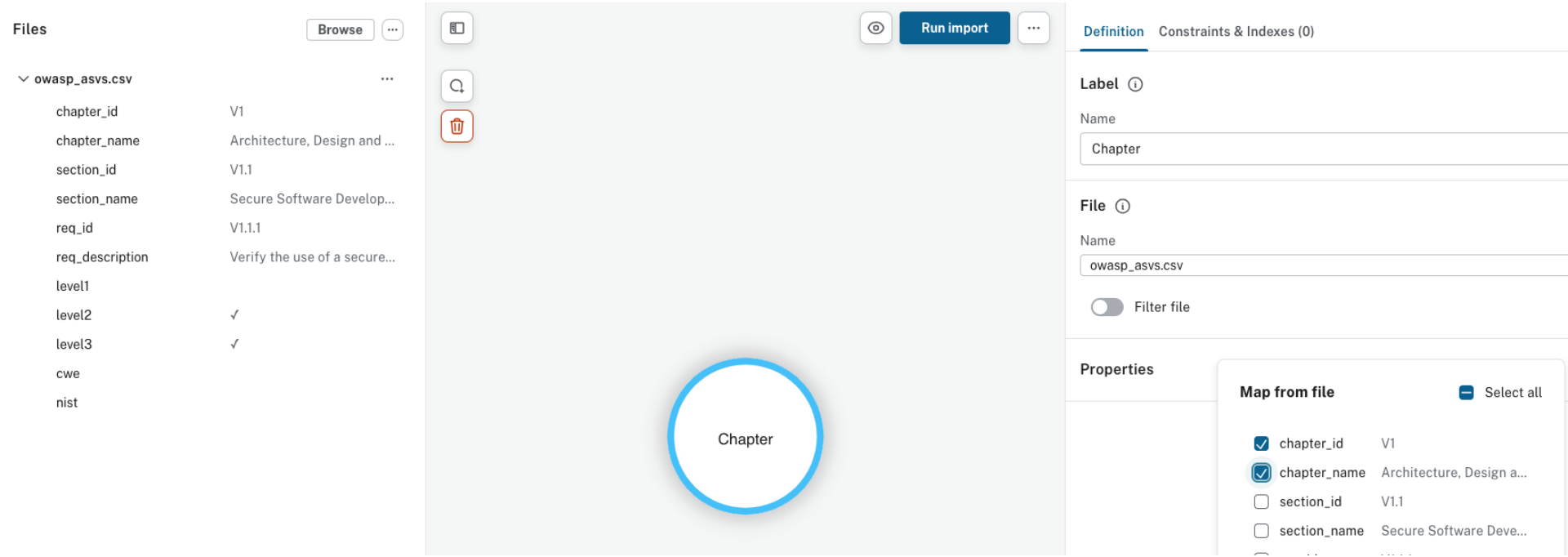
How to update my graph?

V5 is coming

Maybe 4.0.4 is coming?

Use Data Importer



https://workspace-preview.neo4j.io/workspace/import

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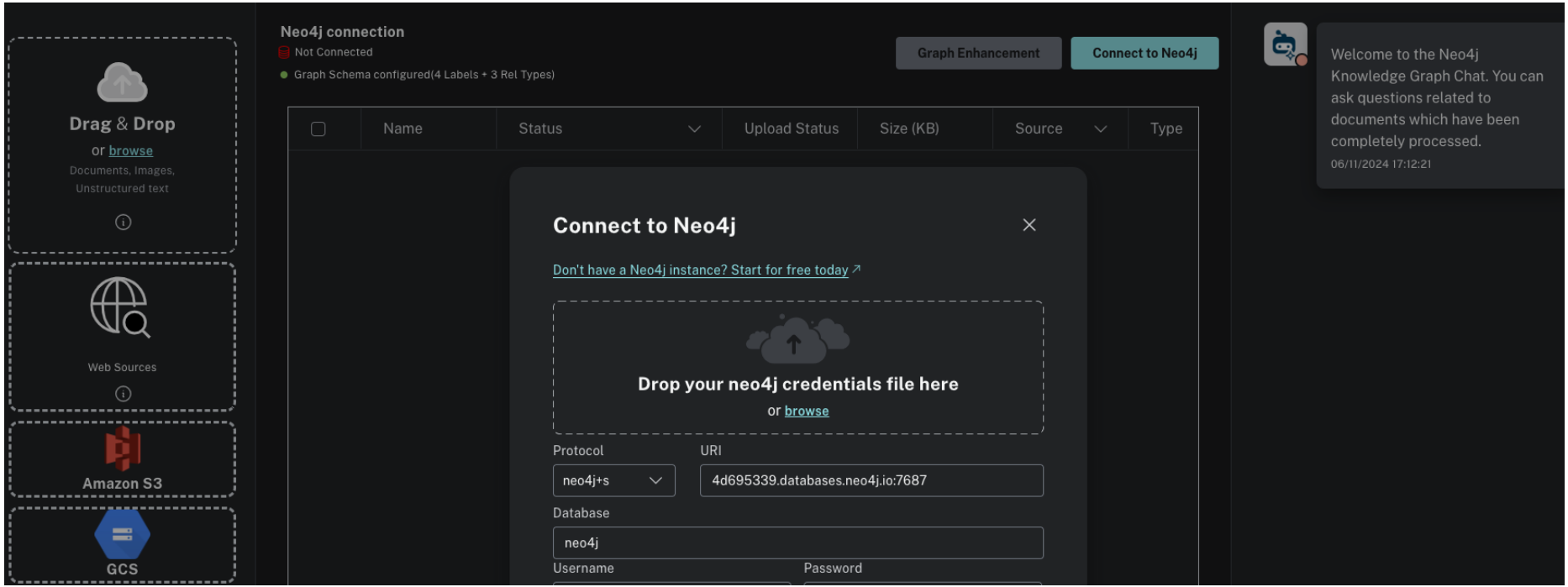
Use LLM Knowledge Graph Builder



https://llm-graph-builder.neo4jlabs.com/

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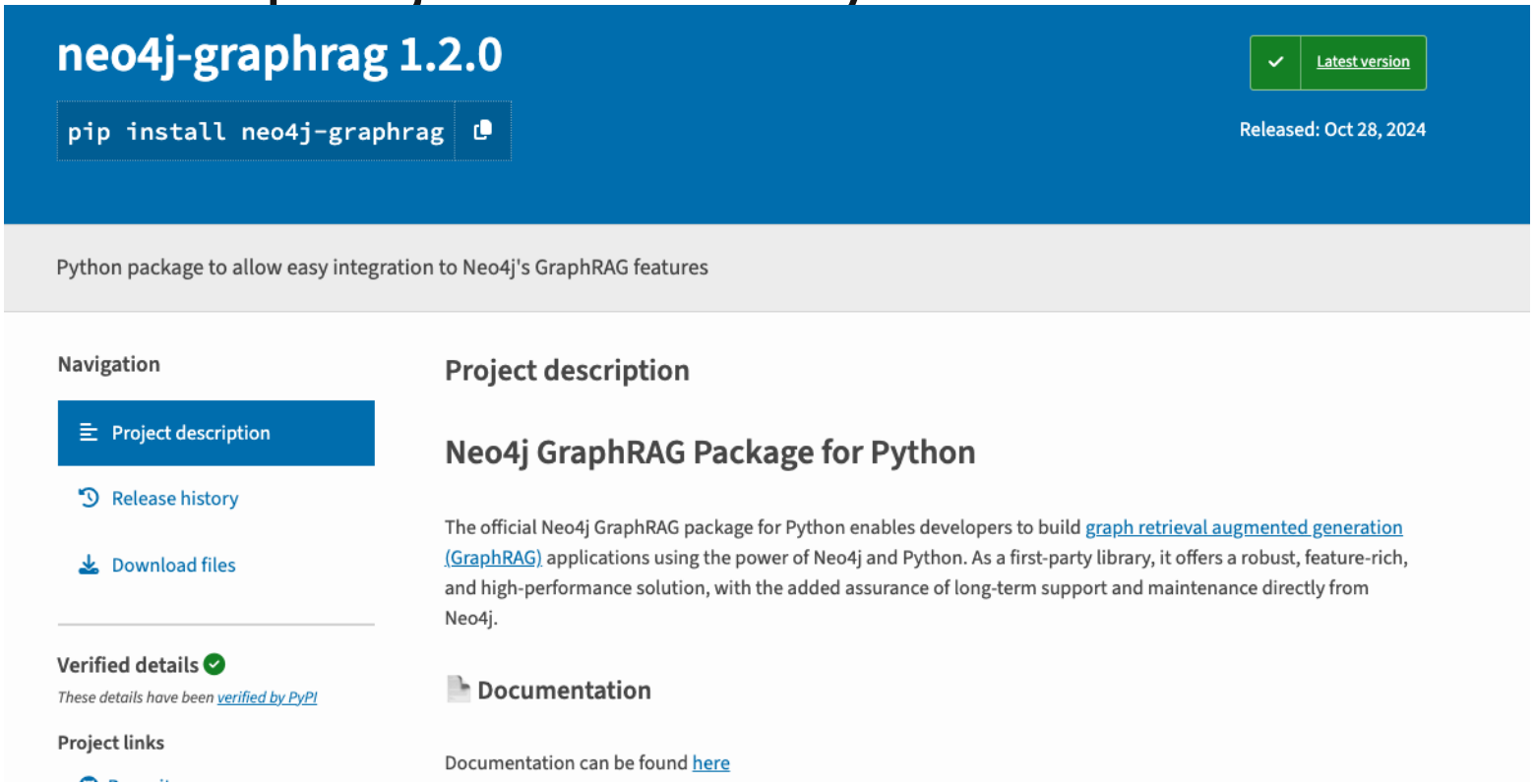
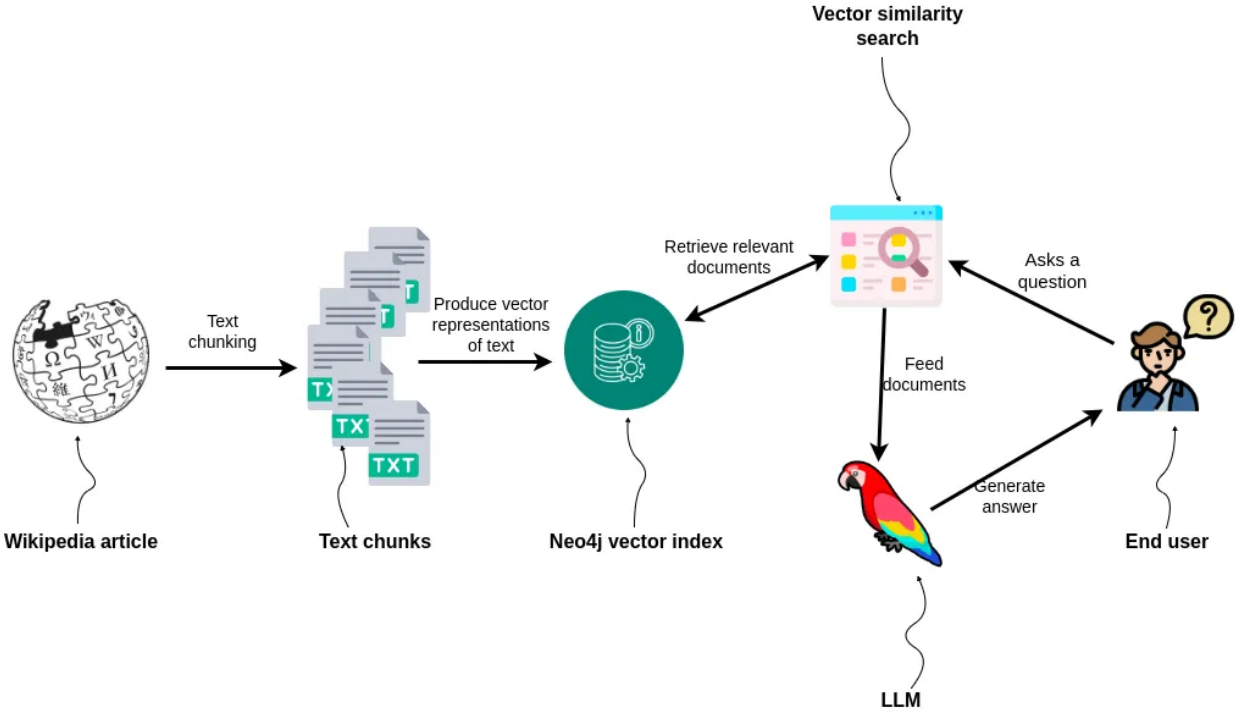
Build it programmatically



First thought - chunks



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Taking advantage of the structure

- https://medium.com/@irina.karkkanen/rag-on-graph-db-using-fixed-entity-architecture-make-you-retrieval-work-for-you-f4bfcac5277f
- https://medium.com/@irina.karkkanen/three-layer-fixed-entity-architecture-for-efficient-rag-on-graphs-787c70e3151a

- Ontological fishbone!

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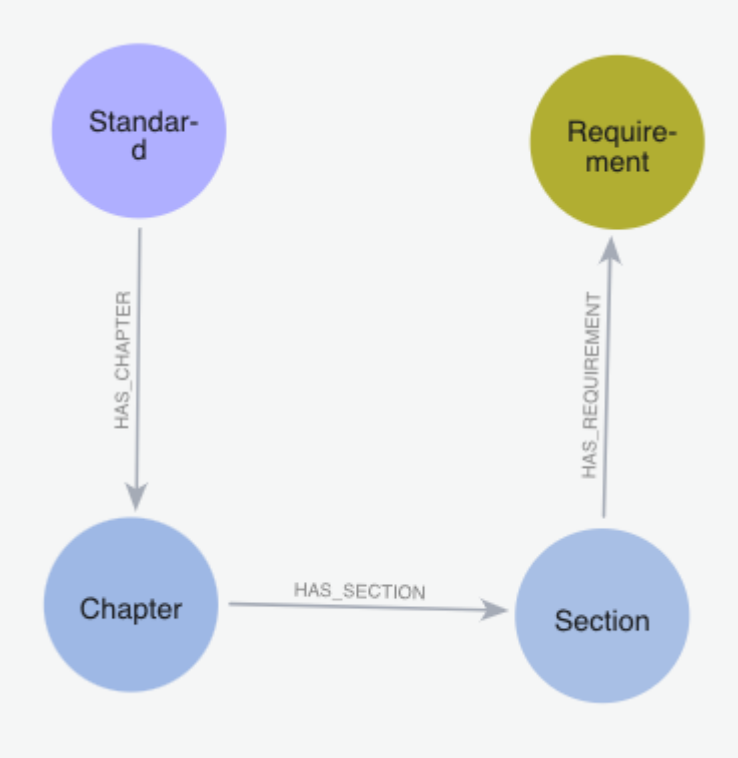
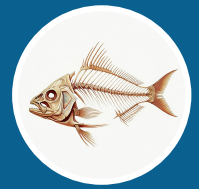
Ontological fishbone





In many organizations, subject matter experts can easily identify critical entities and relationships within well-defined domains. This foundational knowledge is essential for building effective knowledge graphs. By leveraging this expertise, a basic “fishbone” of key entities and their relationships can be established.

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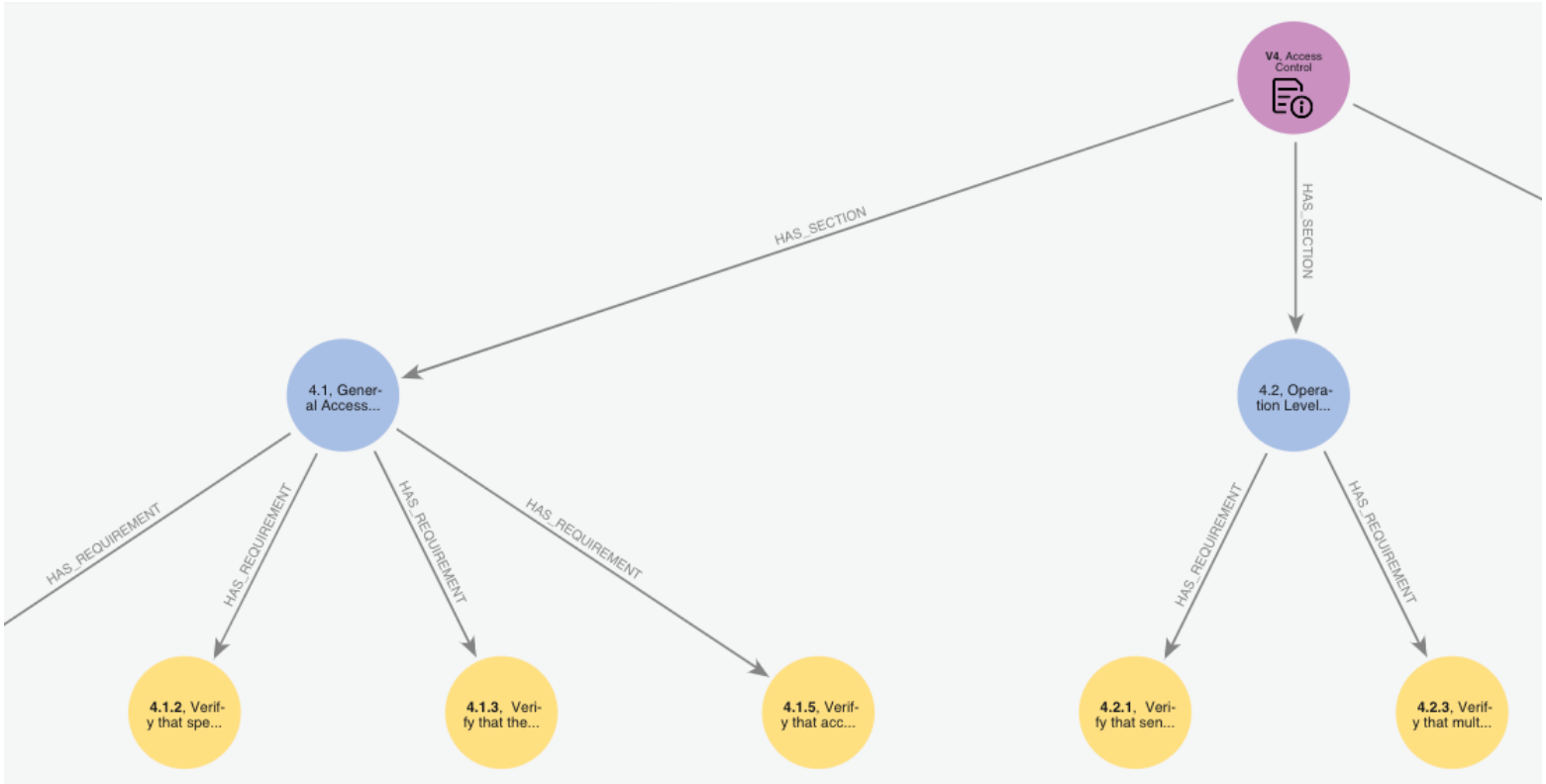
Next version



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What’s different?

- Uses ASVS V5
- Embedding is a property rather than a node
- Chapters, sections, requirements all have embeddings
- Uses EMBEDDING_MODEL = “text-embedding-3-small”
- Comes with full text indexes in addition to the vector index

https://github.com/neo4j-examples/appsec-asvs-bot /tree/ASVS-v5

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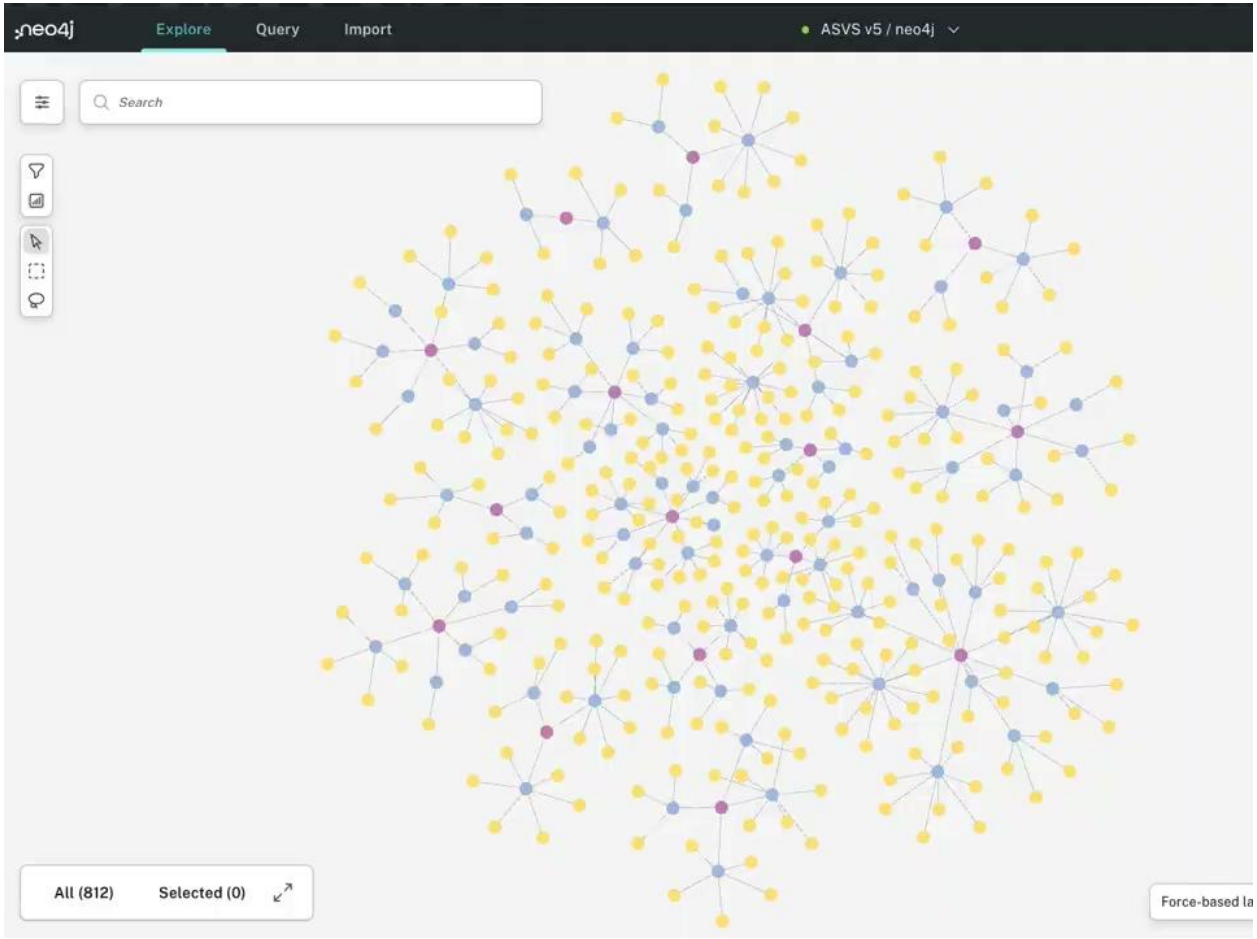

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```
MATCH (m1:Requirement{ID:'2.9.1'})
        WITH m1, m1.embedding as e

        // 2. Find other requirements which have high semantic similarity on description
        CALL db.index.vector.queryNodes("embeddingIndex", 10, e) YIELD node, score
        WITH m1, node AS m2, score
        WHERE m2:Requirement and score < 1.0  and score > 0.80 // exclude self and low-scoring matches

        // 3. For returned Requirement nodes, check they are in the same section and/or chapter
        // Counting hops between the two requirements. 2 means same section, 4 means same chapter

        WITH m1, m2, score
        MATCH (m1)-[r*..6]-(m2)

        // 4. Use structure to calculate weights and apply to similarity score
        WITH m1, m2, score,

           CASE size(r)
              WHEN 2 THEN 2
              WHEN 4 THEN 1+log(2)
              ELSE 1
           END AS proximity

        RETURN  m2.ID AS reqNumber, m2.`Description` AS requirement, score,
         proximity * score AS rank
        ORDER BY rank DESC
```

Taking advantage of the structure

- https://medium.com/@irina.karkkanen/rag-on-graph-db-using-fixed-entity-architecture-make-you-retrieval-work-for-you-f4bfcac5277f
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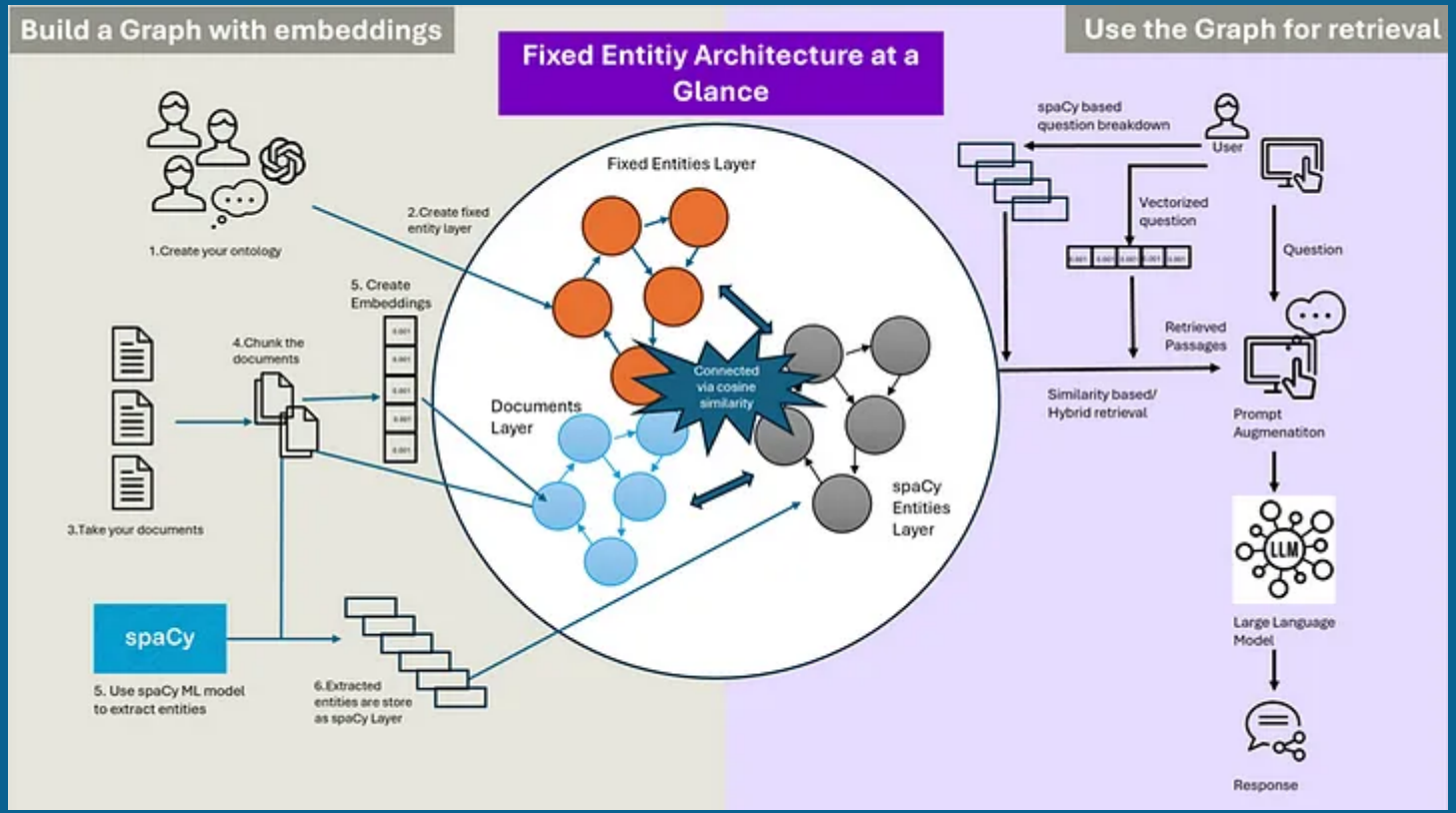
What's next?



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Thank you!

https://github.com/neo4j-examples/appsec-asvs-bot

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