Knowledge Graphs for RAG

Knowledge Graphs Fundamentals

Nodes are data records


```
(Person)
```

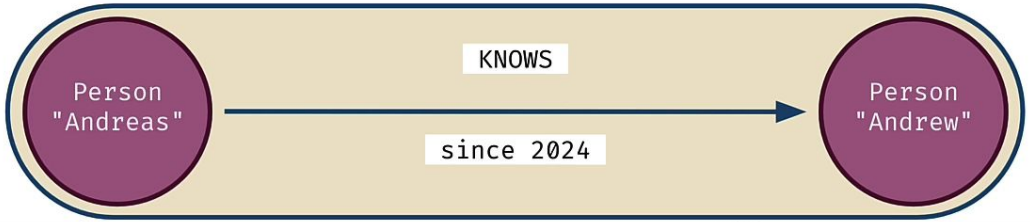
Add another person


```
(Person) , (Person)
```

Relationships are also data records


```
(Person)-[KNOWS]→(Person)
```

Relationships *contain* two nodes



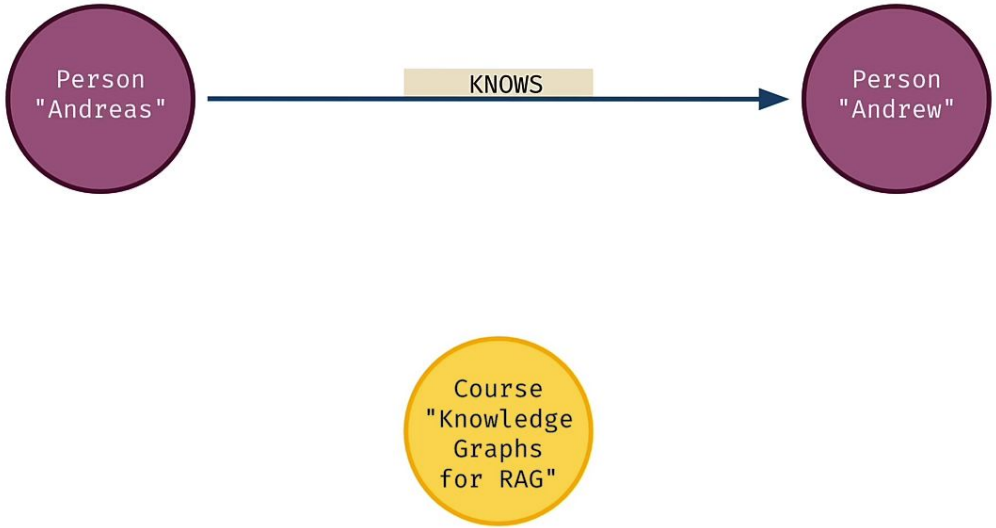
The nodes are "in" a relationship, which itself has properties.

Unlike an OO-perspective or even relational model, where the entity records would "know" about each other with direct references or foreign keys.

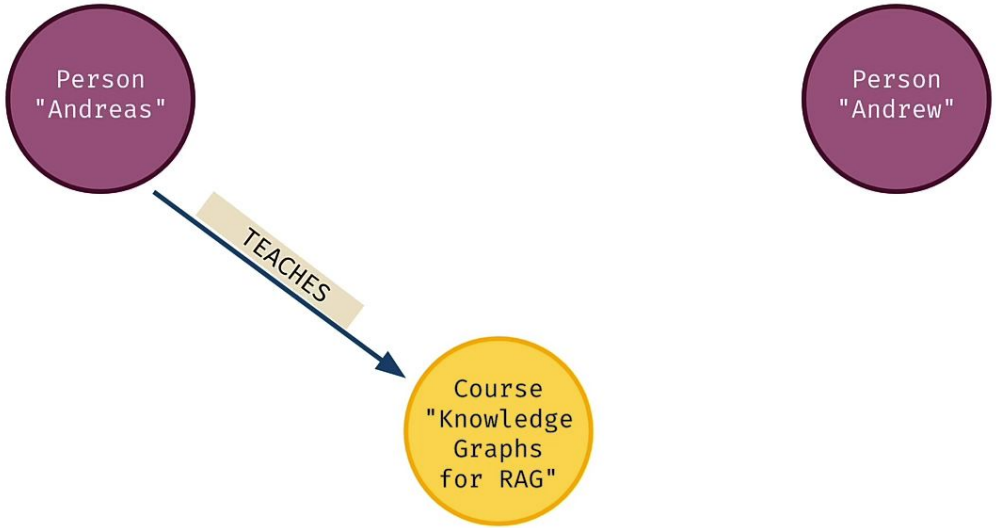
This has amazing implications for modeling and schema.

Graph types are composable!

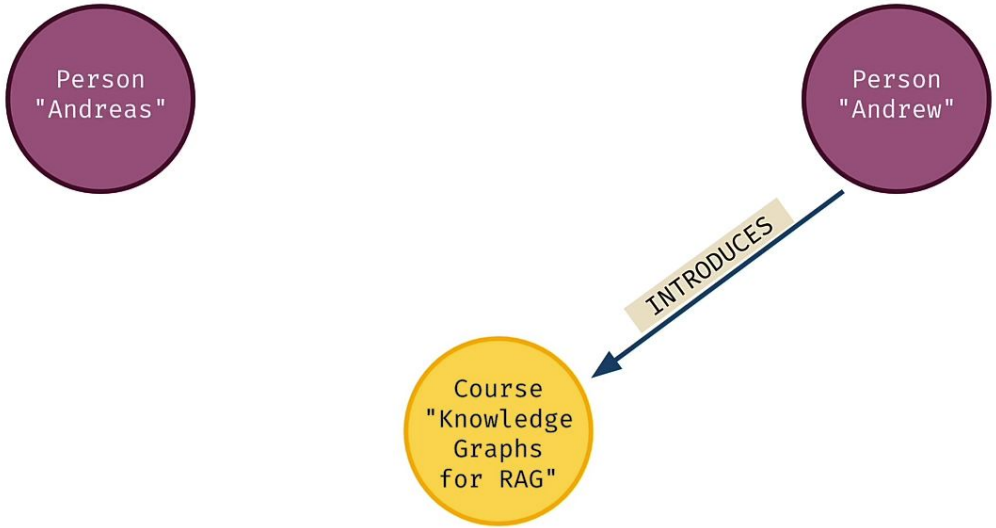
```
(Person)-[KNOWS]→(Person)
```


Person
"Andreas"
KNOWS
Person
"Andrew"
Course
"Knowledge
Graphs
for RAG"

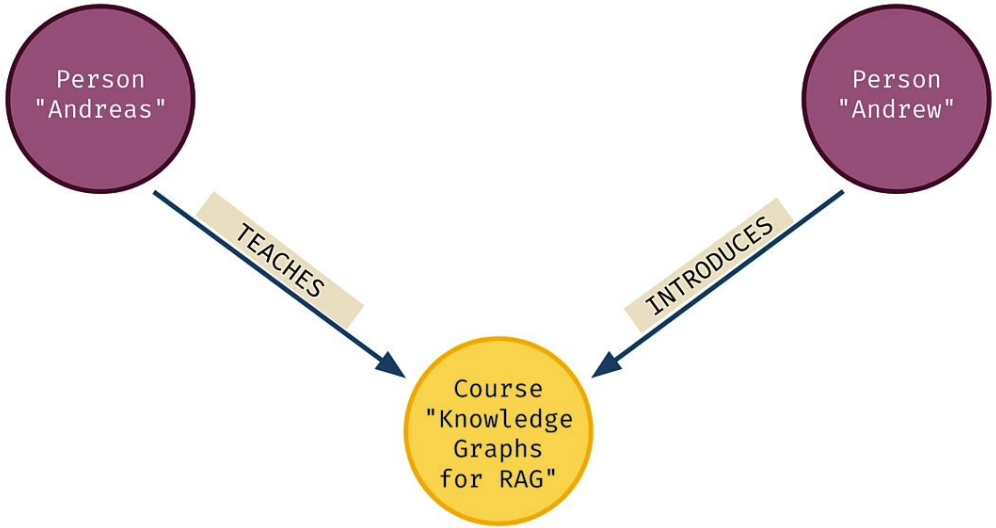
(Course)



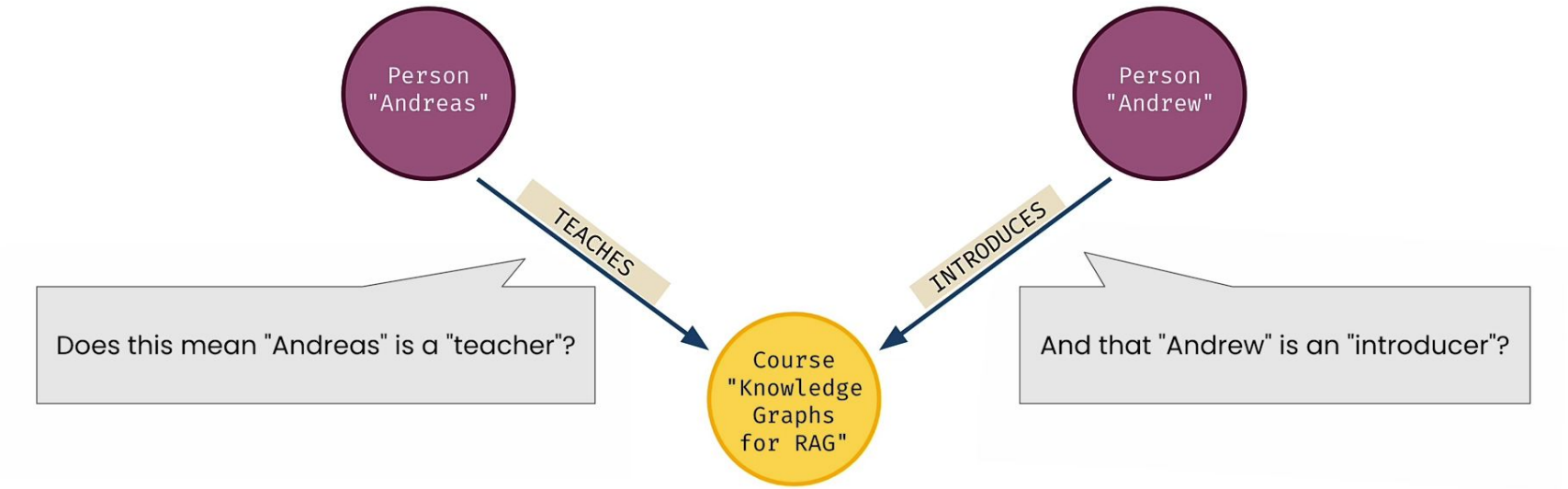

```
(Person)-[TEACHES]→(Course)
```



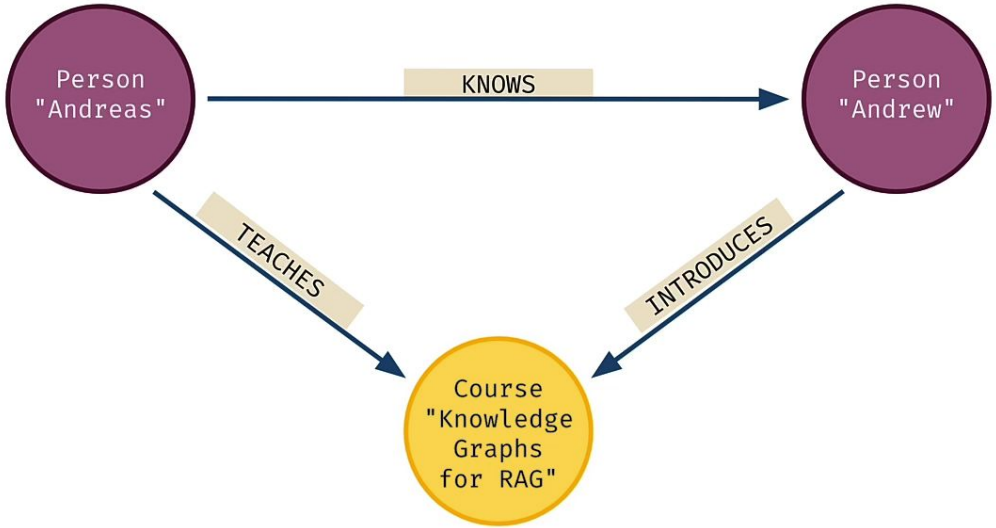
(Person)-[INTRODUCES]→(Course)




```
(Person)-[TEACHES]→(Course)←[INTRODUCES]-(Person)
```

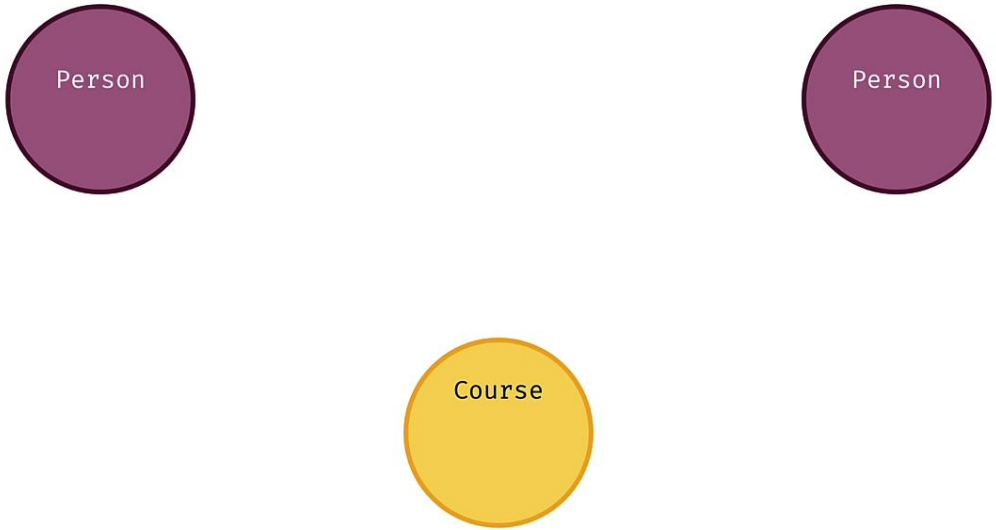



```
(Person)-[TEACHES]→(Course)←[INTRODUCES]-(Person)
```

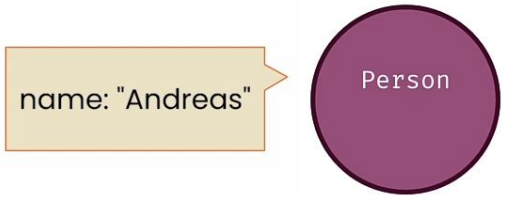


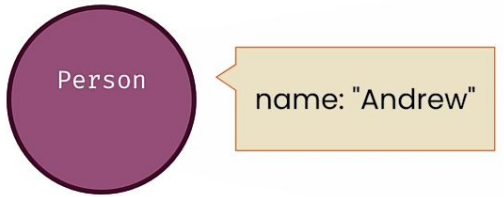

```
(Person)-[TEACHES]→(Course)←[INTRODUCES]-(Person)
```

Formally, nodes have labels

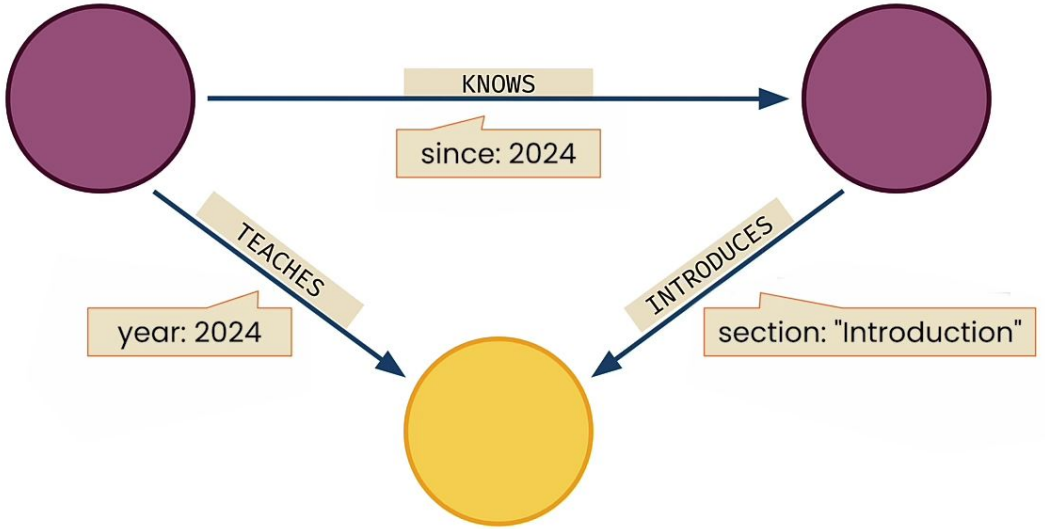


Formally, nodes are data record with key/value properties





Relationships are also data records.
They have a direction, a type, and properties



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Relationships always have a **type** and a **direction**.

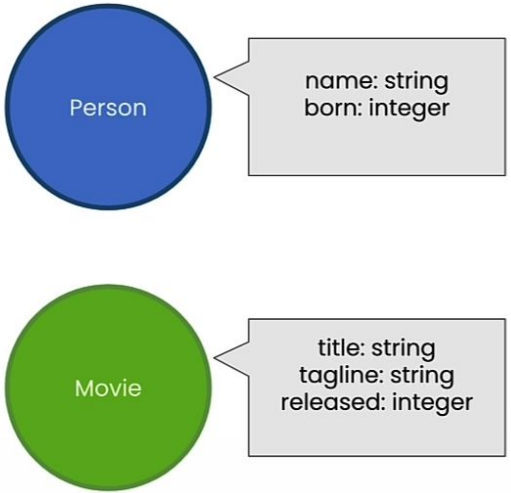
Knowledge Graphs for RAG

Lesson 2: Querying Knowledge Graphs

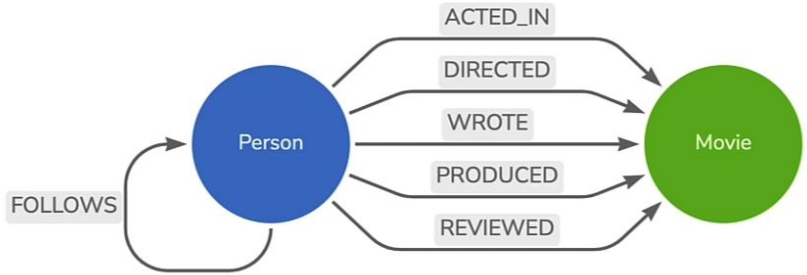
Movie Knowledge Graph - Person acted in movie


```
(Person)-[ACTED_IN]→(Movie)
```

Node properties



All relationships between a Person and a Movie



Knowledge Graphs for RAG

Lesson 3: Preparing Text Data for RAG

Knowledge Graphs for RAG

Lesson 4: Constructing a Knowledge Graph from Text Documents

SEC filing data

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- An important form is the **10-K**, which is an annual report of the companies activities
- These forms are public records, and can be accessed through the SEC's **EDGAR** database

Data cleaning

Completed 10-K forms are available to download as text files that contain XML components

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You can look in the data directory in the notebook if you'd like to examine the cleaned data for yourself.

Plan of attack

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5. Use similarity search to find relevant chunks!

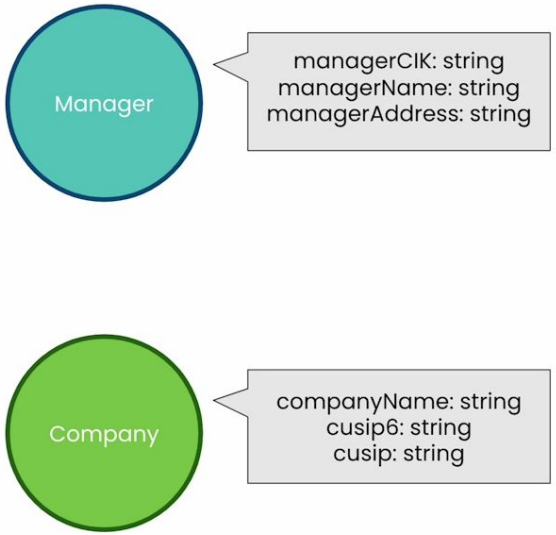
Knowledge Graphs for RAG

Lesson 5: Adding Relationships to the SEC Knowledge Graph

Knowledge Graphs for RAG

Lesson 6: Expanding the SEC Knowledge Graph

New Nodes from Form 13



Knowledge Graphs for RAG

Lesson 7: Chatting with the Knowledge Graph

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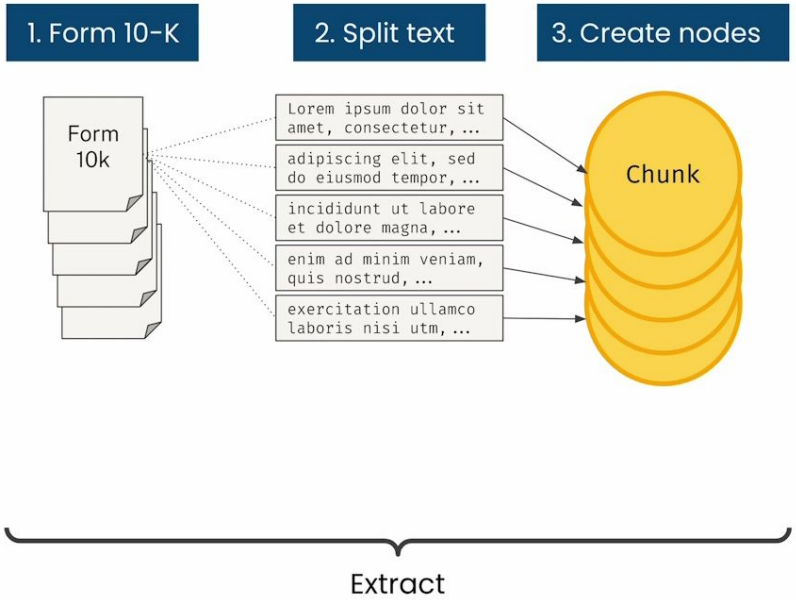
Start with a Minimum Viable Graph (MVG), then extract, enhance, expand, and repeat to grow the graph

Extract: identify interesting information

Enhance: supercharge the data

Expand: connect information to expand context

From text source to MVG



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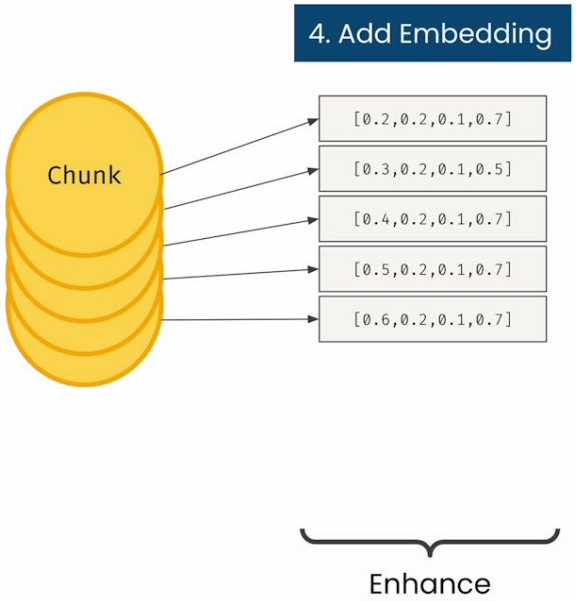

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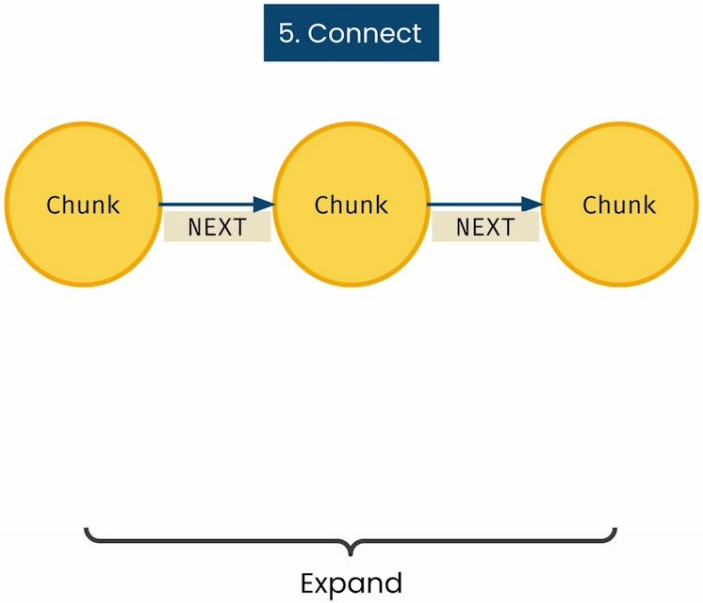

Extract, Enhance, Expand with SEC Forms

	Chunked Text Nodes	Form 10K Nodes	Companies	Management Firms
Source	Form 10K json	(:Chunk)	Form 13 CSV	Form 13 CSV
1. Extract	`(:Chunk)`	`(:Form)`	`(:Company)`	`(:Manager)`
2. Enhance	Vector embedding of text	Unique chunk IDs	Unique company cusip6	Full-text index of names
3. **Expand**	`(Chunk) -[NEXT]→ (Chunk)`	`(Chunk) -[PART_OF]→ (Form)`	`(Company) -[FILED]→ (Form)`	`(Manager) -[OWNS_STOCK_IN]→ (Company)`

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- add Users to refine relevance and enable feedback