Connecting the Dots: Ensuring Customer Data Integrity With Graphs in Oracle Database

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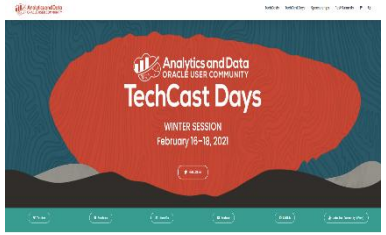

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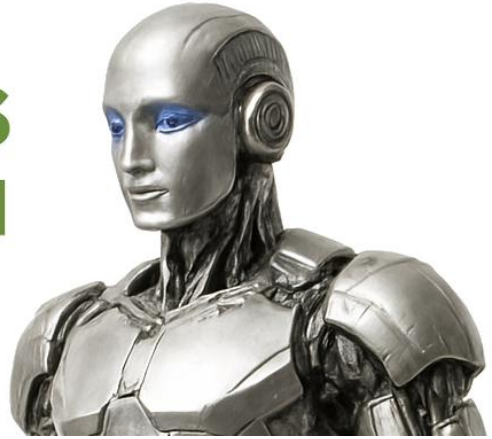

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Connect the Dots: Ensuring Data Integrity with Graphs in Oracle Database

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Oracle

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Who we are

Melli Annamalai

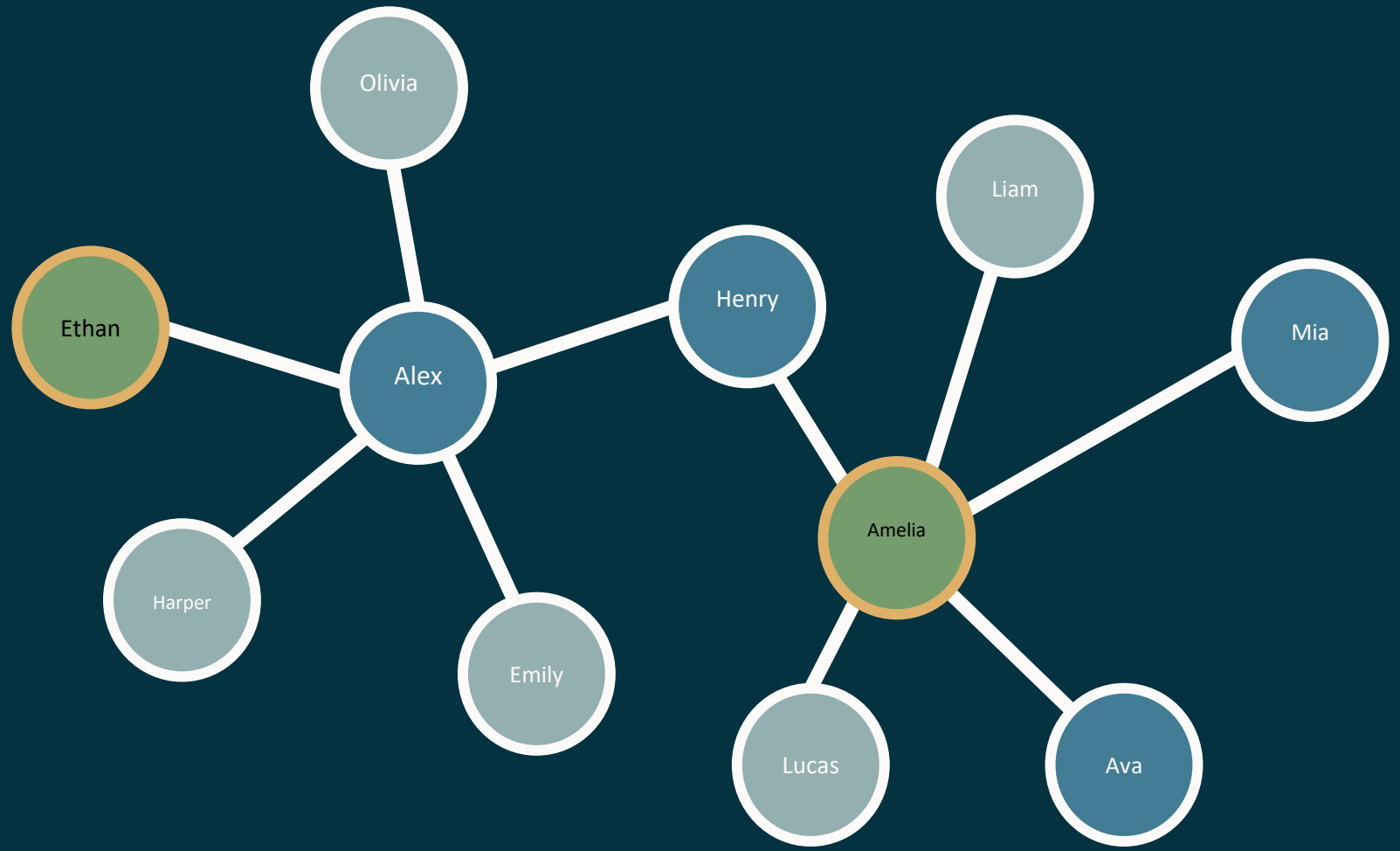
Distinguished Product Manager
Oracle AI Database

Phani Chilakapati

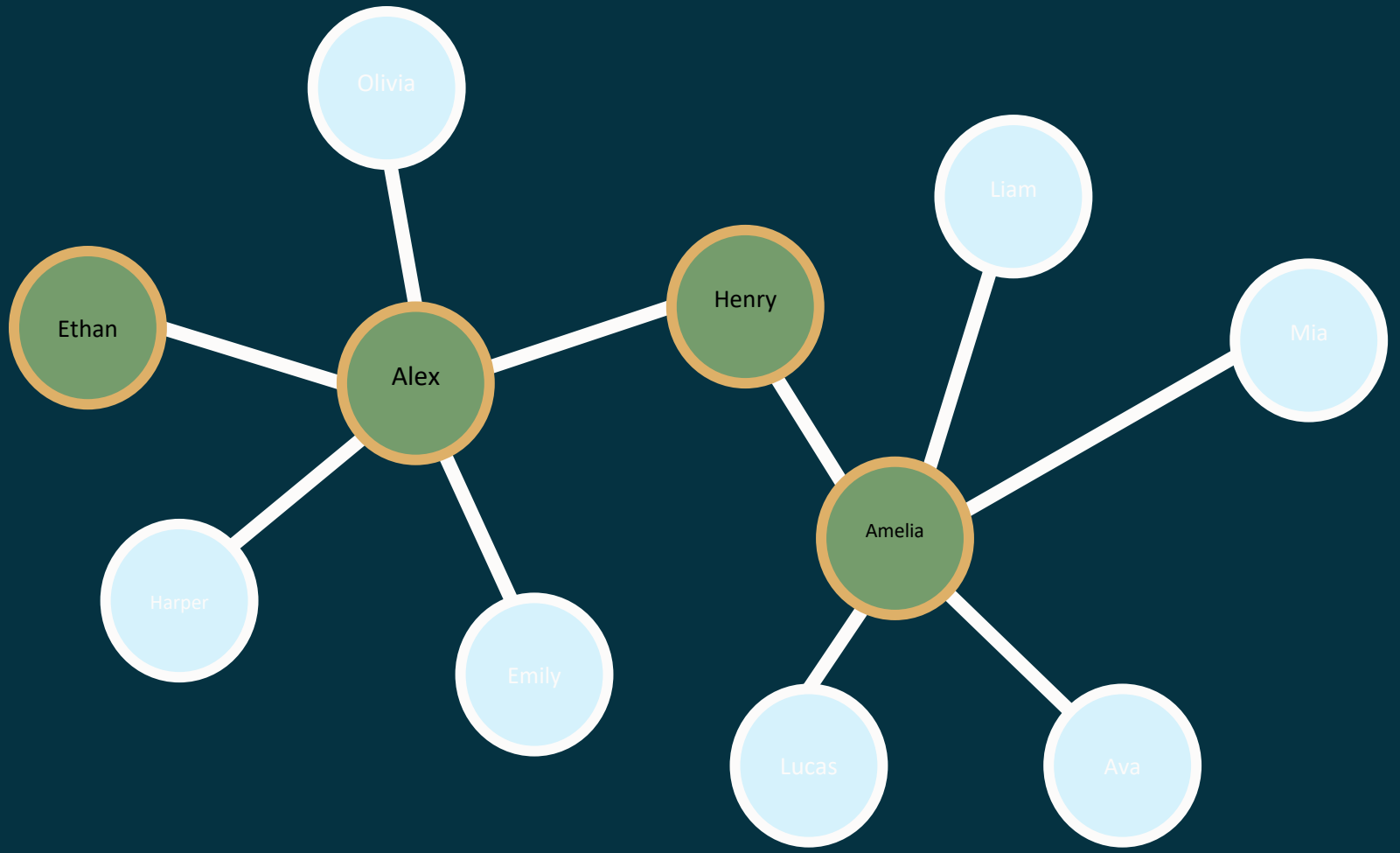
Global Data Architecture Leader
Industrial Scientific

Why Graphs?

Example 1: Navigating Connections in a Social Media Network



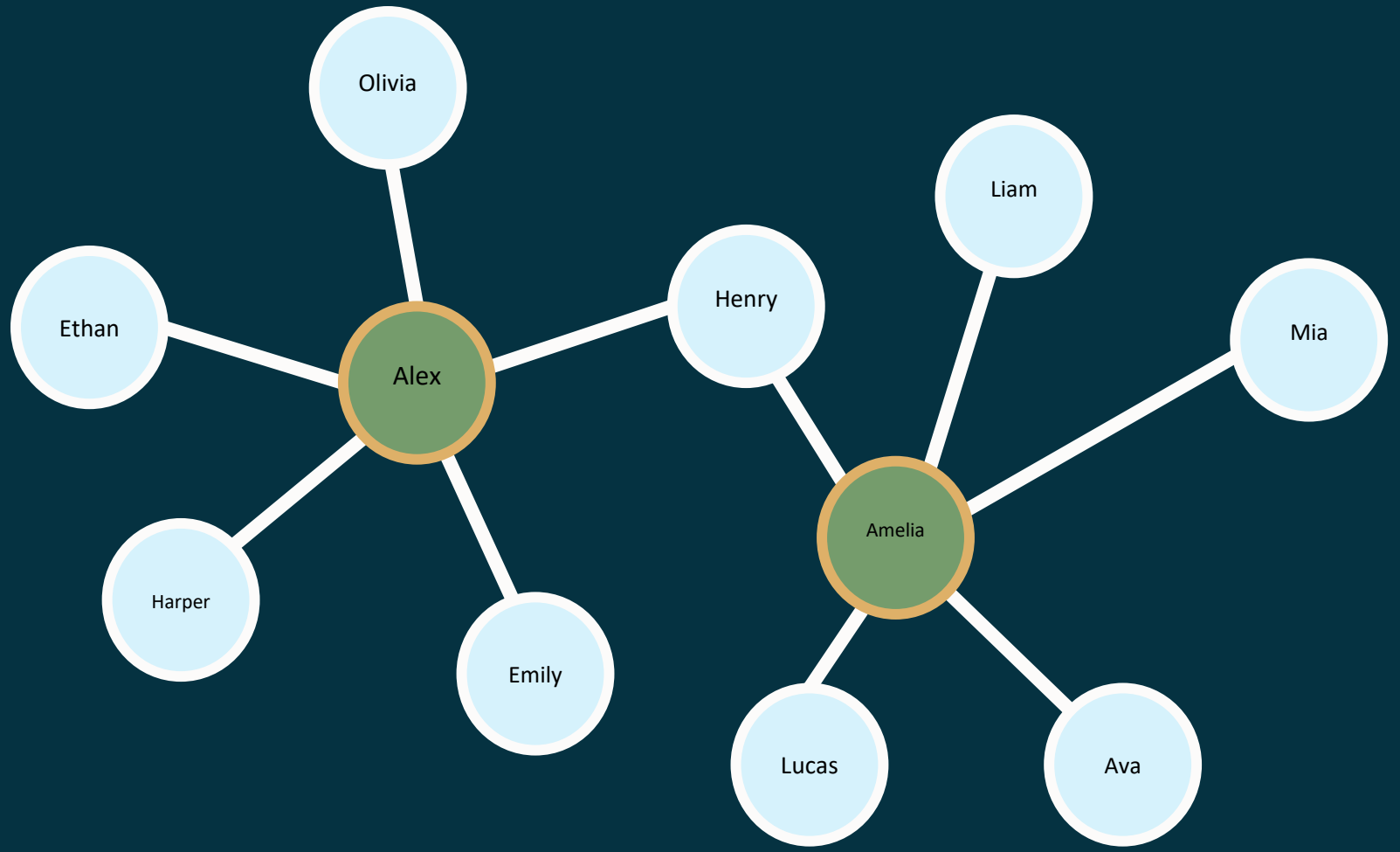
Are you connected to someone?



What is Ethan's connection to Amelia (number of hops and folks along the way)

Are there folks connected to a lot of people (like Alex and Amelia)

Who is highly connected?



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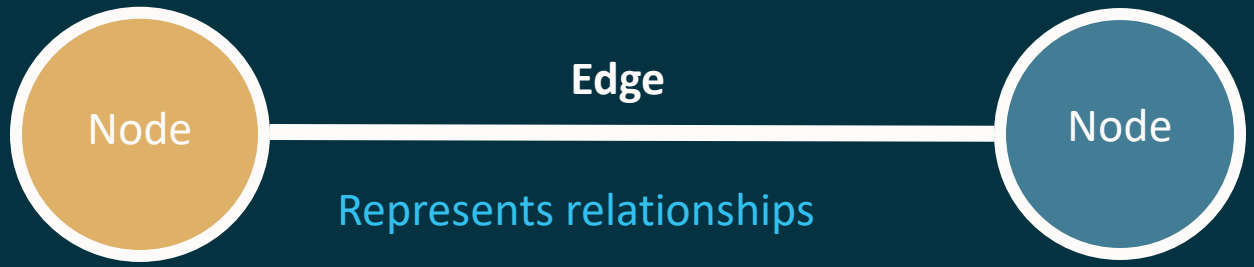
Graph Data Model



Also known as a Vertex

Represents entities in data

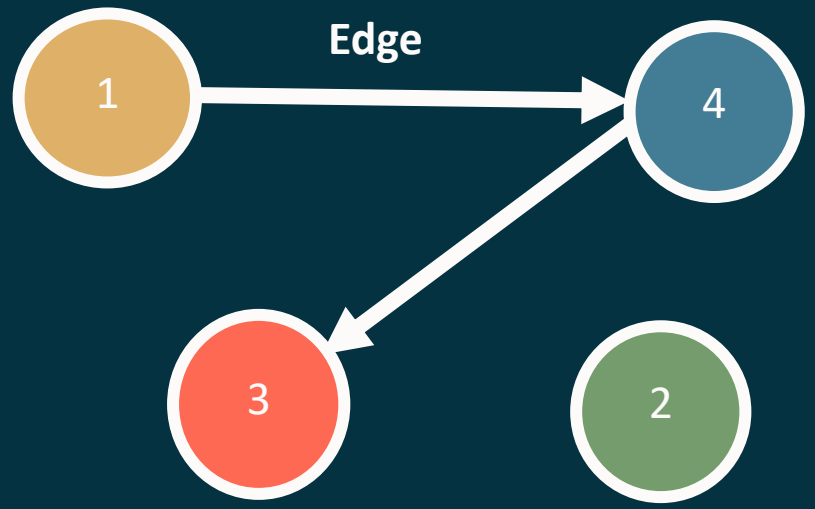
Also known as a Vertex

Represents entities in data

Tables and Graphs

ID	Name
1	
2	
3	
4	

SRC_ID	DST_ID
1	4
4	3



Model Your Data as a Graph

For easier navigation of connections in your data

Complex relationships

Traditional relational queries struggle with multiple relationships (like "find all people connected within 3 degrees of separation" or "what's the shortest path between two entities"). Queries get complex and difficult to read very soon.

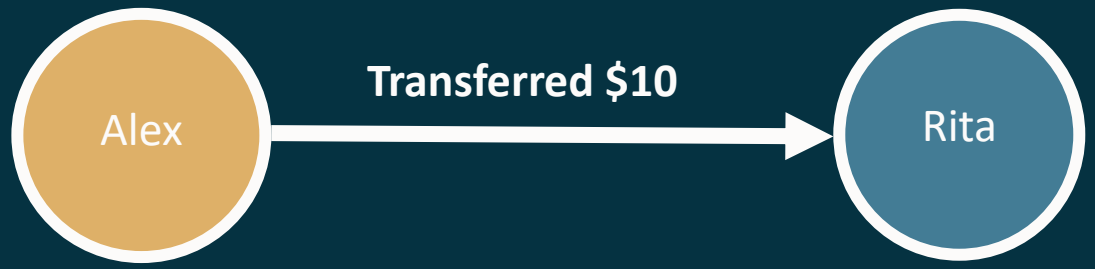
Network and pattern analysis

Discovery of patterns like fraud rings, recommendation networks, supply chain dependencies, or social influence patterns are nearly impossible to detect with standard SQL queries.

Real-time traversals

Need to traverse millions of relationships in milliseconds through data structure not optimized for following connections

Example 2: Follow the Money



Follow the Money

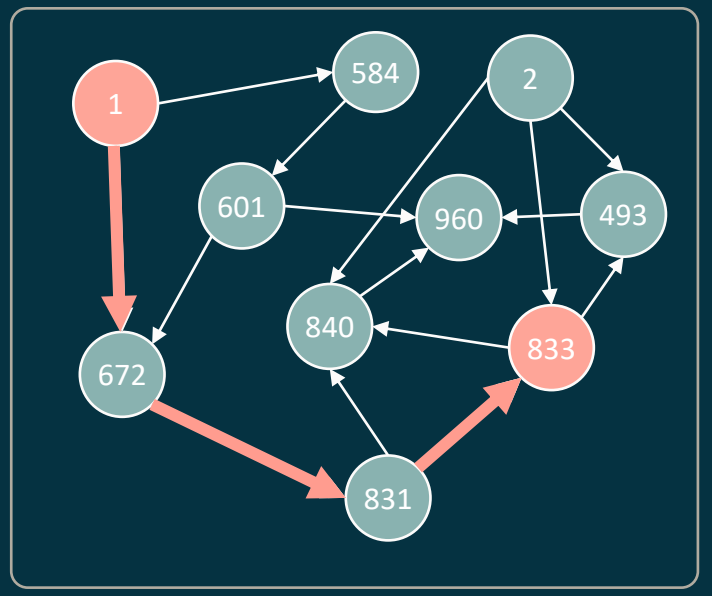
A financial transactions graph will be more intuitive to answer many queries

BANK_ACCOUNTS

ID	Name
1	
2	
3	
…	
672	
673	
674	
…	
831	
832	
833	
…	

BANK_TRANSFERS

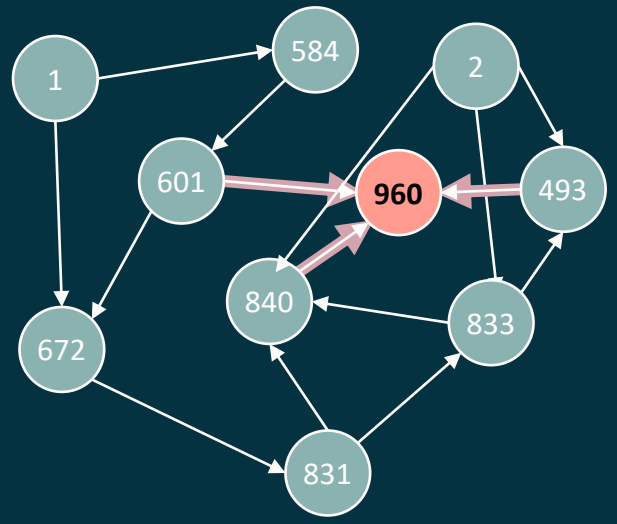
SRC_ACCT_ID	DST_ACCT_ID	AMOUNT
1	672	1000
1	584	1000
1	259	100000
2	833	5001
2	840	7050
2	493	4363
…	…	…
672	831	5425
…	…	…
831	833	256
…	…	…



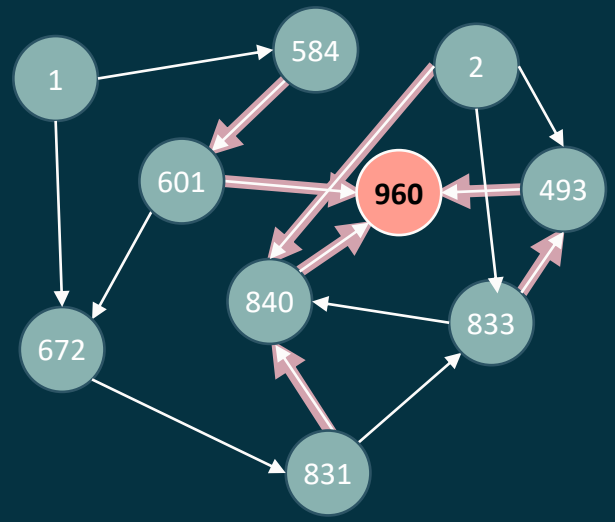
Tables

Graph

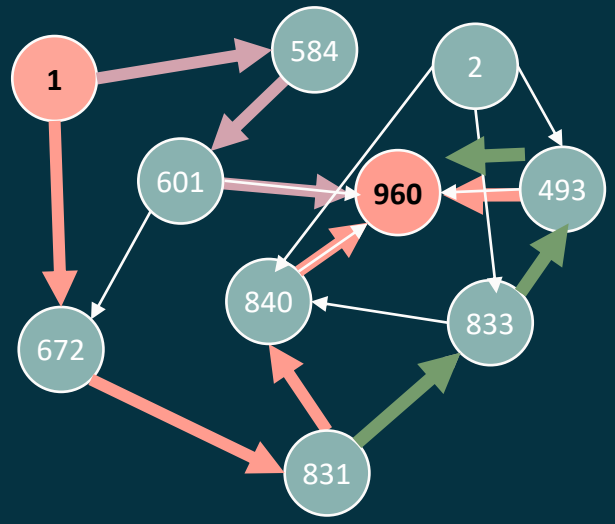
And you can ask more questions of this graph



Who has transferred money *directly* to account 960



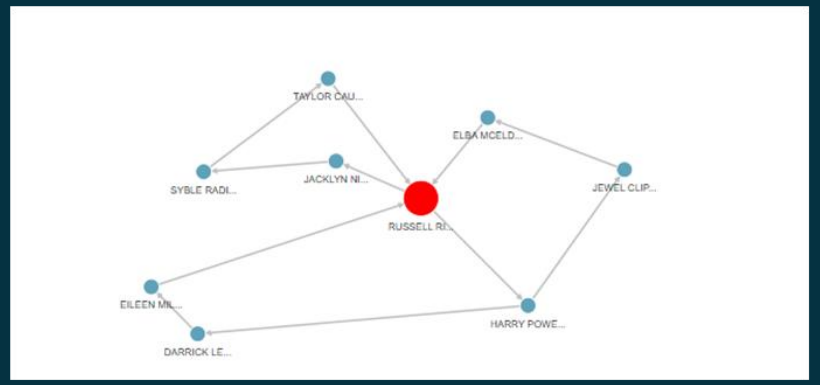
Who has *indirectly* transferred money to 960 through one account



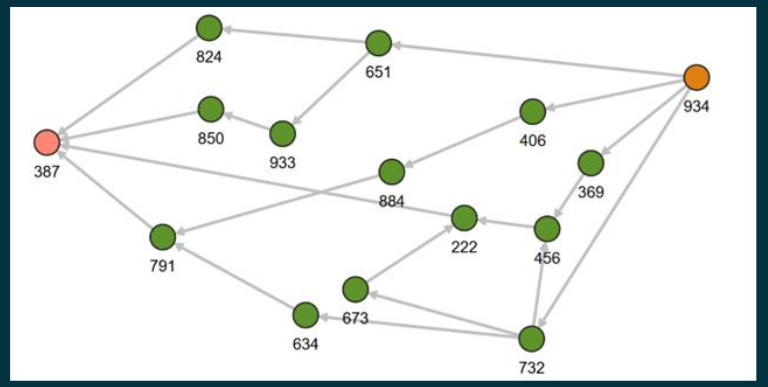
List all the ways in which account1 has transferred money to 960

Oracle AI Database – Graph Analytics

Find patterns, grouping, paths, and make predictions from connections in data

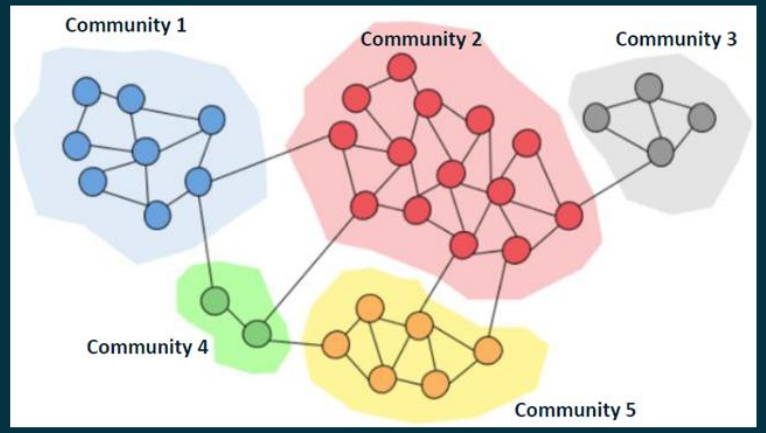


Cyclical patterns

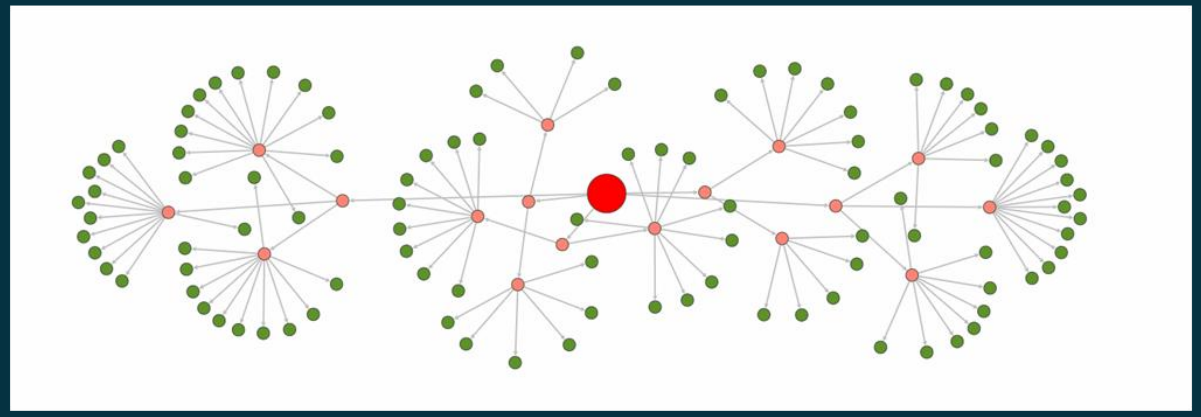


Paths

Oracle Graph: Native feature of Oracle AI Database



Groups / clusters (Courtesy: Garanti Bank)



Two-hop fan out pattern

Oracle Graph Queries and Analytics

In Oracle AI Database

Graph queries in **SQL**
(also DDL to create graphs)

```
SELECT account_id1, account_id2
    FROM graph_table(BANK_GRAPH
        MATCH (v1)-[IS BANK_TRANSFERS]->{1,3}(v2)
        WHERE v1.name = 'RUSSELL RIVERA'
        COLUMNS (..)
    );
```

Graph queries in **natural language**

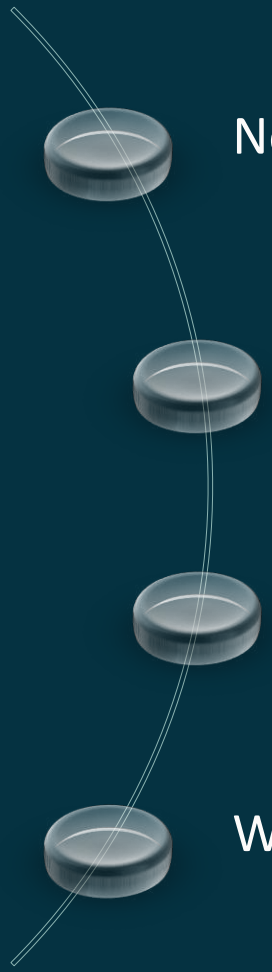
```
Find all accounts that have received money
from Russell Rivera via 1 to 3 accounts
```

Algorithms using **Python or Java API**

```
-- find important nodes (based on connectivity)
graph.pagerank()

-- graph machine learning to find patterns
model = analyst.deepwalk_builder()
model.fit(graph)
```

A graph is like a View of Relational Tables in Oracle Graph



No data copy – graph is a view on relational tables

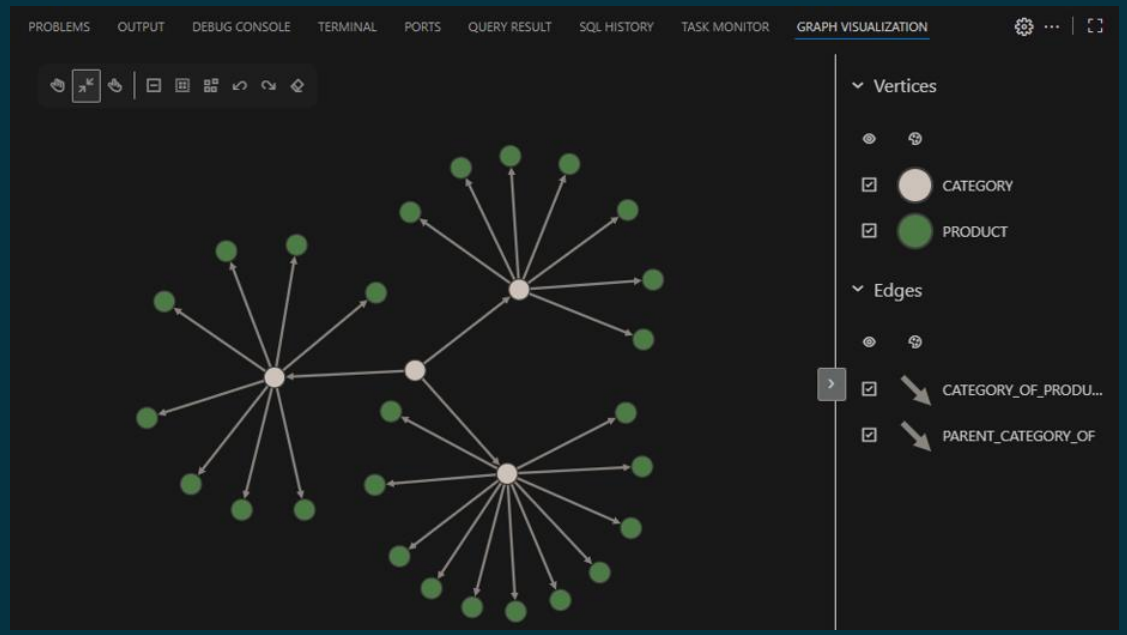
Insert/update/delete in underlying tables instantly available in a graph

Fast, concurrent updates

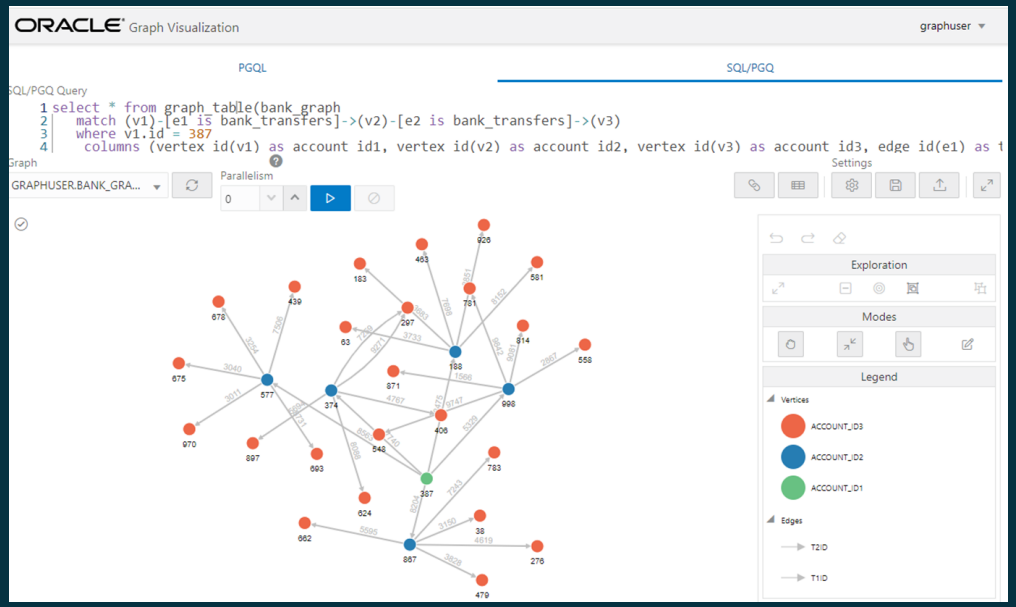
Well suited for operational workloads

Oracle Graph Tools

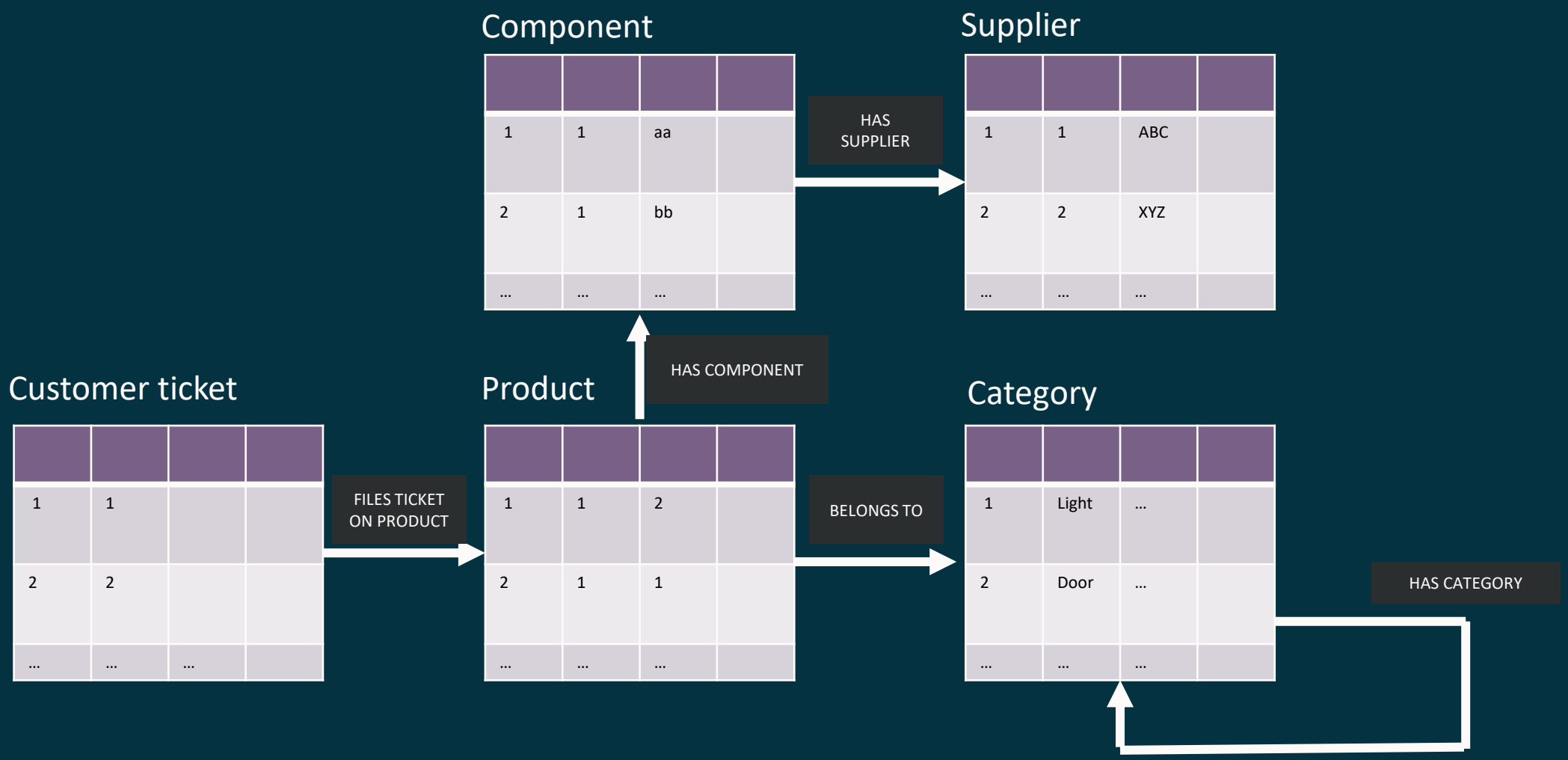
VSCode



Native Graph tools in Oracle AI Database

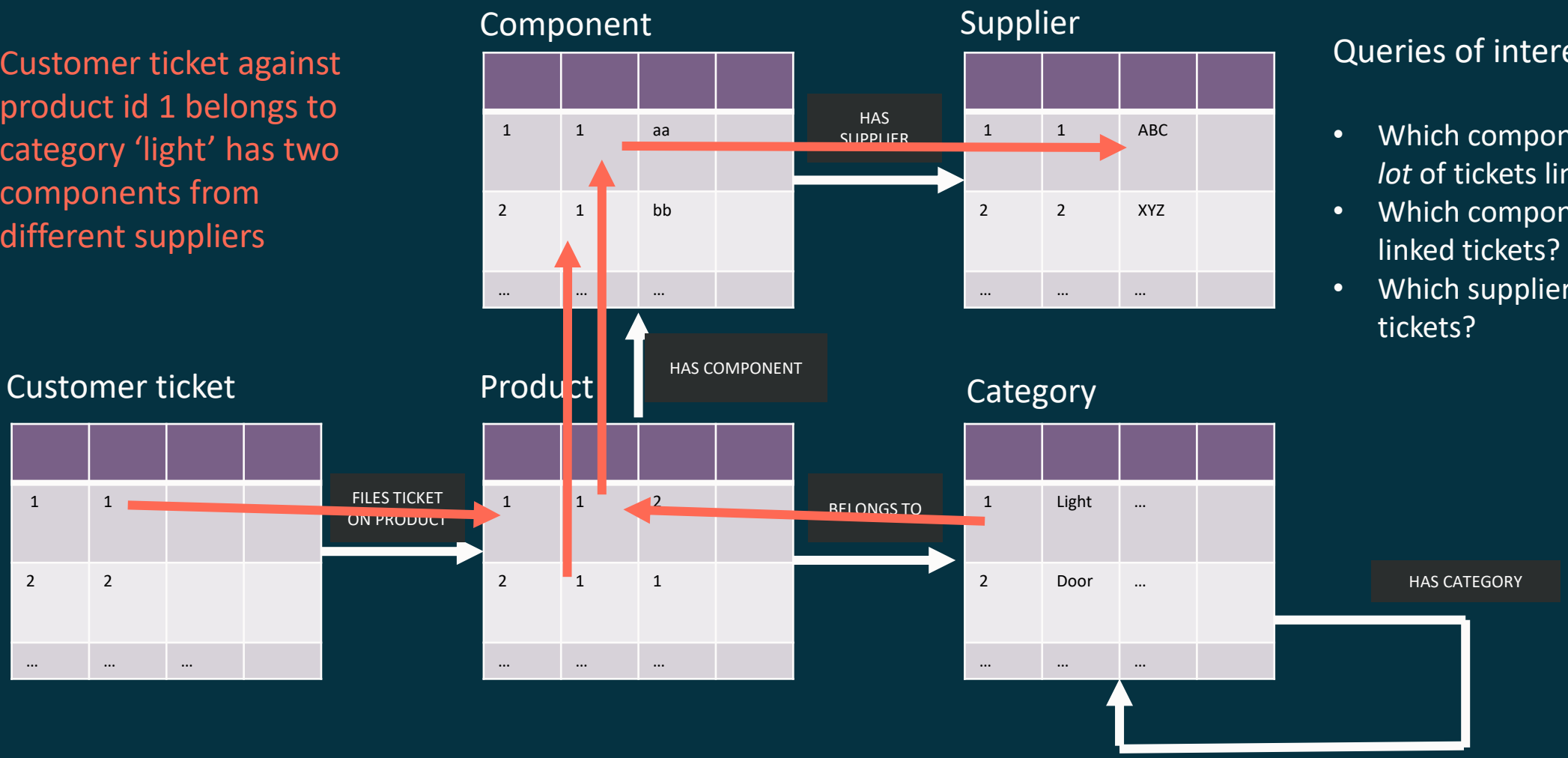


Connections in data



Connections in data

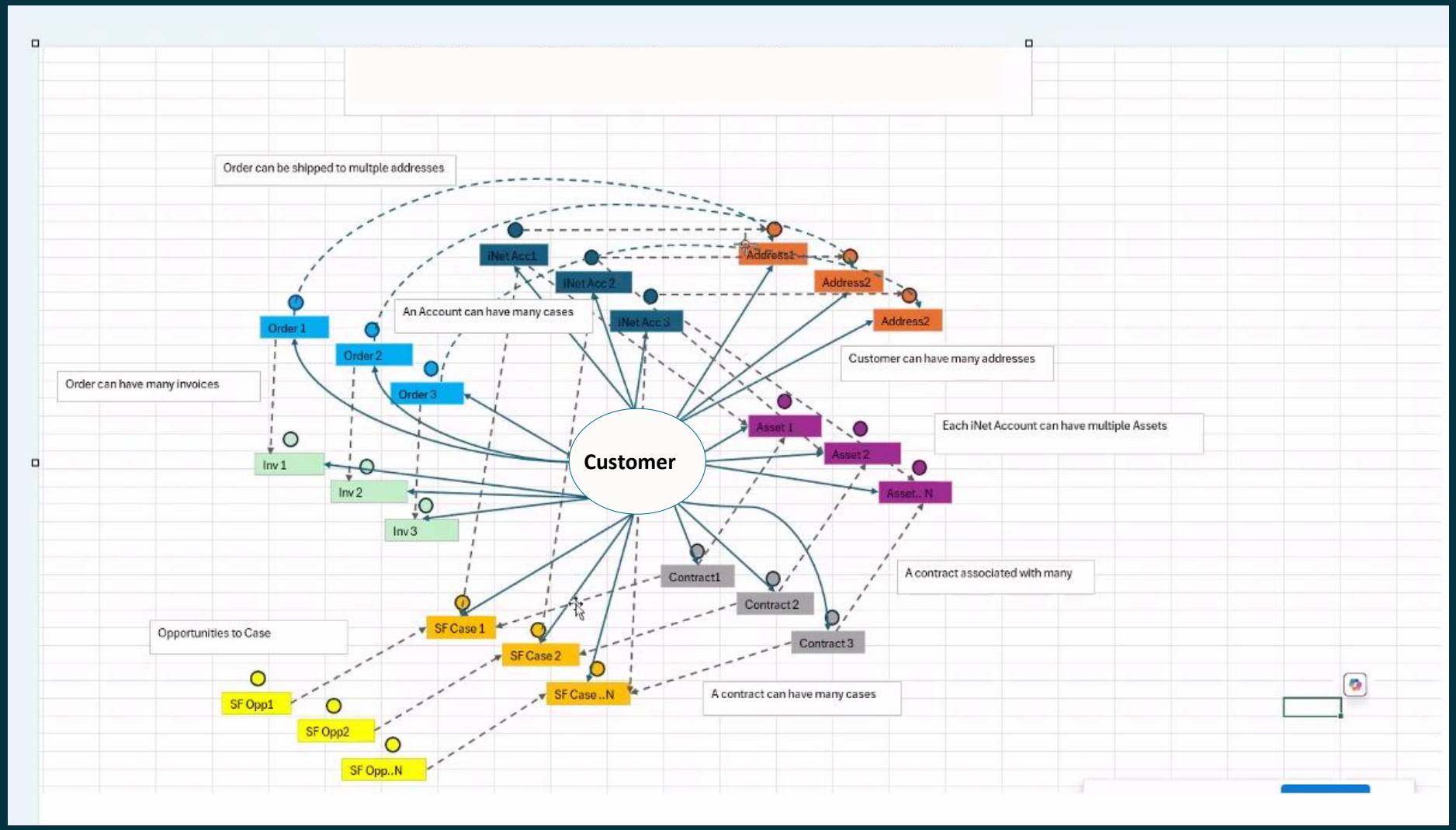
Customer ticket against product id 1 belongs to category ‘light’ has two components from different suppliers



Queries of interest:

- Which components have a *lot* of tickets linked to them?
- Which components have *no* linked tickets?
- Which suppliers have *no* tickets?

Connections get complex very fast

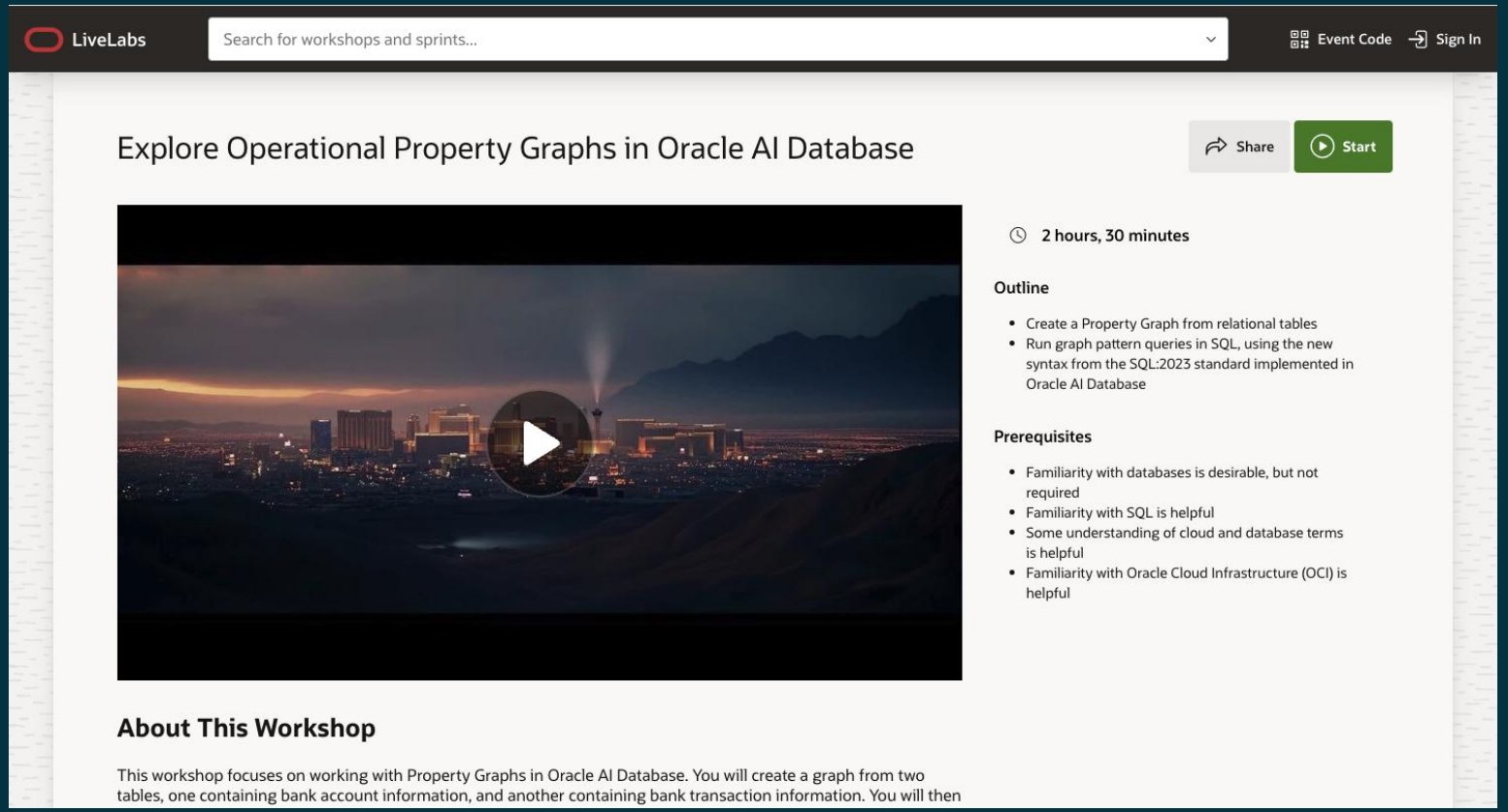


Get Hands On with Oracle Graph

livelabs.oracle.com

Create a Property Graph from relational tables

Run graph pattern queries in SQL, using the new syntax from the SQL:2023 standard implemented in Oracle AI Database



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Connecting the Dots

An Approach to Customer Data Integrity

Oracle Database 26ai + Graph + APEX

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Problem

We are leaking value and trust because **customer, address, and hierarchy data are inconsistent across CRM, ERP, and our custom SaaS**.

Why This Matters

These inconsistencies are directly driving **mis-shipments, mis-billing, "lost asset" write-offs, support rework, and delayed revenue recognition**—and they scale with our volume.

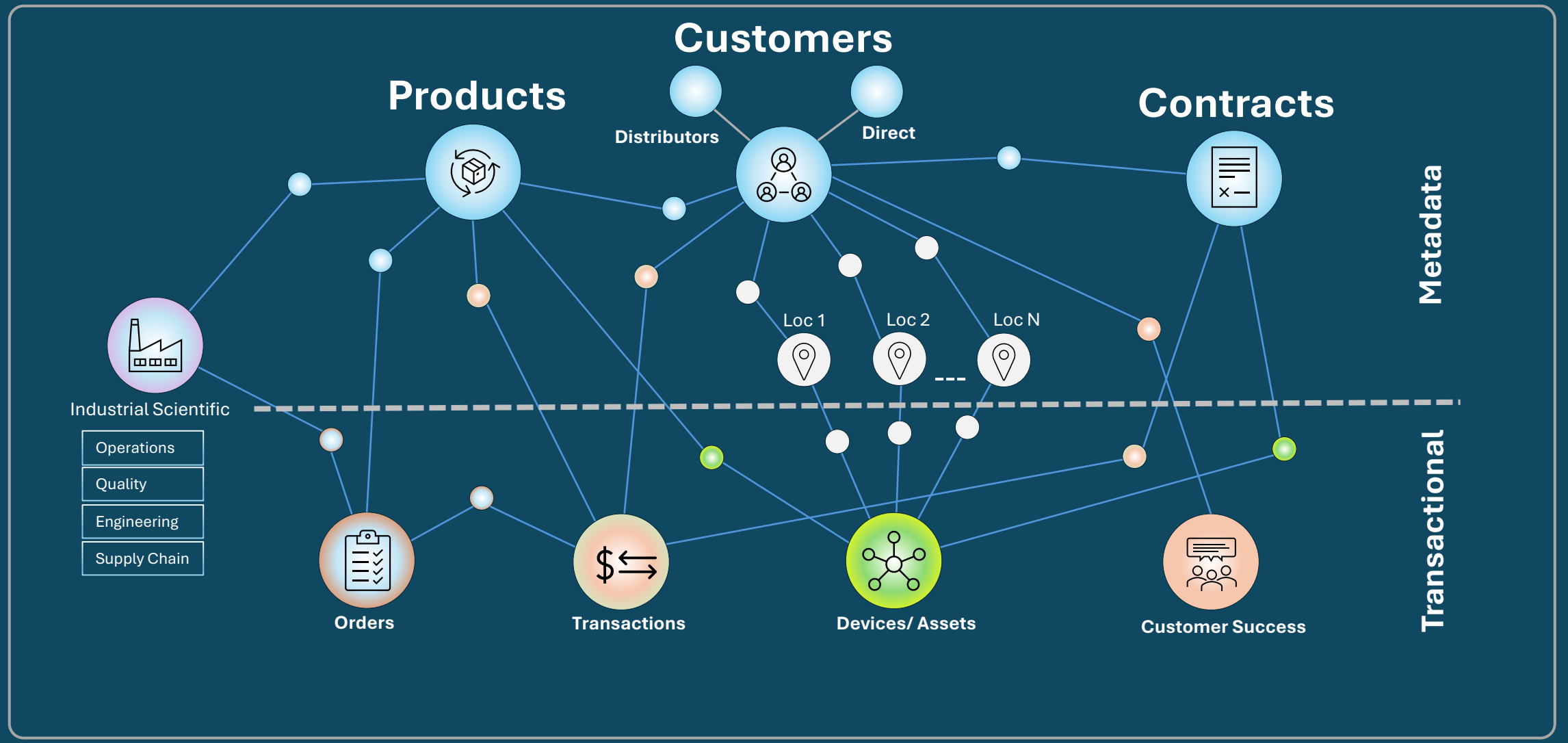
Margin erosion/ Cash impact
Reshipments, Credits, Write-offs, Delayed billing, Accounts Aging

Customer Sentiment:
Wait for shipments, call back, escalate.
Hurts renewals + expansions/ Churn

Operational Drag:
High support and ops rework, inventory noise

Compliance:
Faulty service records, contracts/ device mismatch and inaccurate billing

The Graph


Customers
Products
Contracts
Distributors
Direct
Loc 1
Loc 2
Loc N
Metadata
Industrial Scientific
Operations
Quality
Engineering
Supply Chain
Orders
Transactions
Devices/ Assets
Customer Success
Transactional

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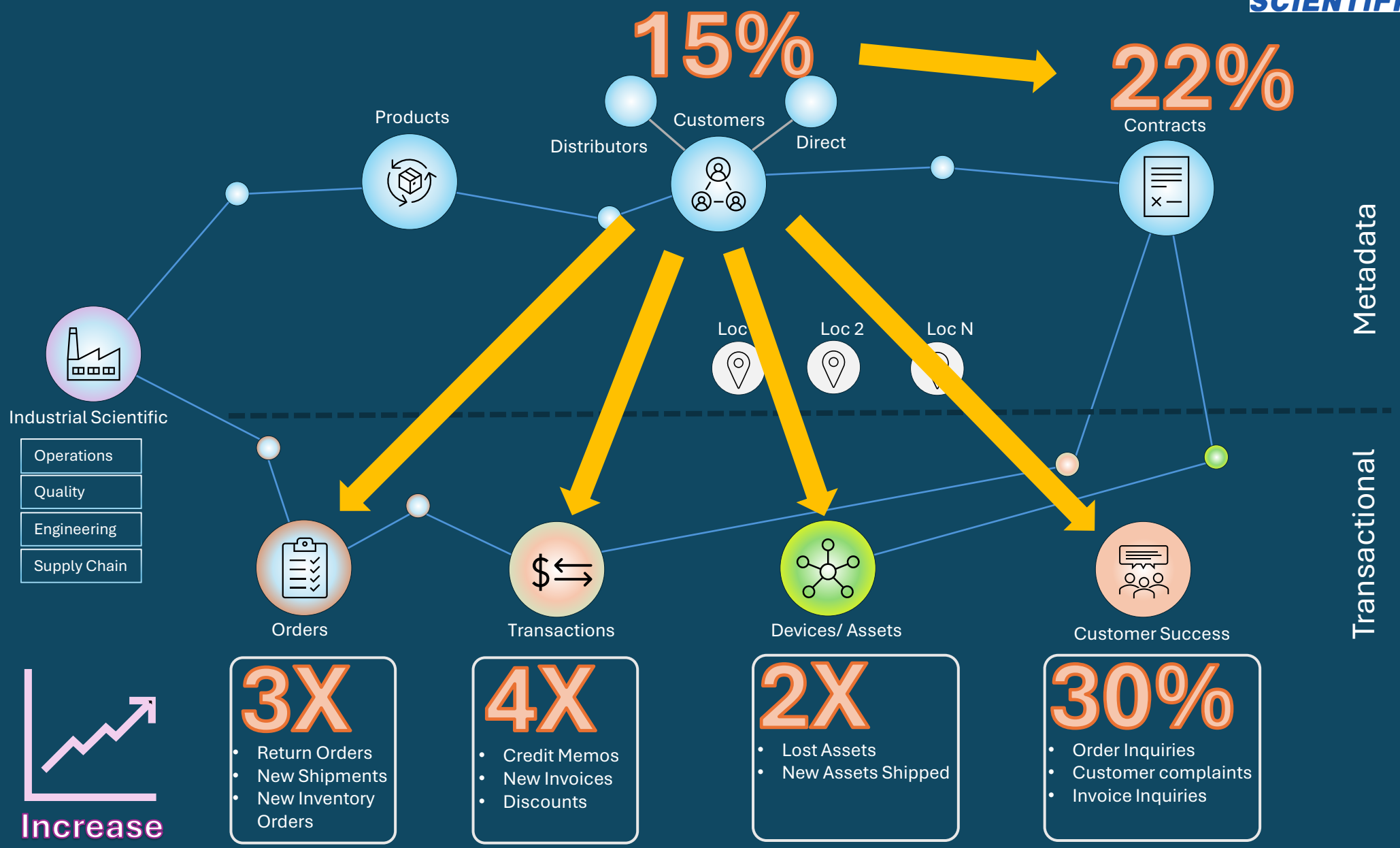

Enrichment Loop - Architecture

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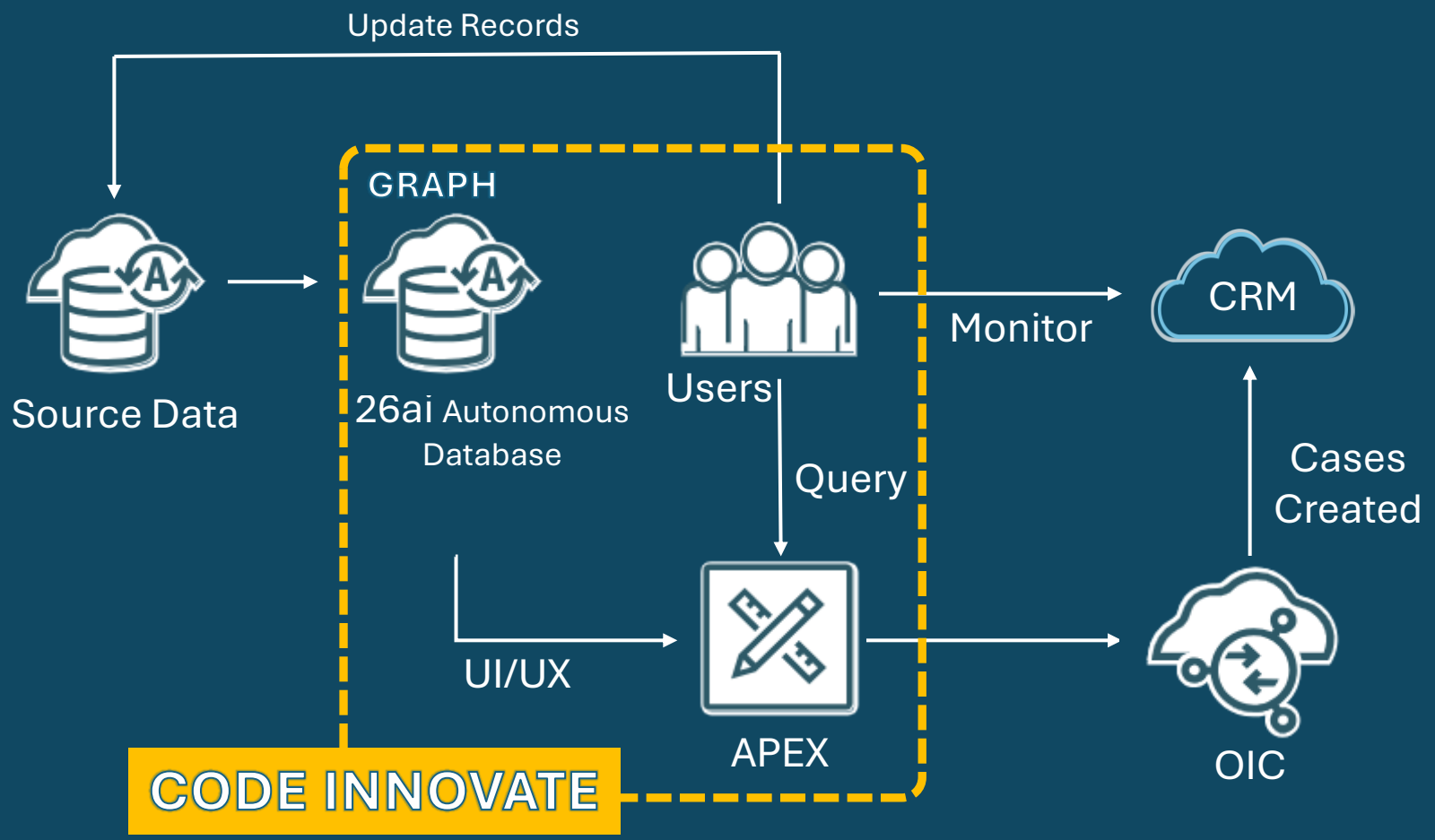

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Traditional Tools

Platform	Core Fit	Baseline Subscription
Collibra	Deep governance Stewardship workflows	**~170K**
Alation	Strong discovery Collaboration	**~75K**
Informatica Data Catalog	Deep lineage + DQ	**~100K**

26ai Graph

Source: https://data.world/

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Pace Setter

Oracle Database 26ai Graph + APEX

- ☑ Governance
- ☑ Workflows
- ☑ Discovery
- ☑ Lineage

TCO

< 5%

of any traditional tools

Traditional Tools

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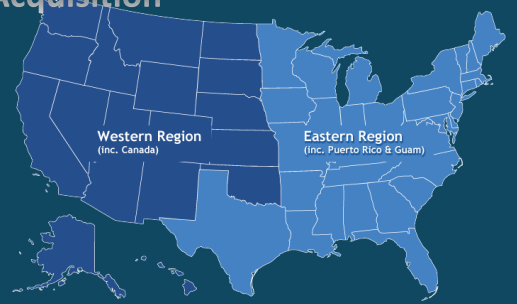
2026 Usecase

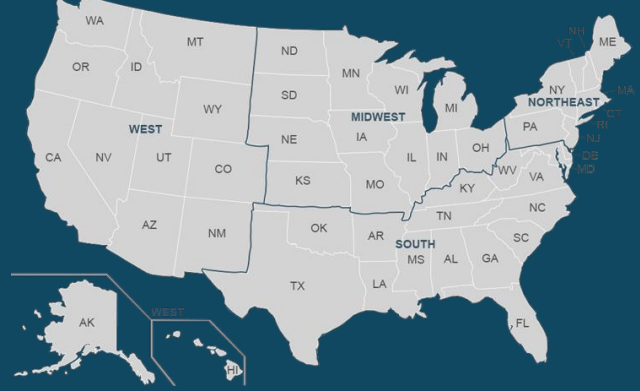
Merging and Mapping Territories globally **Connected to** Sales and Product Volume

Parent Company

Acquisition



Merged/ New Territories



Unified Territories, Account Hierarchies, Sales Rep Territory Mergers

Commissions and Pay out Gap analysis, restructure, Distributor discounts

Product Hierarchy, competing product analysis, Supplier and component analysis

Profitability, Margin analysis. Churn risk analysis. Bundled subscription-based analysis

Resources

- oracle.com/database/integrated-graph-database/
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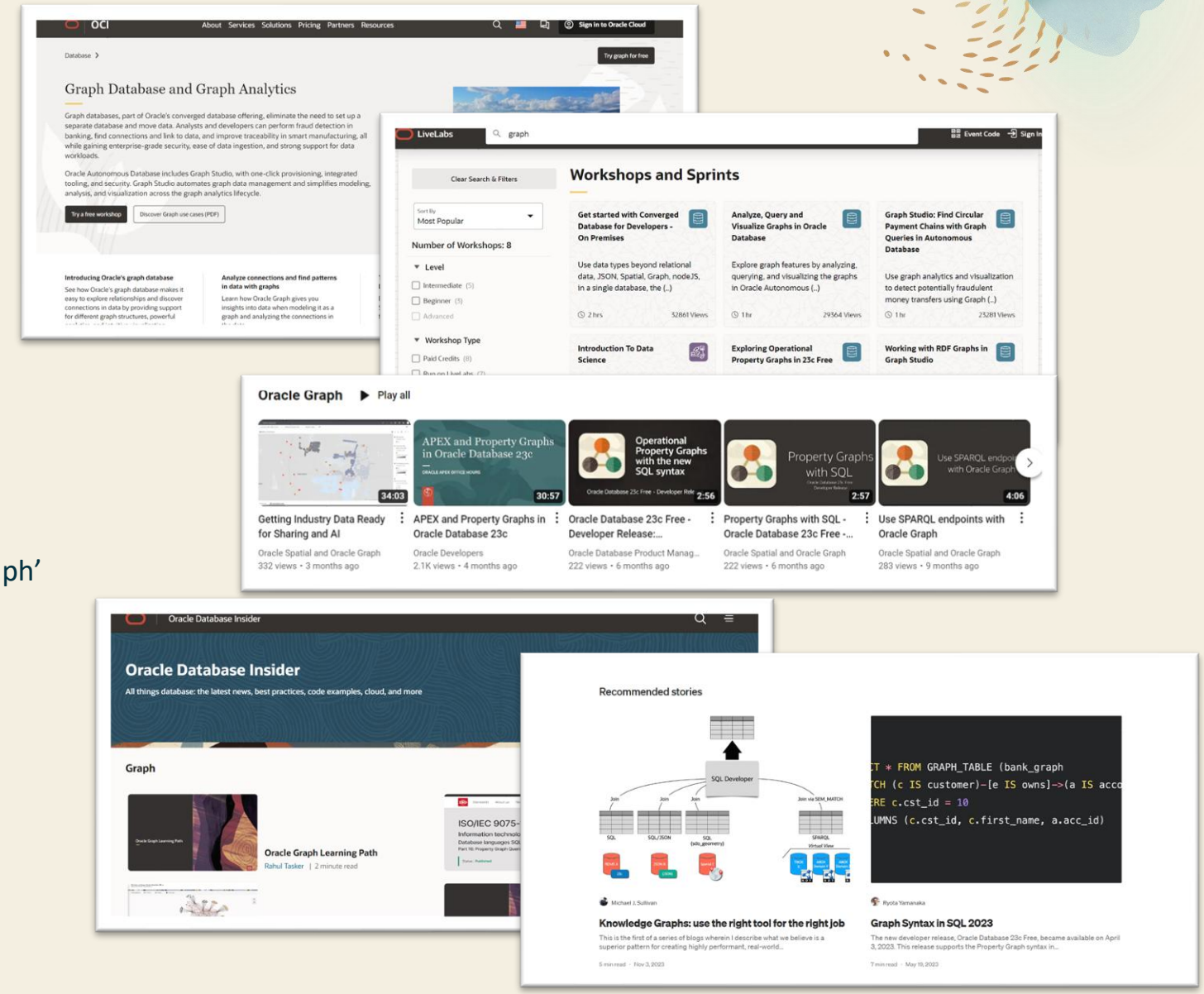
- YouTube search for ‘oracle spatial and graph’
- blogs.oracle.com/database/category/db-graph
- medium.com/tag/oracle-graph/latest



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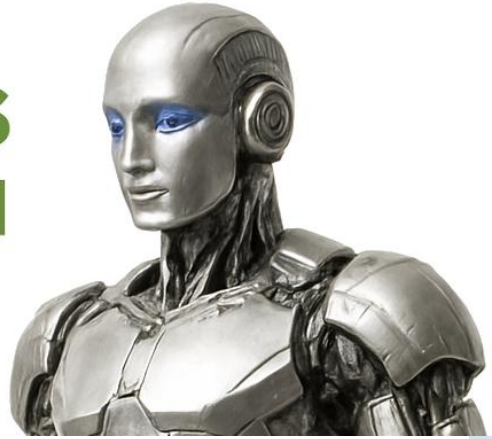

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