

# SQL's Semantic Evolution

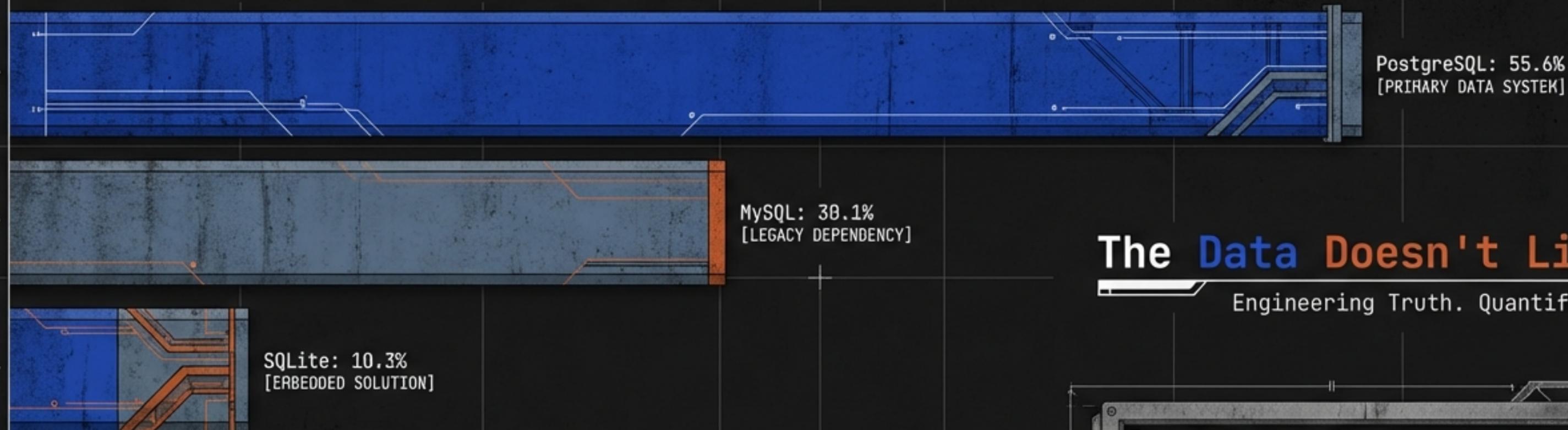
The Bridging Solution for the AI Era



# The Unyielding Lingua Franca

Stack Overflow 2025 Developer Survey - Database Usage

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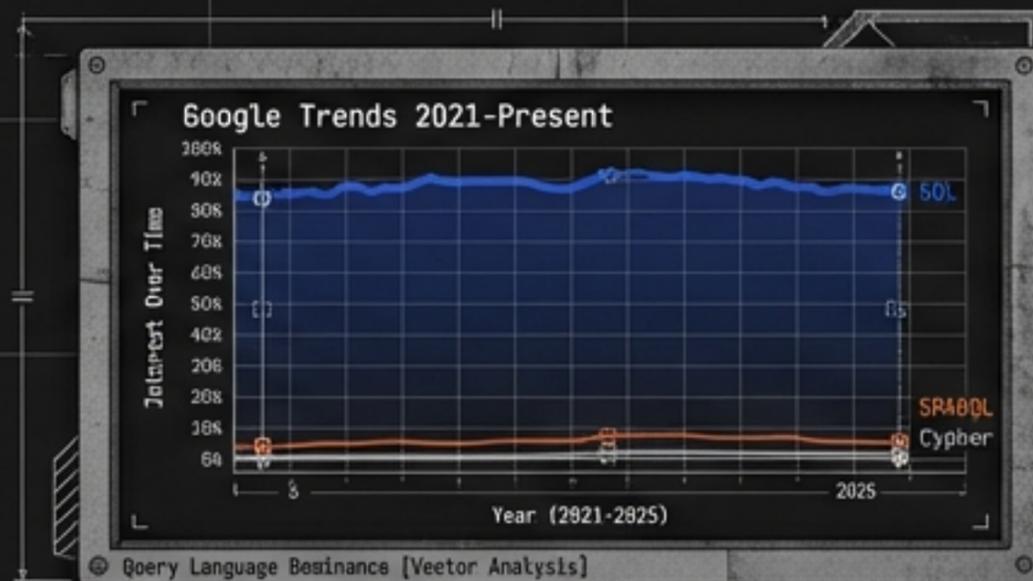


**The Data Doesn't Lie.**  
Engineering Truth. Quantified.

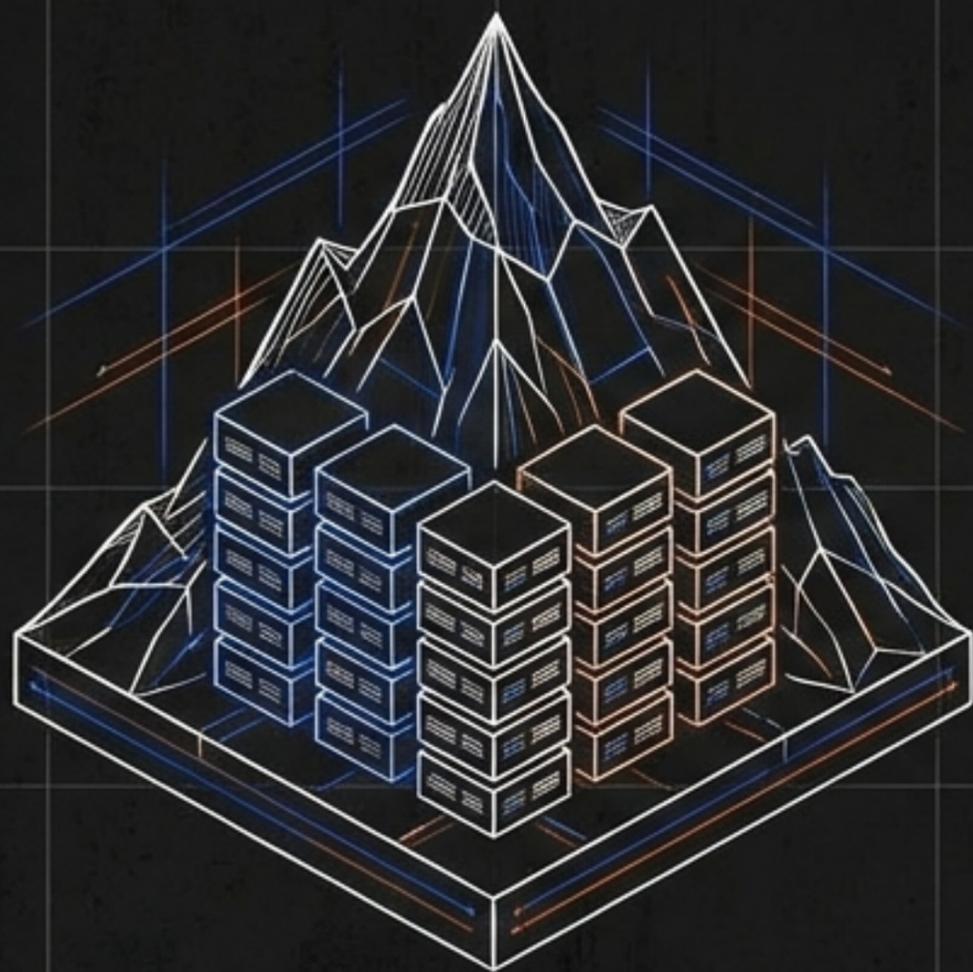


Neo4j: 0.8%  
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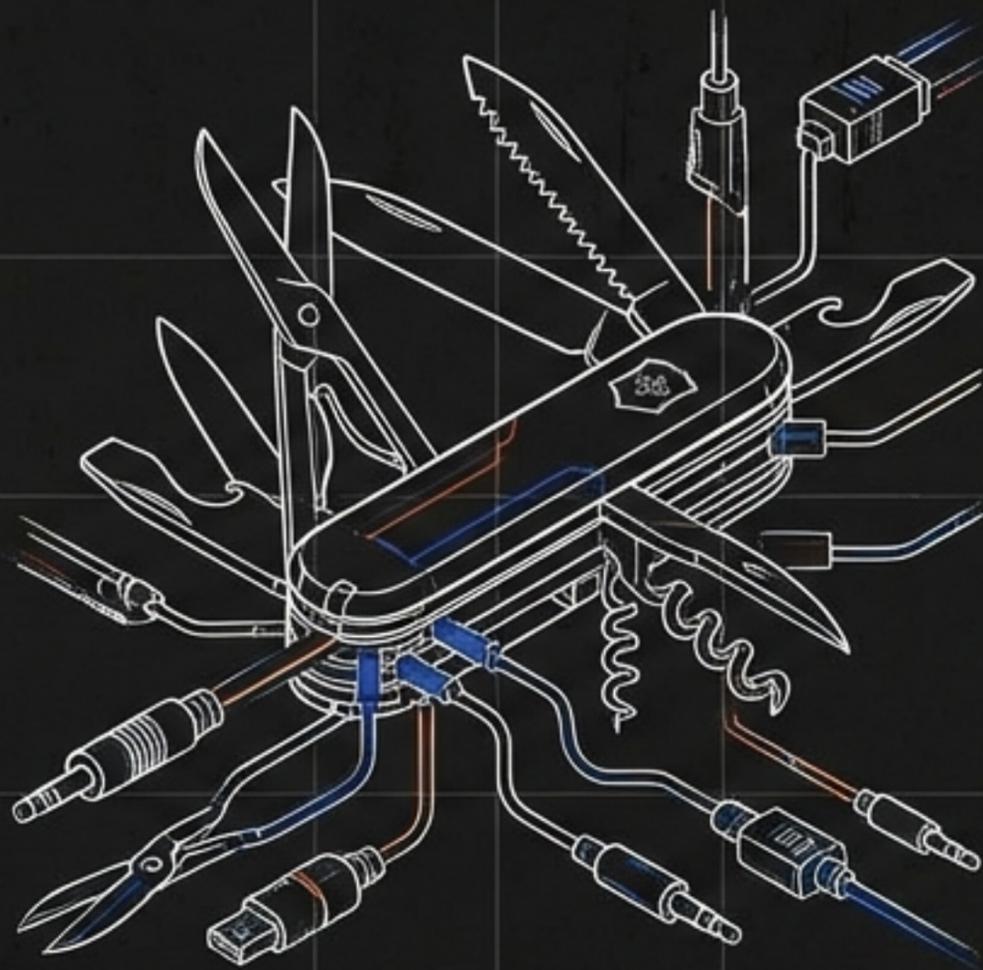
Datomic: 0.2%  
[IMMUTABLE EDGE]



# Why We Stay with SQL



Scale (Petabytes)



Ecosystem Integration



Decades of Optimization

Declarative Power: Tell the database WHAT you want, not HOW to get it.

# The Tabular Limit

```
SELECT * FROM users
JOIN accounts ON users.id = accounts.user_id
JOIN transactions ON accounts.id = transactions.account_id
JOIN products ON transactions.product_id = products.id
LEFT JOIN discounts ON products.category_id = discounts.category_id
LEFT JOIN discounts ON products.category_id = products.id
LEFT JOIN discounts ON products.category_id = discounts.category_id
WHERE ...
```

Deep Joins

```
(SELECT
  (SELECT
    FROM
    JOIN
    JOIN accounts IN order (
      SELECT * accounts.id = users.token
      FROM account.id = transactions.account_id
      JOIN products = nea
      JOIN LEFT products_id
      GROUP BY .discounts.eategor_id
      HAVING ... #.subquery
      AS subquery ON, such AS columns
      ON products = praso! subquery
    )
  )
)
```

Lack of Semantics

```
WHERE
SELECT * FROM users users
JOIN
JOIN
JOIN select BU
(SELECT
  JOIN ambiguous ambiguous columns <column names
  JOIN accounts,userid = account_id
  JOIN products,userid = products.id
  LEFT JOIN products.stouid = discounts.category_id
```

```
SELECT * FROM users
JOIN accounts ON users.id = accounts.user_id
JOIN transactions ON accounts.id = transactions.account_id
JOIN products ON transactions.product_id = products.id
LEFT AS products ON transactions.product_id = products.id
LEFT JOIN discounts ON products.category_id = discounts.category_id
LEFT JOIN discounts ON products.category_id = discounts.category_id
WHERE ...
```



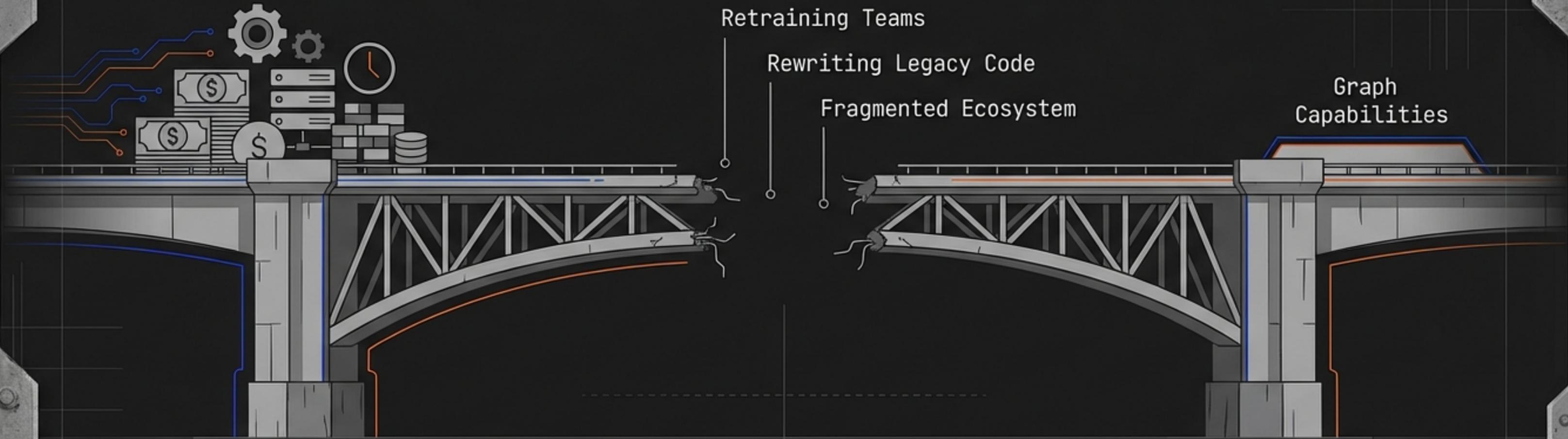
Rows and columns struggle to map the real world.

```
SELECT (
  schema from NOT NULL,
  usser_id NOT NULL,
  transaction: NOT NULL,
) WHERE
(SELECT ...
FROM satername,
JOIN neepotional name,
JOIN product id,
GROUP BY .products_id,
GROUP BY .products_id,
HAVING "products.id = accounts.category_id"
```

Rigidity

```
)
WHERE
(SELECT ...
FROM subquery
JOIN(SELECT
  SELECT in a subquery
  JOIN ambiguous ON accounts.user_id
  JOIN !transactions.account_id
  AS AS onerlyateadche purproder...
)
SELECT * FROM users JOIN accounts ON users.id = accounts.user_id
JOIN transactions ON accounts.id = transactions.account_id
JOIN products ON transactions.product_id = products.id
LEFT JOIN discounts ON products.category_id = discounts.category_id
```

# The “Rip and Replace” Trap



A nightmare rarely worth the investment.

# The Niche Reality

SQL

(673k Stack Overflow Posts)

SPARQL  
(<6k Posts)

Powerful in niches.  
Isolated in practice.

Cypher  
(Platform Tied)

# The Pragmatic Solution: SPASQL



Enhance unobtrusively. Access **Graph superpowers** without abandoning the SQL workflow.

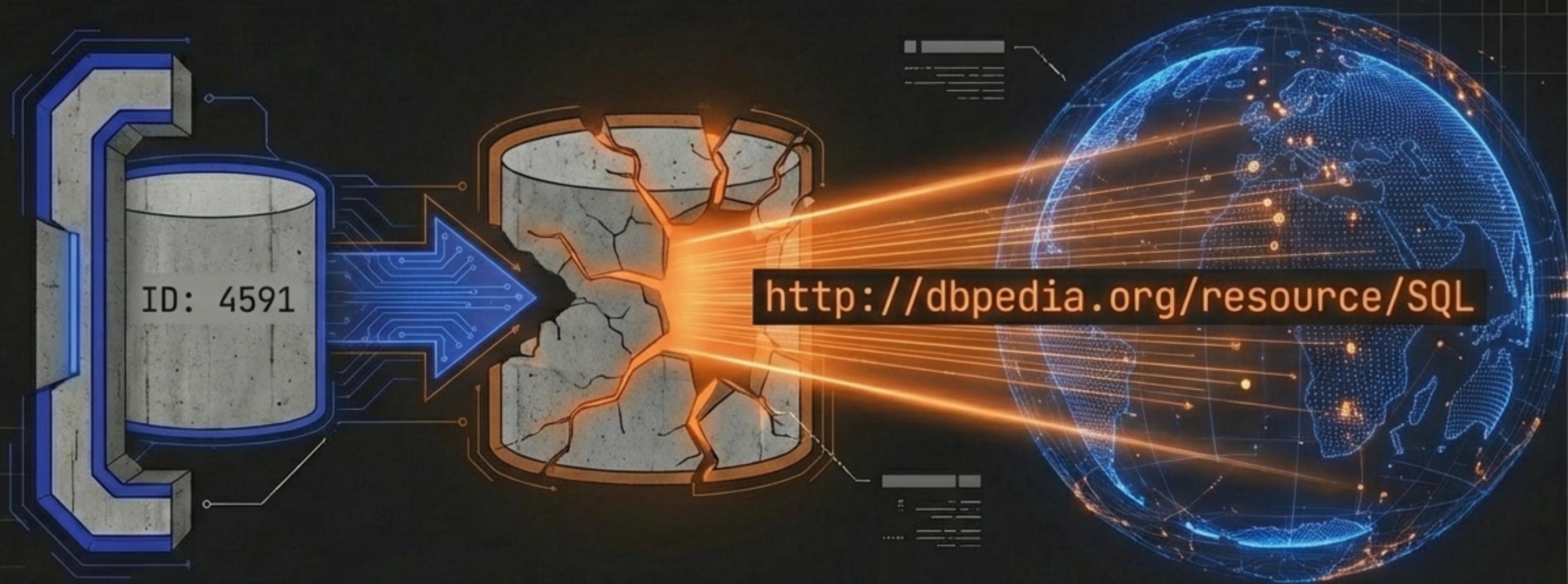
# Hybrid Syntax in Action

Relational  
Wrapper  
JetBrains Mono

```
SELECT * FROM (  
  SPARQL SELECT ?s ?p ?o  
  WHERE { ?s ?p ?o }  
) AS graph_data
```

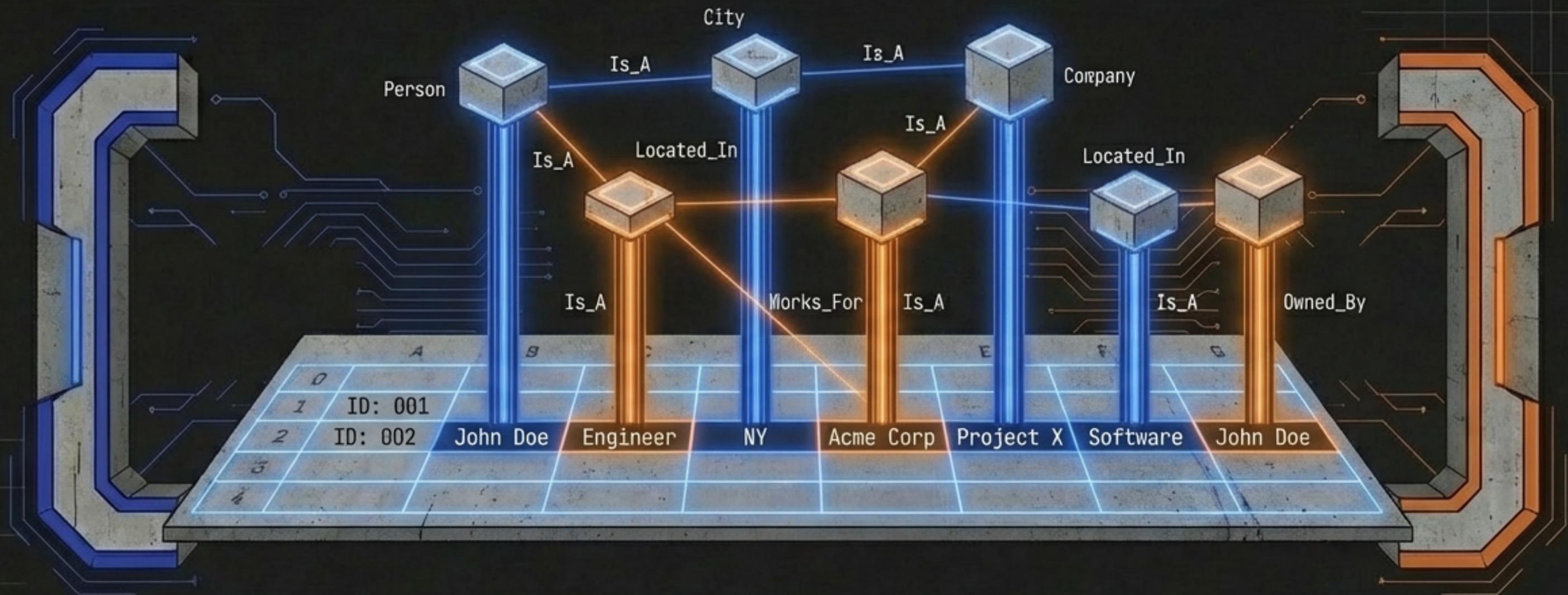
Graph  
Payload  
JetBrains Mono

# Feature 1: The URI as Super-Key



From Local Integers to Global Hyperlinks.

# Feature 2: Semantic Enrichment



Layering machine-readable semantics on top of relational data.

# Fueling the AI Context Engine

Structured Reliability (SQL)



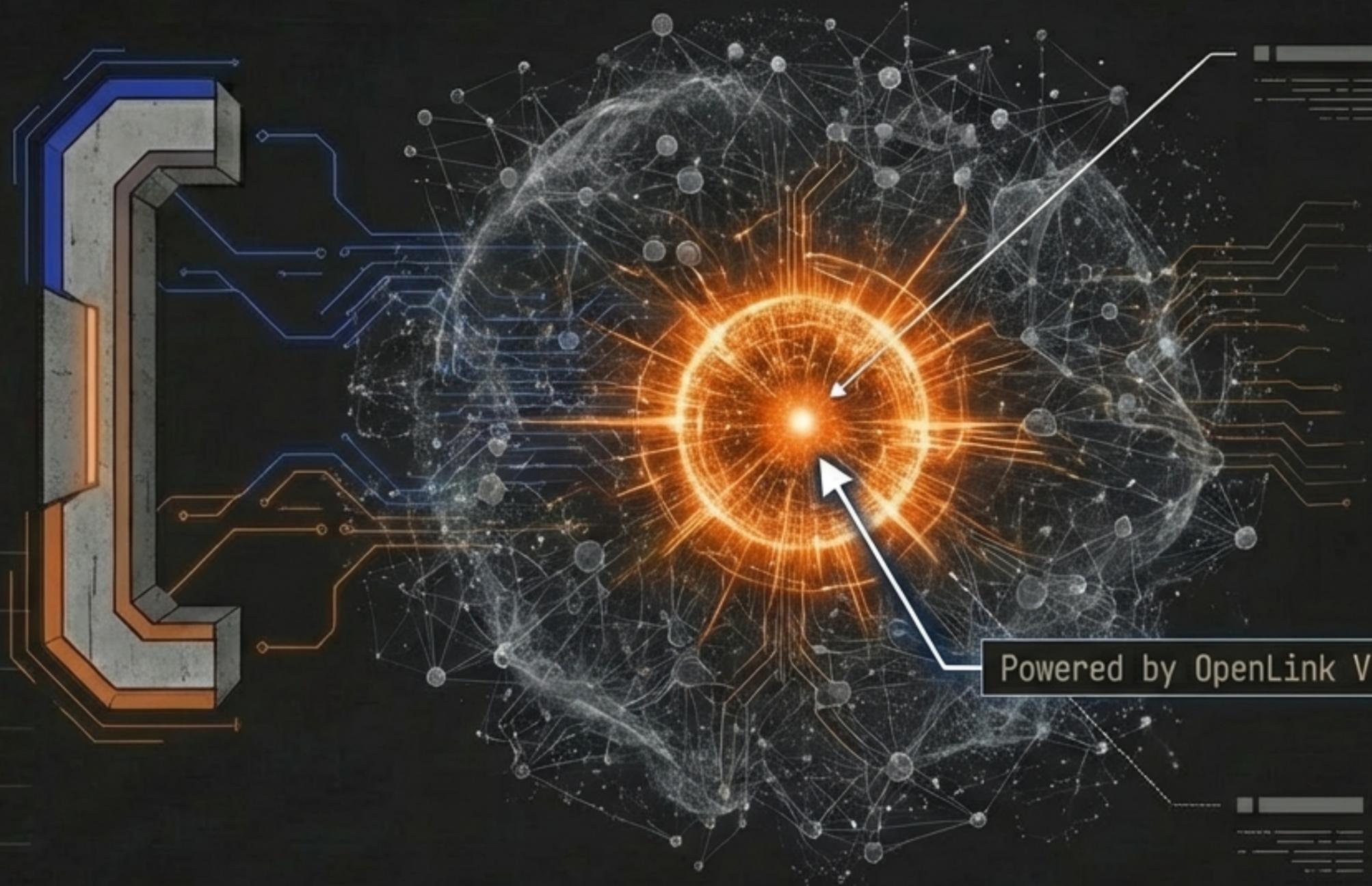
Contextual Depth (Graph)



AI Intelligence

AI Agents need context, not just rows. SPASQL delivers Knowledge Graphs via the SQL pipelines you already have.

# Proven at Scale: Virtuoso



- Backbone of DBpedia
- Powers the Linked Open Data Cloud
- Transforms CSVs into Knowledge Graphs

Powered by OpenLink Virtuoso

**“Ripping and replacing  
SQL is a futile quest.”**

– Kingsley Idehen,  
Founder & CEO, OpenLink Software

# The 99% and the 1%

1%  
Semantic  
Logic

99%  
Tabular  
Workloads

The semantic magic creates massive value  
when added to the SQL bulk.

# The Future is Hybrid

2026

Graph/AI

Evolve your SQL. Don't replace it.