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Property Graphs 101

Arthur Dayton
Tuesday, March 27, 2018
@arthurdayton116

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Sessions

Sunday Apr 22, 2018

START	FINISH	SESSION	SESSION TRACK / MEETING PARTICIPANTS	WHERE
3:00 PM	4:00 PM	**Future-Proof Your Career: What Every Executive Needs to Know About Adaptive Intelligence** Speakers: Tim Vlamis		South Pacific Ballroom J

Monday Apr 23, 2018

START	FINISH	SESSION	SESSION TRACK / MEETING PARTICIPANTS	WHERE
4:15 PM	5:15 PM	**Getting from Answers/Dashboards to Data Visualization** Speakers: Dan Vlamis,Tim Vlamis		Banyan B

Wednesday Apr 25, 2018

START	FINISH	SESSION	SESSION TRACK / MEETING PARTICIPANTS	WHERE
11:00 AM	12:00 PM	**Using Node.js to Make OBIEE the Application You Always Wanted It to Be** Speakers: Dan Vlamis,Arthur Dayton		Banyan E

Monday Apr 23, 2018

START	FINISH	SESSION	SESSION TRACK / MEETING PARTICIPANTS	WHERE
11:00 AM	12:00 PM	**Introduction to Machine Learning in Oracle Analytics Cloud** Speakers: Arthur Dayton		Banyan A

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Agenda

- Why to care about Property Graphs
- How to build a Property Graph on Oracle Database
- Visualize a Property Graph using Cytoscape
- Use PGQL
- Use built in algorithms

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Vlamis Software Solutions

- Vlamis Software founded in 1992 in Kansas City, Missouri
- Developed 200+ Oracle BI and analytics systems
- Specializes in Oracle-based:
  - Enterprise Business Intelligence & Analytics
  - Analytic Warehousing
  - Data Mining and Predictive Analytics
  - Data Visualization
- Multiple Oracle ACEs, consultants average 15+ years
- www.vlamis.com (blog, papers, newsletters, services)
- Co-authors of book “Data Visualization for OBI 11g”
- Co-author of book “Oracle Essbase & Oracle OLAP”
- Oracle University Partner
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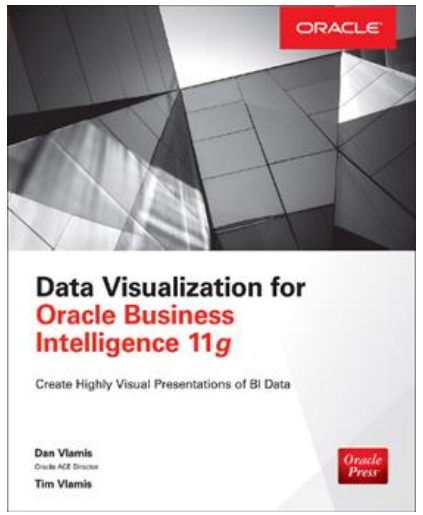

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Presenter Background

Arthur Dayton – Senior Consultant

- Oracle Spatial and Graph SIG Education Chair
- Instructor University of Nebraska at Omaha Information Systems and Quantitative Analysis Program
- ODTUG BI Community Volunteer
- @arthurdayton116

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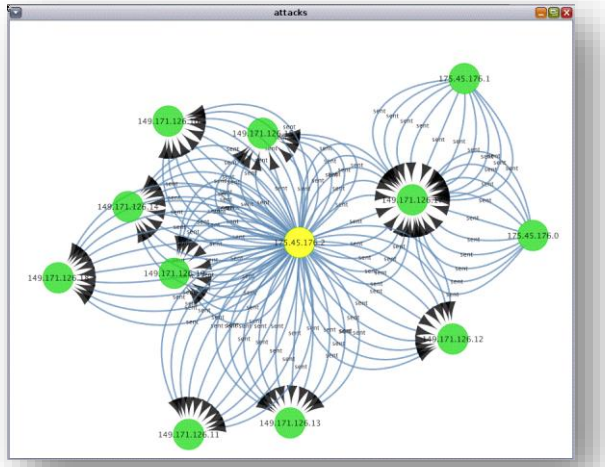
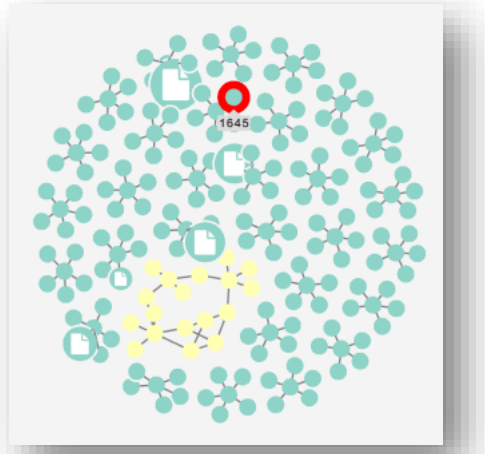
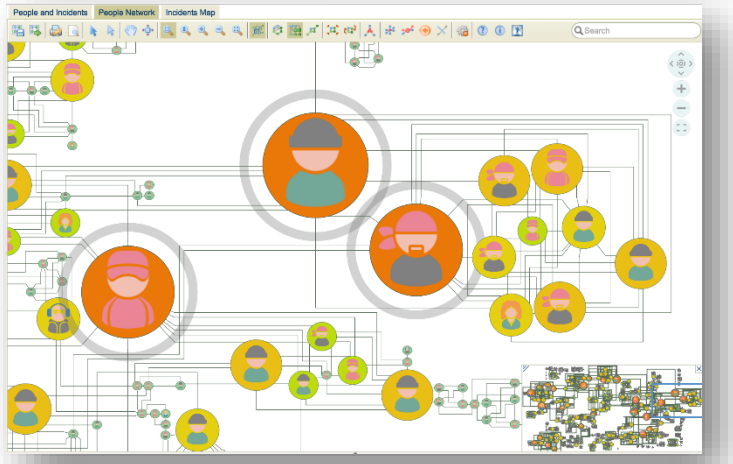
Graph Database Features:

- Scalability and Performance
- Graph analytics
- Graph Visualization
- Graph Query Language
- Standard interfaces
- Integration with Machine Learning tools





Courtesy Linkurious



Courtesy Tom Sawyer Perspectives

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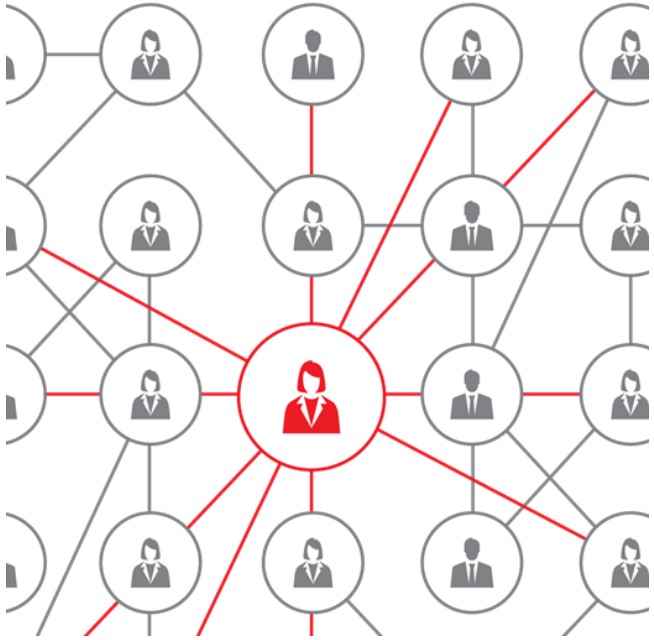
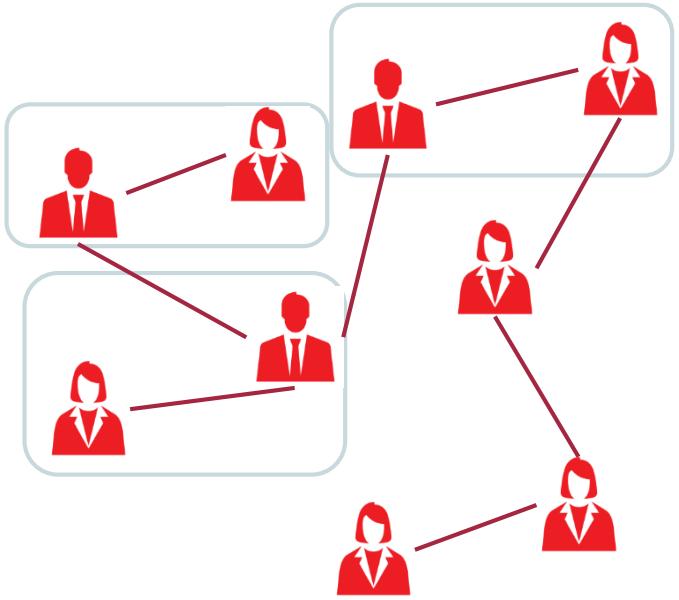
Graph Analysis for Business Insight

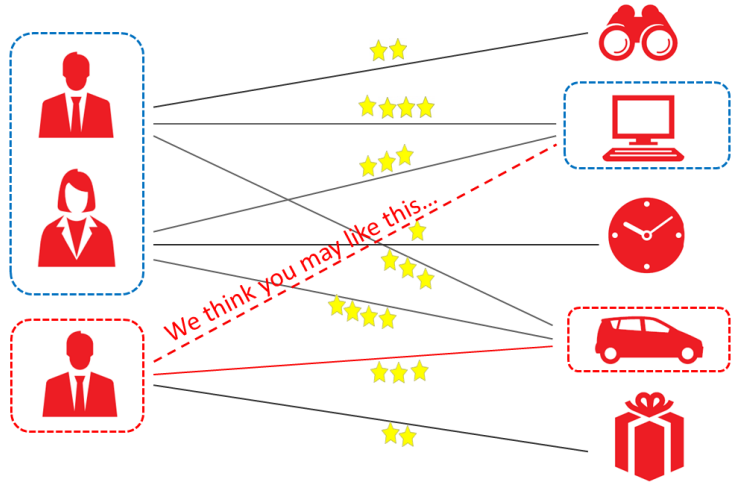
Identify Influencers



Discover Graph Patterns in Big Data



Generate Recommendations



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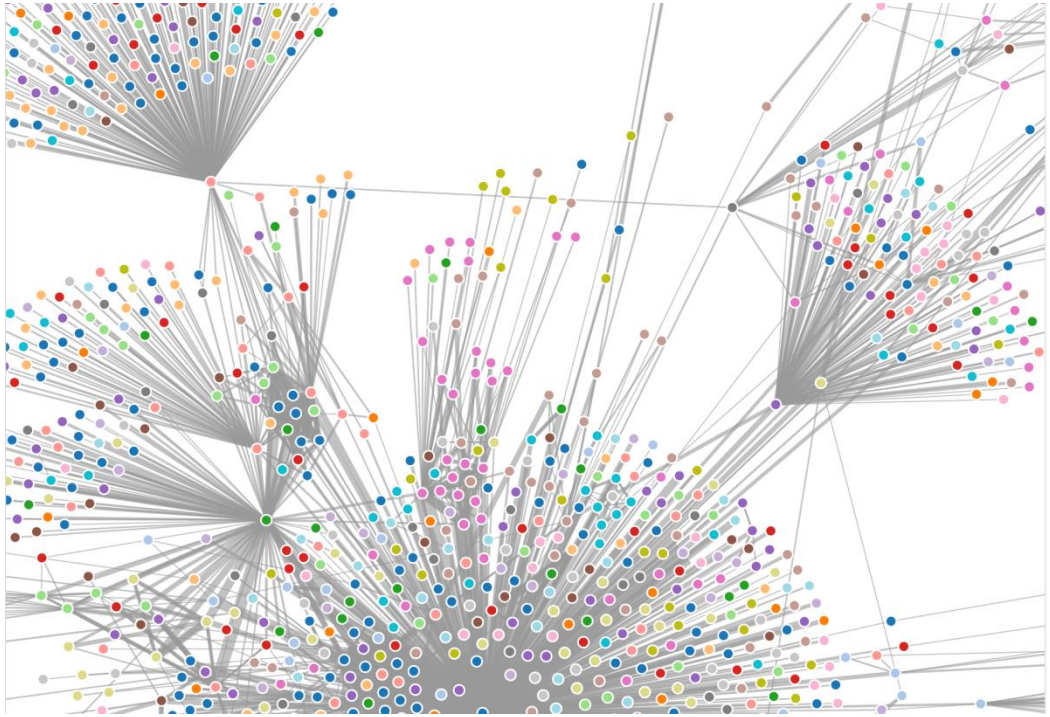
Some Use Case Scenarios

- Finance
  - Customer 360, Fraud detection
- Public Sector
  - Tax Evasion, Crime network analysis
- Retail
  - Recommendation, sentiment analysis
- Manufacturing
  - Analyzing complex bill of materials (BoM)



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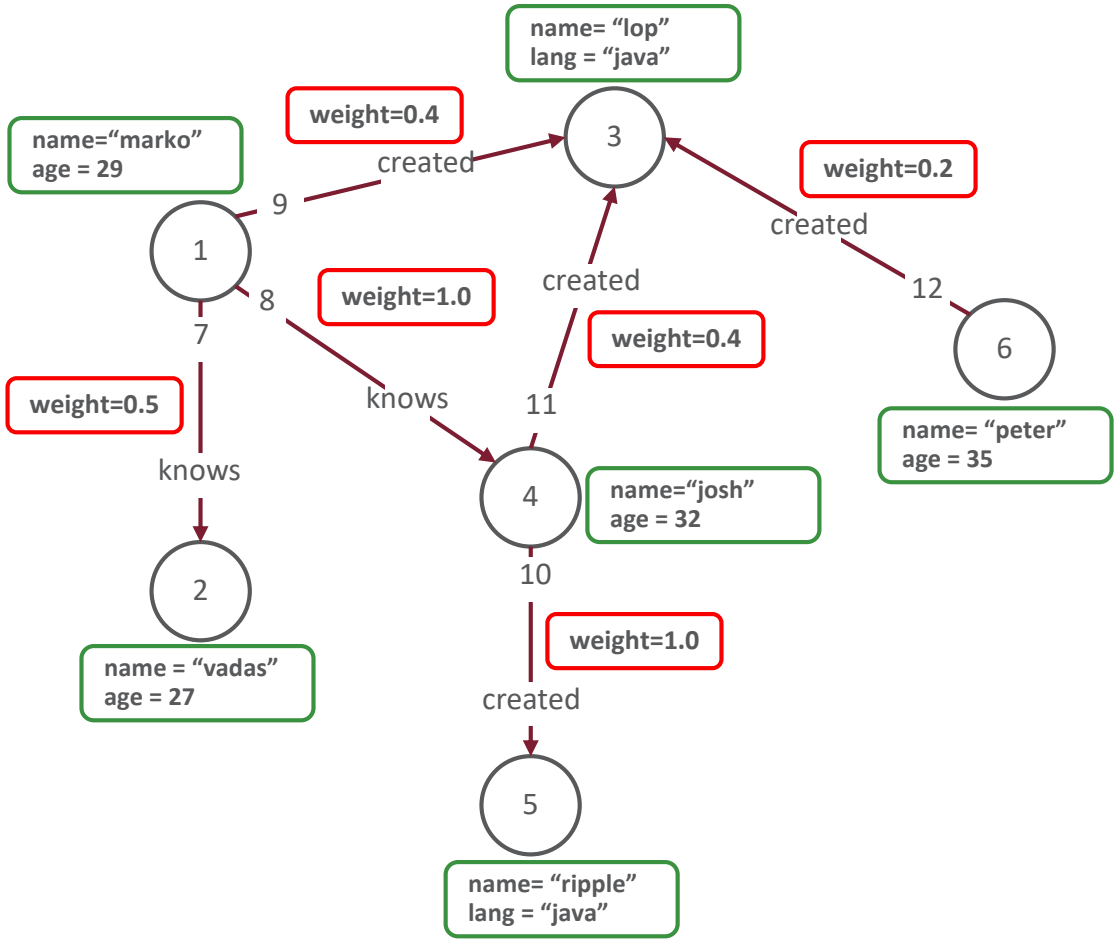
The Property Graph Data Model



https://github.com/tinkerpop/blueprints/wiki/Property-Graph-Model

- A set of vertices (or nodes)
  - each vertex has a unique identifier.
  - each vertex has a set of in/out edges.
  - each vertex has a collection of **key-value** properties.
- A set of edges (or links)
  - each edge has a unique identifier.
  - each edge has a head/tail vertex.
  - each edge has a label denoting type of relationship between two vertices.
  - each edge has a collection of **key-value** properties.

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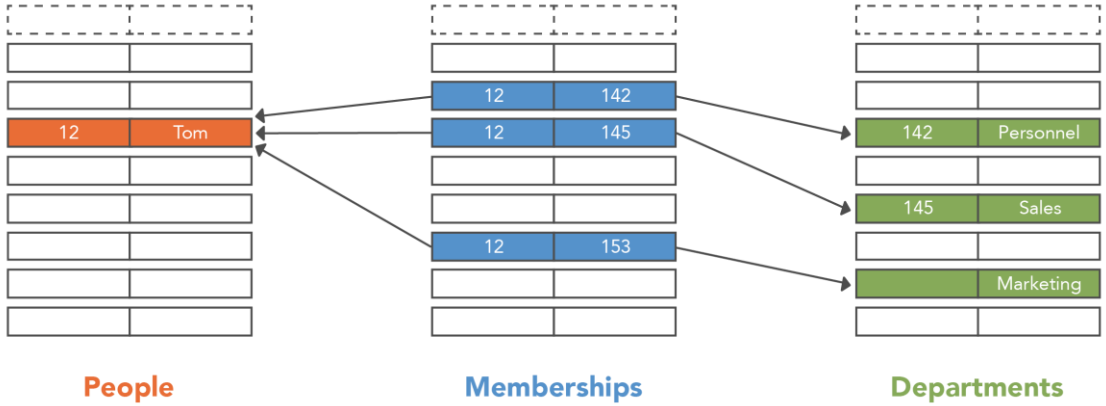
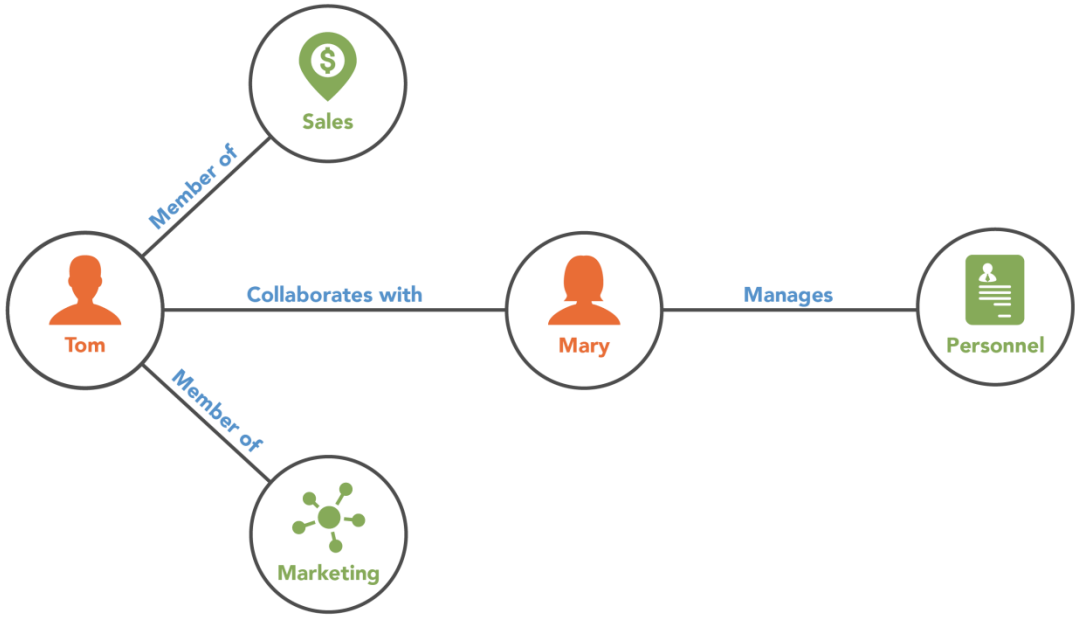
Relational Model vs. Graph Model

- Relational Model



- Graph Model



Courtesy: Tom Sawyer 2016

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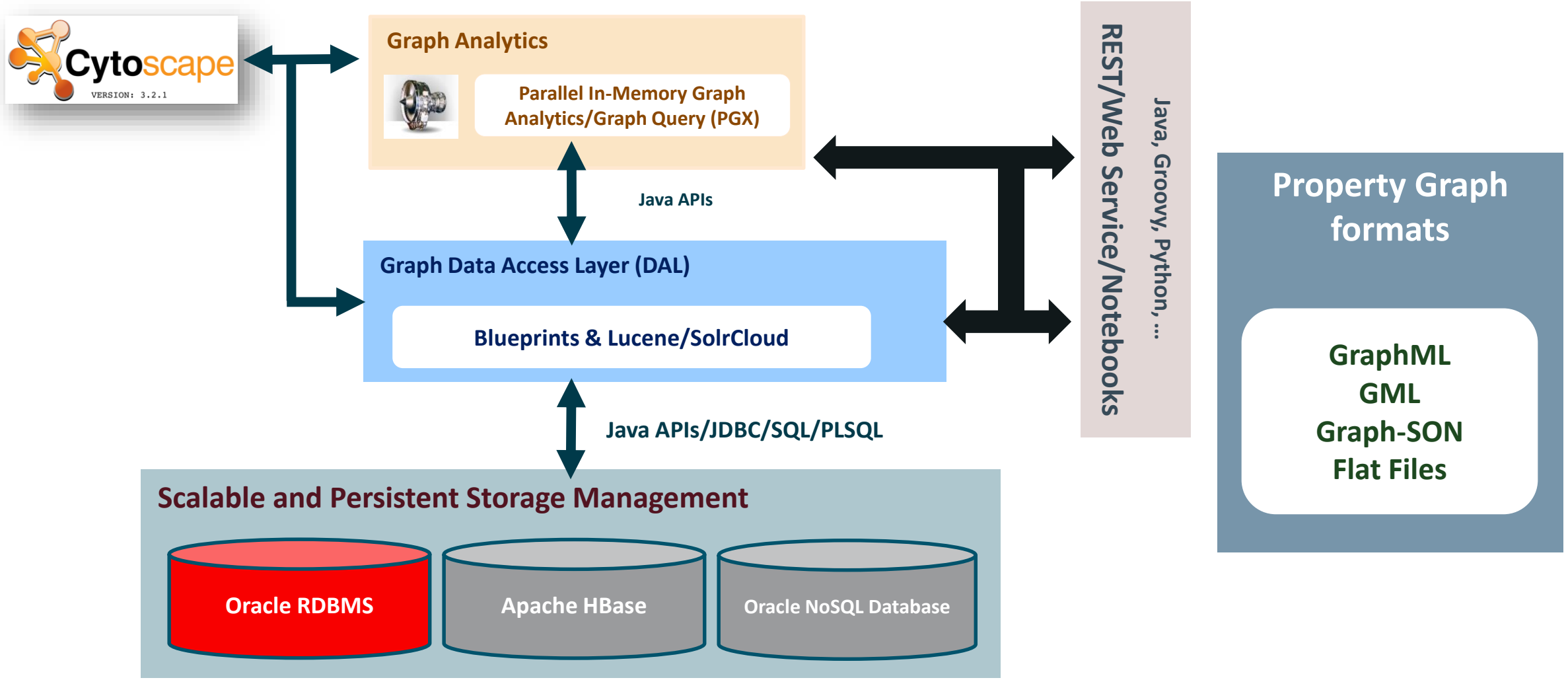
Architecture of Property Graph Support



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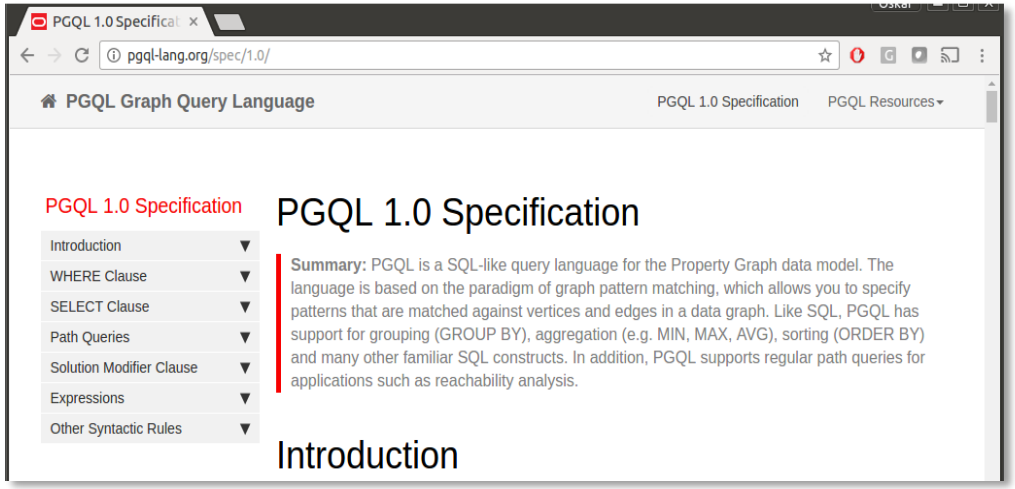
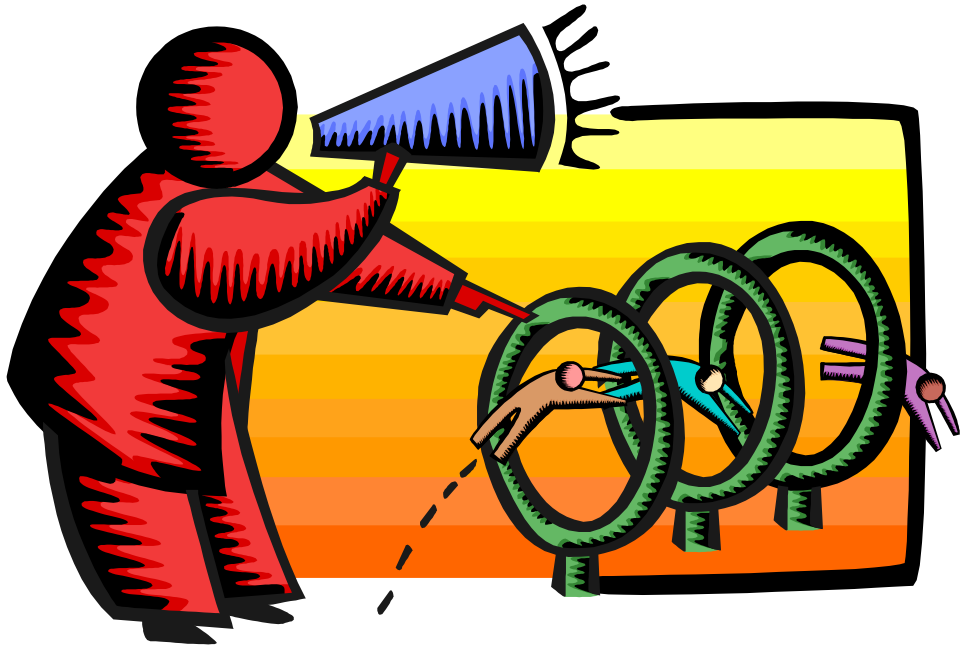
Pattern matching using PGQL

- SQL-like syntax but with graph pattern description and property access
  - Interactive (real-time) analysis
  - Supporting aggregates, comparison, such as max, min, order by, group by
- Finding a given pattern in graph
  - Fraud detection
  - Anomaly detection
  - Subgraph extraction
  - …

- Proposed for standardization by Oracle
  - Specification available on-line
  - Open-sourced front-end (i.e. parser)

https://github.com/oracle/pgql-lang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