

OrientDB

**graph database
in practice**

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About me

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You will learn

WHAT

Graph
Graph database

WHY

Real world
example

HOW

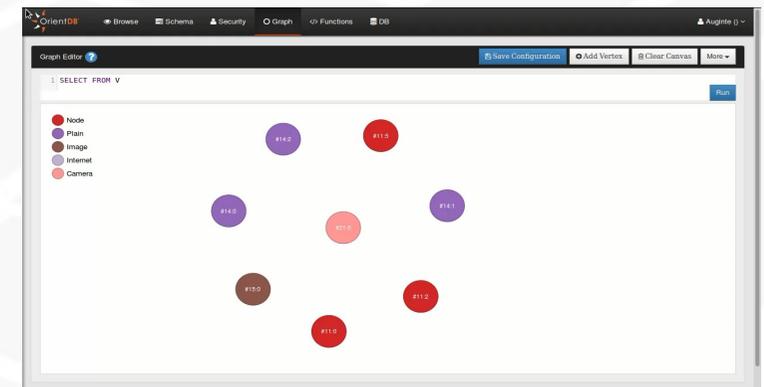
With PHP
With relational database
Best practice



WHAT: Graph



Source: http://commons.wikimedia.org/wiki/File:Tiskevicius_Juozapas_1835-1891.JPG



Not Graf

mathematical graph

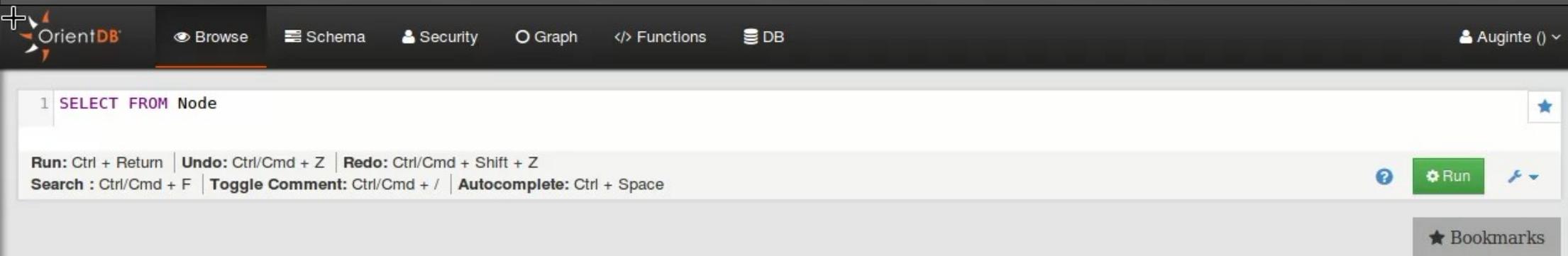
Read more at: http://en.wikipedia.org/wiki/Graph_%28mathematics%29

Graph - vertices, edges and properties

The screenshot shows the OrientDB Graph Editor interface. At the top, there is a navigation bar with tabs for Browse, Schema, Security, Graph (selected), Functions, and DB. The user is identified as Auginte. Below the navigation bar, there is a toolbar with buttons for Save Configuration, Add Vertex, Clear Canvas, and More. The main area contains a SQL query editor with the text "1 SELECT FROM V" and a Run button. Below the query editor, there is a legend for node types: Node (red), Plain (purple), Image (brown), Internet (light purple), and Camera (pink). The graph area displays several nodes, including a red node labeled #11:5, a purple node labeled #14:2, and a dark purple node labeled #14:0. A large black trapezoidal overlay is positioned in the center of the graph, containing the following text:

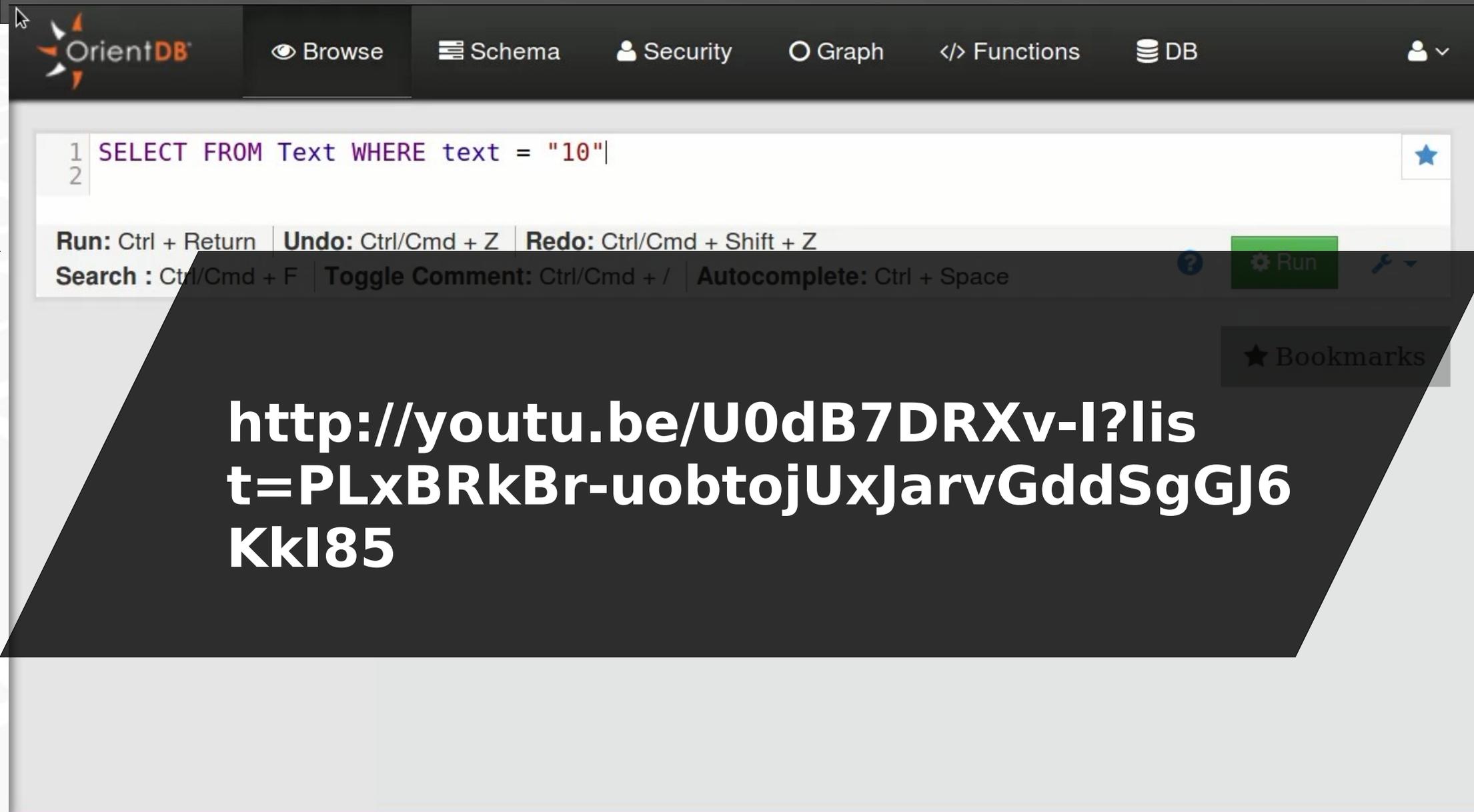
<http://youtu.be/0nQj5ruYoAs?list=PLxBRkBr-uobtojUxJarvGddSgGJ6KkI85>

Data visualization: table, document, graph



http://youtu.be/mA_1McQ4ifl?list=PLxBRkBr-uobtojUxJarvGddSgGJ6KkI85

Graph database is optimized for many relations



The screenshot shows the OrientDB web interface. The top navigation bar includes the OrientDB logo and menu items: Browse, Schema, Security, Graph, Functions, and DB. The main content area is a SQL query editor with the following text:

```
1 SELECT FROM Text WHERE text = "10"|
2
```

Below the query editor, there are keyboard shortcuts: Run: Ctrl + Return, Undo: Ctrl/Cmd + Z, Redo: Ctrl/Cmd + Shift + Z, Search: Ctrl/Cmd + F, Toggle Comment: Ctrl/Cmd + /, and Autocomplete: Ctrl + Space. A green 'Run' button and a 'Bookmarks' section are also visible.

<http://youtu.be/U0dB7DRXv-I?list=PLxBRkBr-uobtojUxJarvGddSgGJ6KkI85>

Summary (1/3)

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Graph

Vertices and edges
As data visualization

Graph database

Optimized for many relations

WHY: Common operations

Auginte

<http://youtu.be/ZcEX9n4-NRM?list=PLxBRkBr-uobtojUxJarvGddSgGJ6Kkl85>

v0.6

v0.7

Long-term plan

- Infinity zooming
- Source tracking
- Distributed architecture

Short-term plan

- Stable infinity zooming
- Self-organizing teams
- Self-organizing teams

Backlog



Calendar

License: Apache 2 (free + for commercial)

Structures: Schema-hybrid, with extend

Scalability: Sharding, replication, WAL

Used by: Cisco, Ericsson

API: JavaLib, binary, REST

Query languages:
WEB, SQL, Gremlin

Results:
Synchronous, asynchronous

Storage:
File, memory, remote

Documentation:
Tutorials, groups, source

Text search:
Lucene full text index

Transactions:
ACID, MVCC

Attributes:
Read-only, metadata

**Time for
DEMO**

Summary (2/3)

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Structures/Operations
Trees with cycles = graph
Traverse like operations

Tools
Debugging complex structures

Business logic
List or association based

HOW: Notes for developers



PHP

OrientDB in PHP world

Migration

and learning cost

Relational

database integration

Design

structures in database

HOW: in PHP world

Official
PHP >=5.4

PhpOrient
OrientDB >=1.7.4

```
"require": {  
  "ostico/phporient": "1.1.*"  
}
```

First/old OrientDB-PHP
PHP >=5.3 API getting outdated

OrientDB-PHP

```
"require": {  
  "ostico/ostico-orientdb-php/orientdb-php": "dev-master"  
}
```

Not recommend

No complex results = no graph

Use PhpOrient instead

Doctrine
Symfony
PHP >=5.3

OrientDB-ODM
On top of OrientDB-PHP

```
"require": {  
  "ostico/ostico-orientdb-odm": "dev-master"  
}  
  
"require": {  
  "concept-it/orient-db-bundle": "dev-master"  
}
```

Slower

REST/HTTP API

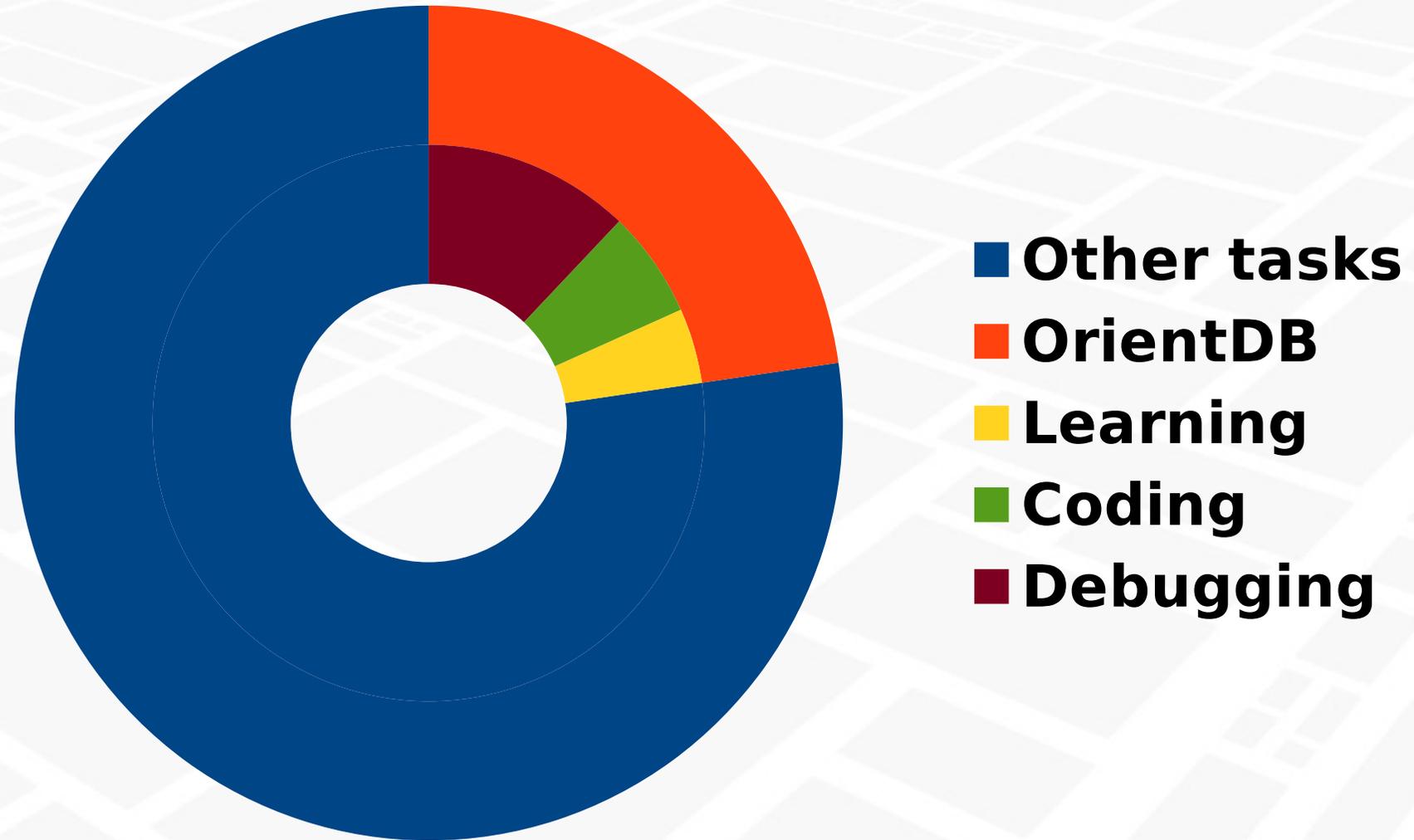
<http://0.0.0.0:2480>

HOW: PhpOrient

```
/** @var Record[] $results */
$results = $client->query(
    'SELECT FROM Testas WHERE c.d.e = 132'
);
foreach ($results as $res) {
    print "{$res->getRid()} {$res['c']['d']['f']}";
}
```

```
/** @var Bag $inParent */ /** @var ID $id */
$inParent = $res['in_Parent'];
foreach ($inParent as $id) {
    $child = $client->recordLoad($id);
}
```

HOW: Migration costs



* Based on time used in my personal project

HOW: Integrate with relational database

OrientDB ETL

**Native tool to import
Too hard for n-n relations**

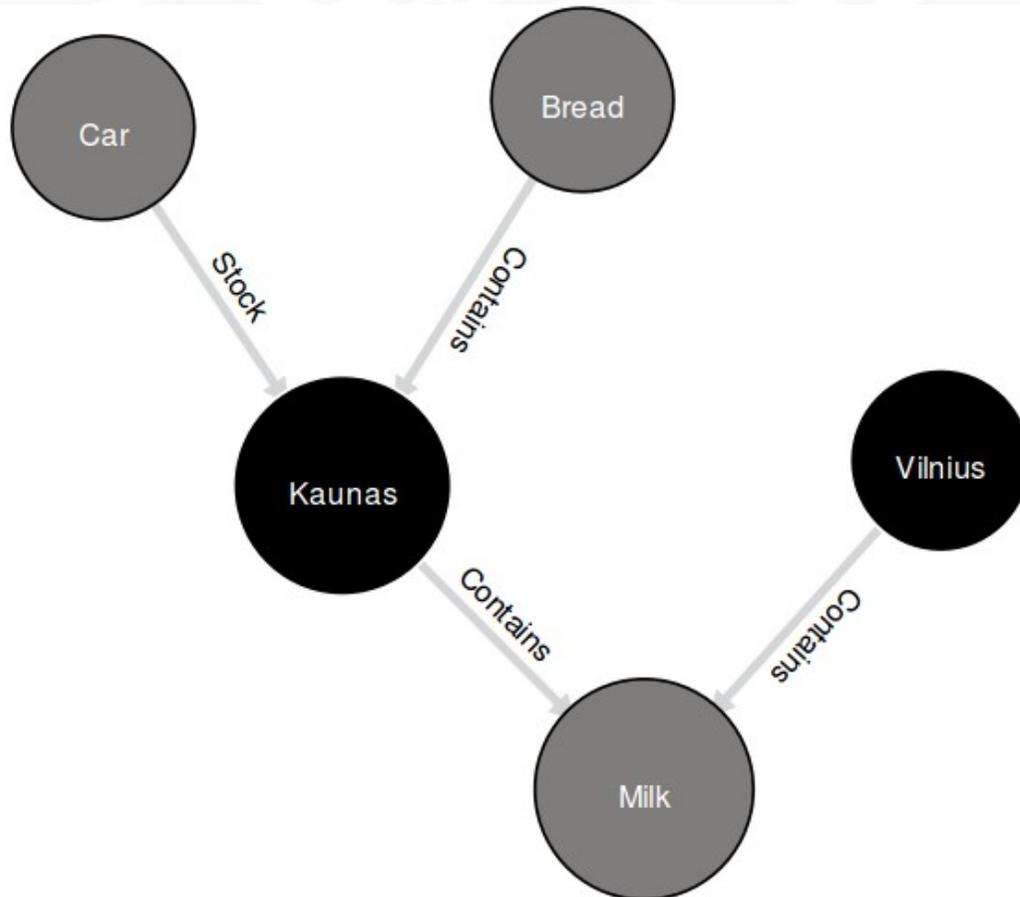
SQL Batch

**Execute multiple queries at
the server side**

```
LET v1 = CRAETE VERTEX Article SET name="123"  
LET v2 = CRAETE VERTEX Action SET name="456"  
LET v3 = CRAETE VERTEX Stock SET house="A", amount=2  
CREATE EDGE Discount FROM $v1 TO $v2  
CREATE EDGE Contains FROM $v3 TO $v1  
  
RETURN [$v1, $v2, $v3]
```

HOW: Design structure in database

Where to put parameters?



In edges

- Not shown in Graph view
- Strange Traverse behavior

Only in vertices

- Easier to implement caching
- Easier to extend relations
- Imitating edge parameter with inheritance of vertices

Summary (3/3)

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With PHP
With relational database
Best practice

PHP wrapper
PhpOrient

Migration cost
Time for debugging/tests

Relational database
Use SQL Batch

Design database
Use light edges

Questions?

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With relational database
Best practice



References and useful links

- **<http://www.orienttechnologies.com>**
- <https://github.com/orientechnologies/orientdb/wiki/SQL-Functions>
- <https://github.com/orientechnologies/orientdb/wiki/SQL-Traversal>
- <http://www.orienttechnologies.com/docs/last/orientdb.wiki/Programming-Language-Bindings.html>
- <https://github.com/orientechnologies/orientdb/wiki/Document-Database#prepared-query>
- <https://github.com/orientechnologies/orientdb/wiki/Fetching-Strategies>
- <http://neo4j.com/>
- <http://auginte.com>