OrientDB®

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Overview

Open Source NoSQL DB combining **Graph**, **Document**, **Key/Value** & **Object** models

Focused on performance

- Fast read & write operations, stores up to 120,000 records / s
- Trees & graphs of records are traversed in milliseconds
- Optimized RAM usage

Multi-Master architecture (global throughput = sum of all servers' throughput)

Database content is restored using **WAL** (write-ahead logging)

3 kinds of drivers: Native binary remote, HTTP REST, Java wrapped

Community Edition

Enterprise Edition

Schema

Class from OOP paradigm

Schema-full

- Strict mode at a class-level (class = record type), **all fields mandatory**

Schema-less

- Classes without properties enabled, records can have **arbitrary fields**

Schema-hybrid

- Classes with some fields enabled, records can define **custom fields**

Data Types

- String
- Integer
- Float
- Boolean
- Long
- Double
- Decimal
- Byte
- Binary
- Short
- Transient
- Embedded
- Date
- Datetime
- Embedded list
- Embedded map
- Embedded set
- Custom
- Link list
- Link set
- Link map
- Any
- LinkBag
- Link

Data Modelling

OrientDB Graph Model	Graph Model	Relational Model
Class, extends vertex & edge	Vertex and Edge Class	Table
Vertex	Vertex	Row
Vertex and Edge property	Vertex and Edge property	Column
Edge	Edge	Relationship

Vertex: ID, set of incoming Edges, set of outgoing Edges

Edge: ID, link to an incoming Vertex = head, link to an outgoing Vertex = tail, label

Mandatory properties

OrientDB Document Model	Document Model	Relational Model
Class / Cluster	Collection	Table
Document	Document	Row
Document field	Key/value pair	Column
Link (relationship)	Unavailable	Relationship

Data Modelling

OrientDB Key/Value Model	Key/Value Model	Relational Model
Class / Cluster	Bucket	Table
Document	Key/Value pair	Row
Doc field or Vertex/Edge prop	Unavailable	Column
Link (relationship)	Unavailable	Relationship

Value: Document / Graph Element Use cases: POST, GET, DELETE

OrientDB Object Model	Object Model	Relational Model
Class / Cluster	Class	Table
Document or Vertex	Object	Row
Doc field or Vertex/Edge prop	Object property	Column
Link (relationship)	Pointer	Relationship

Supports: Inheritance, Polymorphism, Direct binding from/to Objects

SQL Query Language

OrientDB extends SQL to support graphing concepts such as Trees & Graphs

Query targets

- **Classes** (default) `SELECT FROM Employee`
- **Clusters** `SELECT FROM CLUSTER:Employee`
- **Record ID** (#<cluster>:<position>) `SELECT FROM #10:3` `SELECT FROM [#10:1, #10:30]`
- **Indexes** `SELECT VALUE FROM INDEX:employees WHERE name='Jack Black'`

SQL Query Language

Statement	Example
SELECT	SELECT FROM Employee
WHERE	SELECT FROM Employee WHERE age < 50
ORDER BY	SELECT FROM Employee WHERE name LIKE ‘Bl%' ORDER BY name ASC
GROUP BY	SELECT SUM(salary) FROM Employee GROUP BY department
LIMIT	SELECT FROM Employee WHERE gender=‘female' LIMIT 20
SKIP	SELECT FROM Employee WHERE gender='male' SKIP 20 LIMIT 20
INSERT	INSERT INTO Employee(name, surname, age) VALUES(‘Jack', ‘Black’, 30)
UPDATE	UPDATE Employee SET retired=TRUE WHERE age > 65
DELETE	DELETE FROM Employee WHERE city <> ‘Prague'

SQL Query Language

Statement	Example

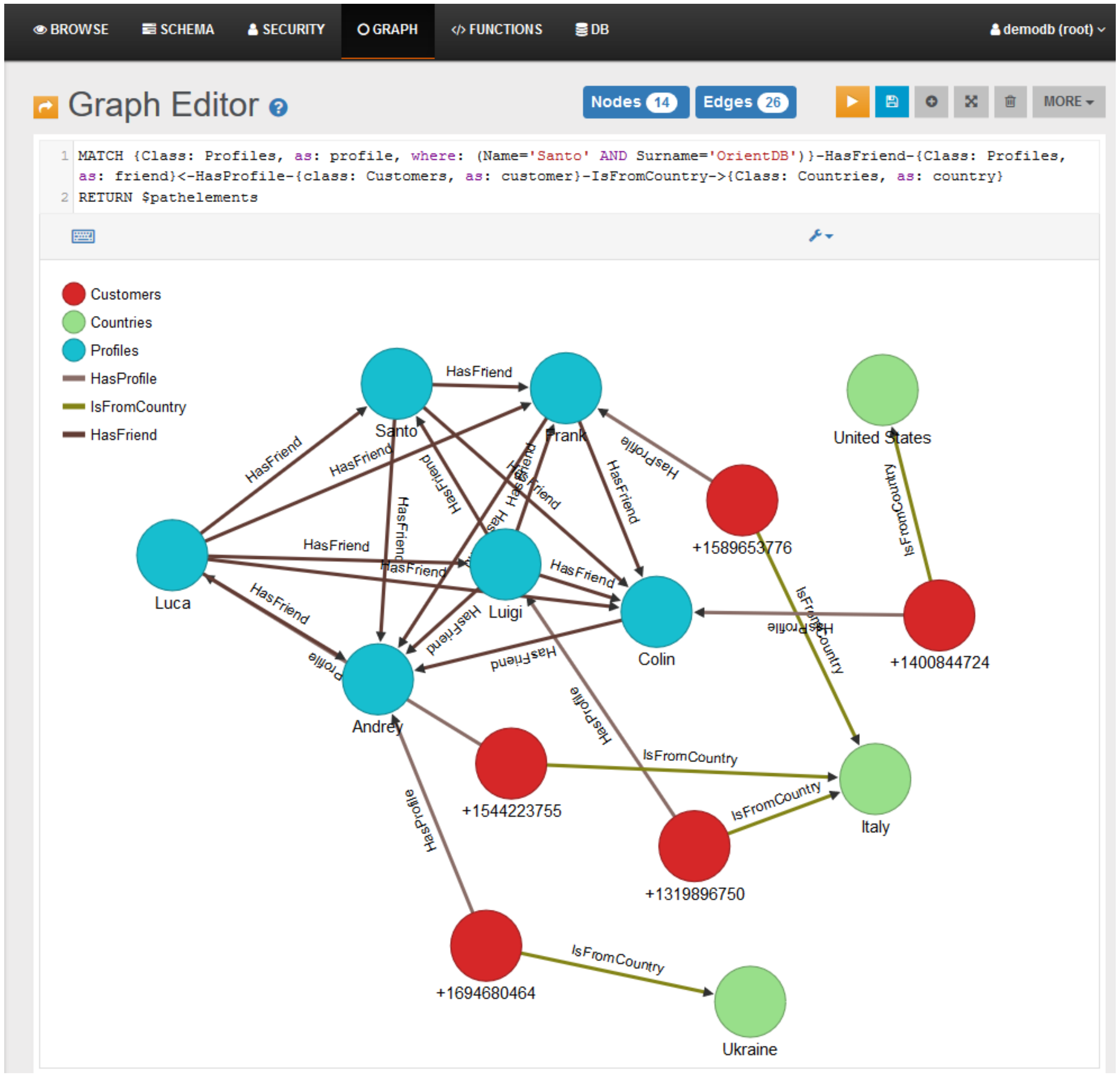
CREATE	CREATE CLASS Animal ABSTRACT
	CREATE CLASS Cat EXTENDS Animal
	CREATE CLUSTER animal

TRAVERSE	TRAVERSE out("Friend") FROM #1:1234 MAXDEPTH 3 STRATEGY BREADTH_FIRST TRAVERSE out() FROM #1:1234
TRUNCATE	TRUNCATE CLASS Task POLYMORPHIC TRUNCATE CLUSTER task TRUNCATE RECORD 1:5
MATCH	MATCH {class: Person, as: people, where: (name = ‘Jack')} RETURN people MATCH {class: Employee, as: employee, where: (surname = ‘Black')}.both(‘Colleague') {as: colleague} RETURN employee, colleague

Studio

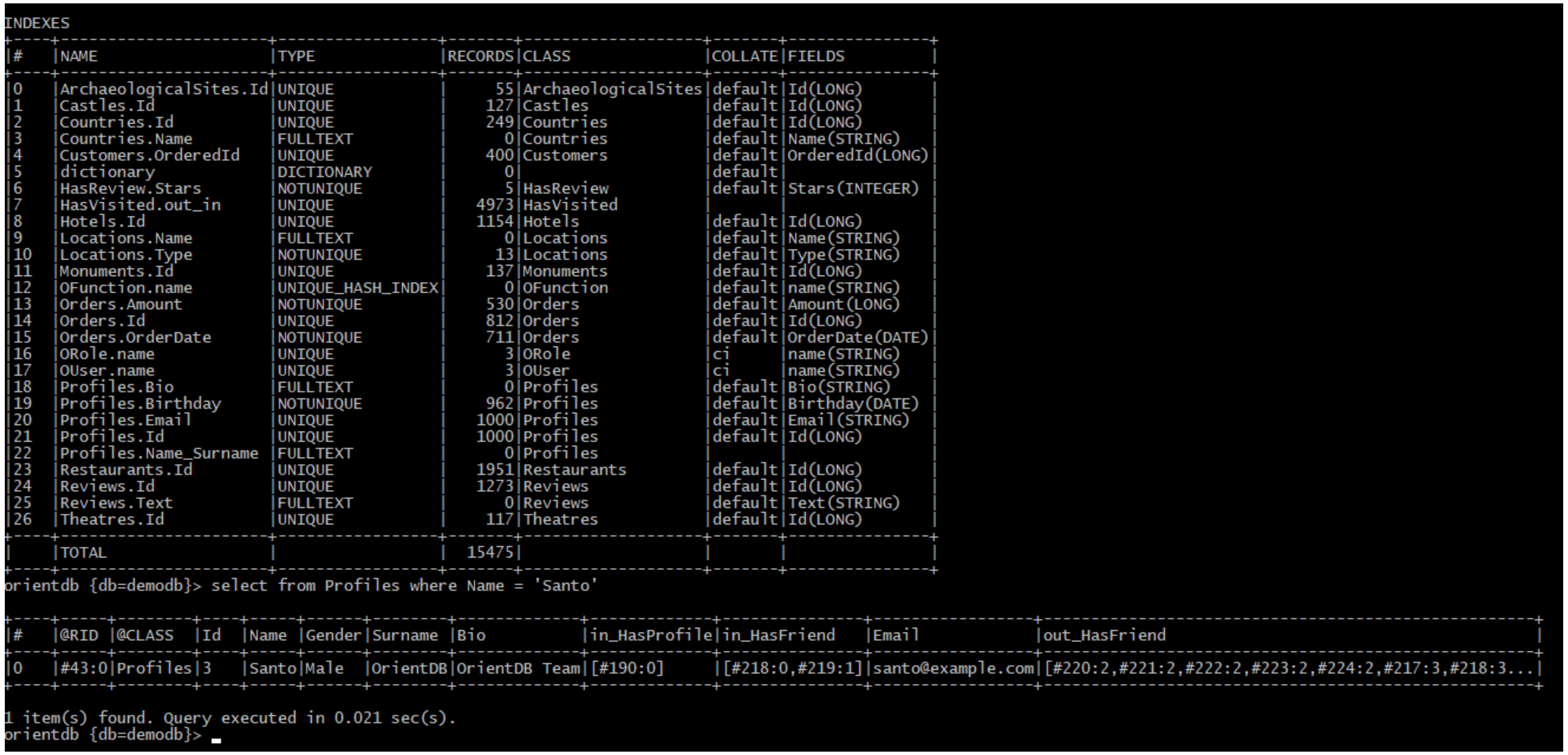
Graph Editor

- Visualize
- Interact
- Modify



```
MATCH {Class: Profiles, as: profile, where: (Name='Santo' AND Surname='OrientDB')}-HasFriend-{Class: Profiles,
as: friend}<-HasProfile-{class: Customers, as: customer}-IsFromCountry->{Class: Countries, as: country}
RETURN $pathelements
```

Console



```
INDEXES
+----+----------------------+-----------------+-------+-------------------+-------+---------------+
|#   |NAME                  |TYPE             |RECORDS|CLASS              |COLLATE|FIELDS         |
+----+----------------------+-----------------+-------+-------------------+-------+---------------+
|0   |ArchaeologicalSites.Id|UNIQUE           |     55|ArchaeologicalSites|default|Id(LONG)       |
|1   |Castles.Id            |UNIQUE           |    127|Castles            |default|Id(LONG)       |
|2   |Countries.Id          |UNIQUE           |    249|Countries          |default|Id(LONG)       |
|3   |Countries.Name        |FULLTEXT         |      0|Countries          |default|Name(STRING)   |
|4   |Customers.OrderedId   |UNIQUE           |    400|Customers          |default|OrderedId(LONG)|
|5   |dictionary            |DICTIONARY       |      0|                   |default|               |
|6   |HasReview.Stars       |NOTUNIQUE        |      5|HasReview          |default|Stars(INTEGER) |
|7   |HasVisited.out_in     |UNIQUE           |   4973|HasVisited         |       |               |
|8   |Hotels.Id             |UNIQUE           |   1154|Hotels             |default|Id(LONG)       |
|9   |Locations.Name        |FULLTEXT         |      0|Locations          |default|Name(STRING)   |
|10  |Locations.Type        |NOTUNIQUE        |     13|Locations          |default|Type(STRING)   |
|11  |Monuments.Id          |UNIQUE           |    137|Monuments          |default|Id(LONG)       |
|12  |OFunction.name        |UNIQUE_HASH_INDEX|      0|OFunction          |default|name(STRING)   |
|13  |Orders.Amount         |NOTUNIQUE        |    530|Orders             |default|Amount(LONG)   |
|14  |Orders.Id             |UNIQUE           |    812|Orders             |default|Id(LONG)       |
|15  |Orders.OrderDate      |NOTUNIQUE        |    711|Orders             |default|OrderDate(DATE)|
|16  |ORole.name            |UNIQUE           |      3|ORole              |ci     |name(STRING)   |
|17  |OUser.name            |UNIQUE           |      3|OUser              |ci     |name(STRING)   |
|18  |Profiles.Bio          |FULLTEXT         |      0|Profiles           |default|Bio(STRING)    |
|19  |Profiles.Birthday     |NOTUNIQUE        |    962|Profiles           |default|Birthday(DATE) |
|20  |Profiles.Email        |UNIQUE           |   1000|Profiles           |default|Email(STRING)  |
|21  |Profiles.Id           |UNIQUE           |   1000|Profiles           |default|Id(LONG)       |
|22  |Profiles.Name_Surname |FULLTEXT         |      0|Profiles           |       |               |
|23  |Restaurants.Id        |UNIQUE           |   1951|Restaurants        |default|Id(LONG)       |
|24  |Reviews.Id            |UNIQUE           |   1273|Reviews            |default|Id(LONG)       |
|25  |Reviews.Text          |FULLTEXT         |      0|Reviews            |default|Text(STRING)   |
|26  |Theatres.Id           |UNIQUE           |    117|Theatres           |default|Id(LONG)       |
+----+----------------------+-----------------+-------+-------------------+-------+---------------+
|    |TOTAL                 |                 |  15475|                   |       |               |
+----+----------------------+-----------------+-------+-------------------+-------+---------------+
orientdb {db=demodb}> select from Profiles where Name = 'Santo'

+----+-----+--------+----+-----+------+--------+-------------+-------------+-----------------+-----------------+----------------------------------------------------+
|#   |@RID |@CLASS  |Id  |Name |Gender|Surname |Bio          |in_HasProfile|in_HasFriend     |Email            |out_HasFriend                                       |
+----+-----+--------+----+-----+------+--------+-------------+-------------+-----------------+-----------------+----------------------------------------------------+
|0   |#43:0|Profiles|3   |Santo|Male  |OrientDB|OrientDB Team|[#190:0]     |[#218:0,#219:1]|santo@example.com|[#220:2,#221:2,#222:2,#223:2,#224:2,#217:3,#218:3...|
+----+-----+--------+----+-----+------+--------+-------------+-------------+-----------------+-----------------+----------------------------------------------------+

1 item(s) found. Query executed in 0.021 sec(s).
orientdb {db=demodb}> _
```

Command-Line Console

- **Manage and query databases**

Resources

http://orientdb.com/