

Projet NoSQL: OrientDB

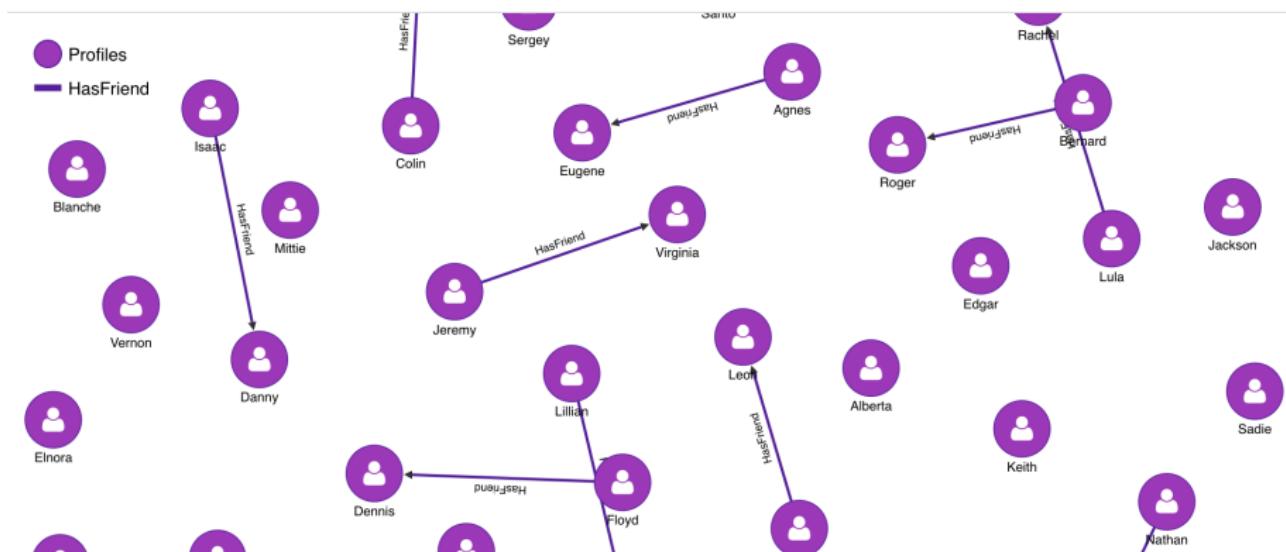
Panchalingamoorthy Gajenthran

Université Paris 8

Introduction

- NoSQL = Not Only SQL
- Famille de SGBD
- Données de plus en plus volumineuses

Introduction



Représentation d'un graphe

Introduction

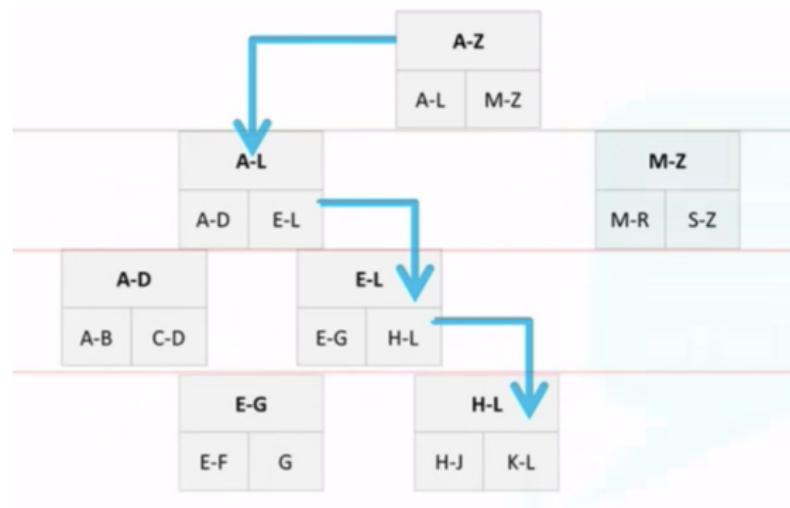


Schéma du modèle d'indexation

Introduction

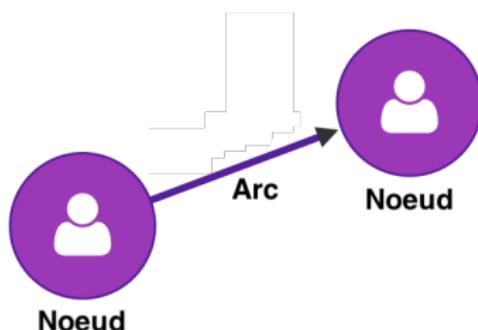


Schéma d'une relation en graphe

Introduction

Modèle orienté graphes

Connexion arc

Relation à chaque requête

$O(1)$

SGBD Relationnel

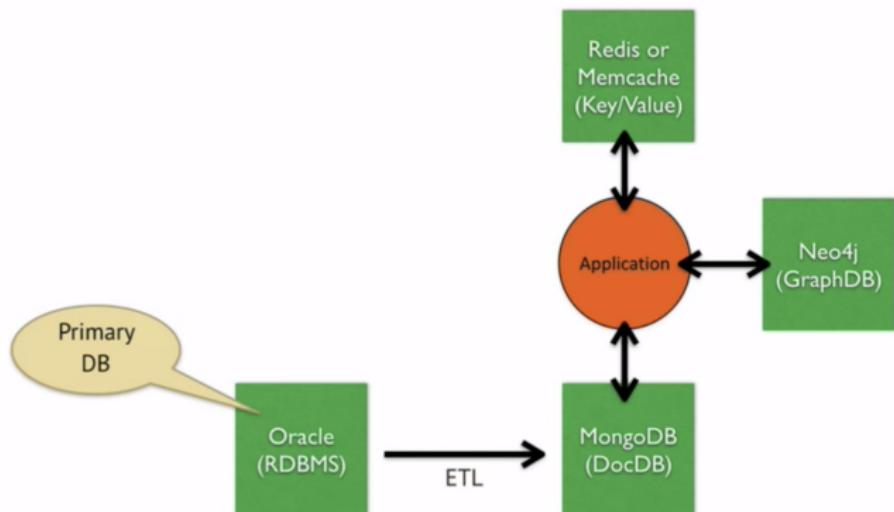
Requête JOIN

Relation une seule fois (arc créé)

$O(\log N)$

Comparaison entre modèle orienté graphes et relationnel

Introduction



Problème de conflit avec les modèles NoSQL

Introduction



Logo OrientDB

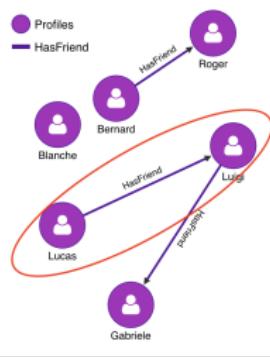
Plan

- Présentation d'OrientDB
- Installation
- Fonctionnalités

Présentation d'OrientDB

- SGBD multi-modèle
- écrit en Java
- 22 000 enregistrements par seconde.
- Principale modèle orienté graphes

Présentation d'OrientDB



@rid	@version	@class	Email	Bio	Id	Gender	Surname	Name
#61:0	13	Profiles	luca@example.com	OrientDB Team	1	Male	OrientDB	Lucas

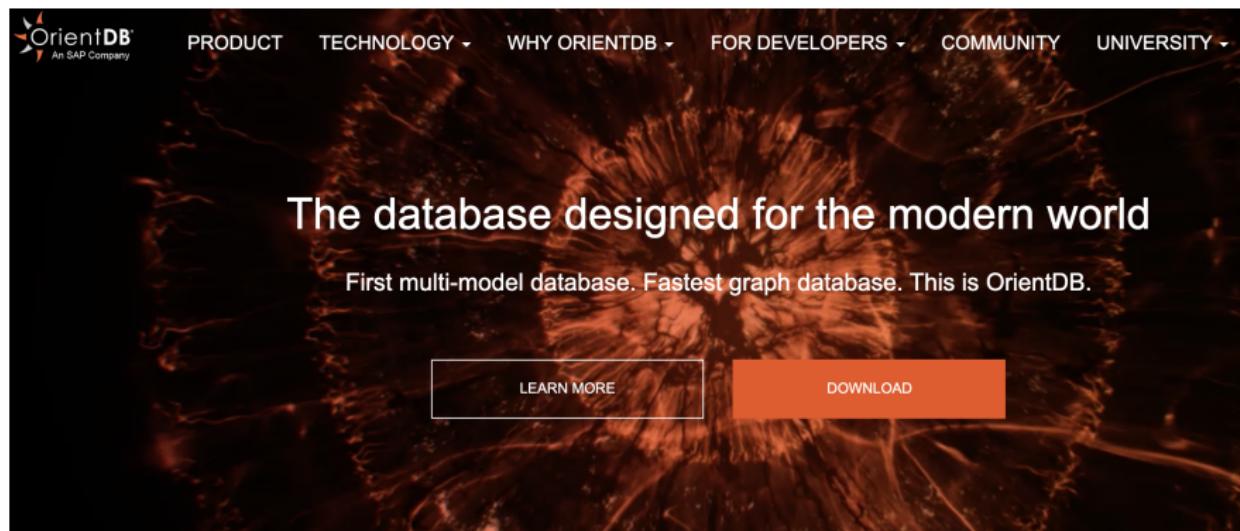
From Vertex Edge HasFriend - #547:0 - Version 1 To Vertex

From #61:0 To #62:0

@rid	@version	@class	Email	Bio	Id	Gender	Surname	Name
#62:0	12	Profiles	luigi@example.com	OrientDB Team	2	Male	OrientDB	Luigi

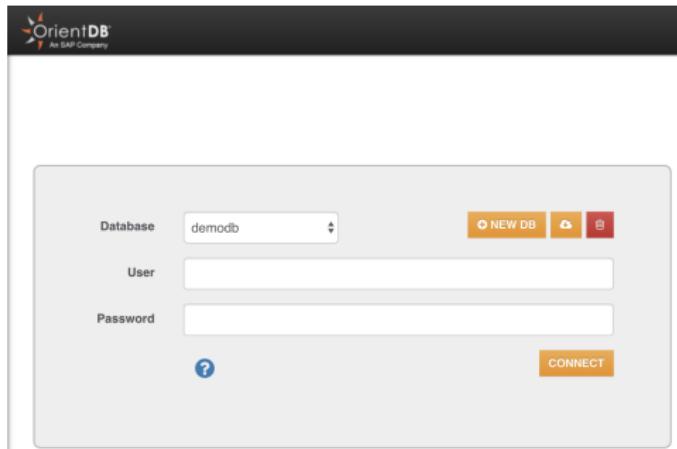
Relation entre les noeuds et les arcs

Installation



Site officiel d'OrientDB

Installation



(a)



(b)

Installation d'OrientDB

Formats acceptés

The screenshot shows the OrientDB web interface with the following details:

- Header:** OrientDB - An SAP Company, BROWSE, SCHEMA, SECURITY, GRAPH, FUNCTIONS, DB.
- Section:** Database Management
- Sub-section:** EXPORT DATABASE
- Description:** OrientDB Server exports the database in JSON format. Click the Export Database button to download a gzip compressed file containing the JSON file. You can re-import it by using OrientDB command line console.
- Content:** A large JSON object representing the database structure and data.

```

{
  "info": {"name": "demodb", "default-cluster-id": 3, "exporter-version": 12, "engine-version": "3.0.26 - Veloce (build 39bd95d8410374abcf6770ef2fecac26145b04f, branch 3.0.x)"}, "engine-build": "39bd95d70410374abcf6770ef2fecac26145b04f", "storage-config": "version": 14, "schema": "version": 14, "schemaRecordId": "#0:1", "indexMgtRecordId": "#0:2"}, "clusters": [{"name": "default", "id": 3}, {"name": "index", "id": 1}, {"name": "mainIndex", "id": 2}, {"name": "user", "id": 5}], "functions": [{"id": 3}, {"name": "index", "id": 4}, {"name": "user", "id": 5}], {"name": "function", "id": 3}, {"name": "sequence", "id": 7}, {"name": "nschedule", "id": 8}, {"name": "v_1", "id": 9}, {"name": "v_2", "id": 11}, {"name": "v_3", "id": 12}, {"name": "v_4", "id": 13}, {"name": "v_5", "id": 14}, {"name": "v_6", "id": 15}, {"name": "v_7", "id": 16}, {"name": "v_8", "id": 17}, {"name": "v_9", "id": 18}, {"name": "v_10", "id": 19}, {"name": "v_11", "id": 20}, {"name": "v_12", "id": 21}, {"name": "e_1", "id": 22}, {"name": "e_2", "id": 23}, {"name": "e_3", "id": 24}, {"name": "e_4", "id": 25}, {"name": "e_5", "id": 26}, {"name": "e_6", "id": 27}, {"name": "e_7", "id": 28}, {"name": "e_8", "id": 29}, {"name": "e_9", "id": 30}, {"name": "e_10", "id": 31}, {"name": "e_11", "id": 32}, {"name": "e_12", "id": 33}, {"name": "e_13", "id": 34}, {"name": "dbinfo_1", "id": 35}, {"name": "dbinfo_2", "id": 36}, {"name": "dbinfo_3", "id": 37}, {"name": "dbinfo_4", "id": 38}, {"name": "dbinfo_5", "id": 39}, {"name": "dbinfo_6", "id": 40}, {"name": "dbinfo_7", "id": 42}, {"name": "dbinfo_8", "id": 43}, {"name": "dbinfo_9", "id": 44}, {"name": "dbinfo_10", "id": 45}, {"name": "dbinfo_11", "id": 46}, {"name": "dbinfo_12", "id": 47}, {"name": "countries", "id": 48}, {"name": "countries_1", "id": 49}, {"name": "countries_2", "id": 50}, {"name": "countries_3", "id": 51}, {"name": "countries_4", "id": 52}, {"name": "countries_5", "id": 53}, {"name": "countries_6", "id": 54}, {"name": "countries_7", "id": 55}, {"name": "countries_8", "id": 56}, {"name": "countries_9", "id": 57}, {"name": "countries_10", "id": 58}, {"name": "countries_11", "id": 59}, {"name": "countries_12", "id": 60}, {"name": "profiles", "id": 61}, {"name": "profiles_1", "id": 62}, {"name": "profiles_2", "id": 63}, {"name": "profiles_3", "id": 64}, {"name": "profiles_4", "id": 65}, {"name": "profiles_5", "id": 66}, {"name": "profiles_6", "id": 67}, {"name": "profiles_7", "id": 68}, {"name": "profiles_8", "id": 69}, {"name": "profiles_9", "id": 70}
}
  
```

Exportation de la base de données

Transactions ACID

```
database.begin();
try {
    account.field("amount", amount + 100);
    account.save();
    operation.field("status", "Completed");
    operation.save();
    database.commit();
} catch( Exception e ) {
    database.rollback();
}
```

Journal WAL utilisé par OrientDB

Langage de requête

<pre>insert into profiles(Email, Bio, Id, Gender, Surname, Name) values('p.gajenthran@gmail.com', 'Fan of OrientDB', 99, "Male", "Gajen", "Gajenthran");</pre>																																																																																																											
	com.orientechnologies.orient.core.storage.ORecordDuplicatedException: Cannot index record #61:77: found duplicated key '99' in index 'Profiles.Id' previously assigned to the record #68:7 DB names="demodb" INDEX=Profiles.Id RID=#68:7																																																																																																										
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<pre>update profiles set Name="Lucas" where Name="Luca" and Id=1</pre>																																																																																																											
<pre>delete vertex profiles where Name="Gajenthran";</pre>																																																																																																											
<pre>select * from profiles</pre>	<table border="1"> <thead> <tr> <th colspan="2">METADATA</th> <th colspan="4">PROPERTIES</th> <th colspan="2">IN</th> <th colspan="2">OUT</th> </tr> <tr> <th>#Id</th> <th>Version</th> <th>Index</th> <th>Email</th> <th>Bio</th> <th>M</th> <th>Gender</th> <th>Surname</th> <th>Name</th> <th>BirthDay</th> <th>HasProfile</th> <th>HasFriend</th> </tr> </thead> <tbody> <tr> <td>#61.0.12</td> <td>1</td> <td>Profile</td> <td>luca@example.com</td> <td>OrientDB Team</td> <td>1</td> <td>Male</td> <td>OrientDB</td> <td>Luca</td> <td>1997-06-25 00:00:00</td> <td>HasProfile</td> <td>HasFriend</td> </tr> <tr> <td>#61.1.6</td> <td>1</td> <td>Profile</td> <td>jonnie@live.io</td> <td>Fotóban található utazásainak pag. Jól nézni lehetővé válik az alkalmi művekkel.</td> <td>14</td> <td>Female</td> <td>Powell</td> <td>Edgar</td> <td>1997-06-25 00:00:00</td> <td>HasProfile</td> <td>HasFriend</td> </tr> <tr> <td>#61.2.4</td> <td>1</td> <td>Profile</td> <td>mluoto@liferay.co.uk</td> <td>Néha várja jövőlegi kiadásaiat, mivel nem mindenki fogadja meg.</td> <td>27</td> <td>Male</td> <td>Mendoza</td> <td>Winnie</td> <td>1997-02-17 00:00:00</td> <td>HasProfile</td> <td>HasFriend</td> </tr> <tr> <td>#61.3.2</td> <td>1</td> <td>Profile</td> <td>wol@ieevo.co.uk</td> <td>Zigurat bonyolultsága miatt nem mindenki fogadja meg.</td> <td>40</td> <td>Female</td> <td>Jordan</td> <td>Ebony</td> <td>1994-02-27 00:00:00</td> <td>HasProfile</td> <td>HasFriend</td> </tr> <tr> <td>#61.4.7</td> <td>1</td> <td>Profile</td> <td>bazza@tunepw.gov</td> <td>Se kiválasztották a legjobb művészek között.</td> <td>53</td> <td>Female</td> <td>Graham</td> <td>Luke</td> <td>1995-06-26 00:00:00</td> <td>HasProfile</td> <td>HasFriend</td> </tr> <tr> <td>#61.5.2</td> <td>1</td> <td>Profile</td> <td>jeckov@bagone.co.uk</td> <td>Tárhelyet készítette ki a legjobb művészek között.</td> <td>66</td> <td>Male</td> <td>Claire</td> <td>Kelt</td> <td>1997-08-03 00:00:00</td> <td>HasProfile</td> <td>HasFriend</td> </tr> <tr> <td>#61.6.2</td> <td>1</td> <td>Profile</td> <td>guthrie@nufield.co.uk</td> <td>Lőrémi díját is mehetetlenné tette a legjobb művész.</td> <td>79</td> <td>Female</td> <td>Porter</td> <td>Alberta</td> <td>1979-07-21 00:00:00</td> <td>HasProfile</td> <td>HasFriend</td> </tr> </tbody> </table>	METADATA		PROPERTIES				IN		OUT		#Id	Version	Index	Email	Bio	M	Gender	Surname	Name	BirthDay	HasProfile	HasFriend	#61.0.12	1	Profile	luca@example.com	OrientDB Team	1	Male	OrientDB	Luca	1997-06-25 00:00:00	HasProfile	HasFriend	#61.1.6	1	Profile	jonnie@live.io	Fotóban található utazásainak pag. Jól nézni lehetővé válik az alkalmi művekkel.	14	Female	Powell	Edgar	1997-06-25 00:00:00	HasProfile	HasFriend	#61.2.4	1	Profile	mluoto@liferay.co.uk	Néha várja jövőlegi kiadásaiat, mivel nem mindenki fogadja meg.	27	Male	Mendoza	Winnie	1997-02-17 00:00:00	HasProfile	HasFriend	#61.3.2	1	Profile	wol@ieevo.co.uk	Zigurat bonyolultsága miatt nem mindenki fogadja meg.	40	Female	Jordan	Ebony	1994-02-27 00:00:00	HasProfile	HasFriend	#61.4.7	1	Profile	bazza@tunepw.gov	Se kiválasztották a legjobb művészek között.	53	Female	Graham	Luke	1995-06-26 00:00:00	HasProfile	HasFriend	#61.5.2	1	Profile	jeckov@bagone.co.uk	Tárhelyet készítette ki a legjobb művészek között.	66	Male	Claire	Kelt	1997-08-03 00:00:00	HasProfile	HasFriend	#61.6.2	1	Profile	guthrie@nufield.co.uk	Lőrémi díját is mehetetlenné tette a legjobb művész.	79	Female	Porter	Alberta	1979-07-21 00:00:00	HasProfile	HasFriend
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Les opérations dans OrientDB

Réponse aux requêtes

METADATA				PROPERTIES							IN		OUT					
@rid	@version	@class	Email	Bio							Id	Gender	Surname	Name	Birthday	HasProfile	HasFriend	HasFriend
#61:0	13	Profiles	luca@example.com	OrientDB Team							1	Male	OrientDB	Lucas		#297:0		#347:0 #348:0 #349:0 #350:0 #351:0 #352:0 ...More(4)
#61:1	6	Profiles	jomugsi@ve.io	Fohbarel tutuwfutu utuojimot pag lulu wimus olwisalu vuluhtek arilisav ban nupce fu.							14	Female	Powell	Edgar	1997-06-25 00:00:00		#356:91 #348:102 #349:107 #356:113	#348:80

Représentation du tableau, réponse aux requête

Réponse aux requêtes

METADATA			PROPERTIES							IN		OUT	
@rid	@version	@class	Email	Bio	Id	Gender	Surname	Name	Birthday	HasProfile	HasFriend		
#61:0	13	Profiles	luca@example.com	OrientDB Team	1	Male	OrientDB	Lucas	1997-01-01	#297:0		#347:0 #348:0 #349:0 #350:0 #351:0 #352:0 ...More(4)	#348:0
#61:1	6	Profiles	jomugsi@ve.io	Fohbarel tutuwfū utuojimot pag lulu wimus olwisan vuluhtek arlisav ban nupce fu.	14	Female	Powell	Edgar	1997-06-25 00:00:00		#358:91 #348:102 #349:107 #356:113	#348:90	

Représentation du tableau, réponse aux requête

Réponse aux requêtes

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@rid	@version	@class	Email	Bio	Id	Gender	Surname	Name	Birthday	HasProfile	HasFriend		
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Représentation du tableau, réponse aux requête

Réponse aux requêtes

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Représentation du tableau, réponse aux requête

Réponse aux requêtes

Fonctionnalités	OrientDB	MongoDB
Base de données opérationnelle	✓	✓
Base de données orientée documents	✓	✓
Types de données modifiables	✓	✓
Documents imbriqués	✓	✓
Sharding	✓	✓
Fonctions côté serveur	✓	✓
HTTP Rest/JSON	✓	✓
Sécurité utilisateur et rôle	✓	✓
Base de données orientée graphes	✓	
Concept orienté objets	✓	
Schéma, sans schéma, schéma mixte	✓	
SQL	✓	
Langage TinkerPop Gremlin	✓	
Transactions ACID	✓	
Relationnel (documents connectés)	✓	

Tableau des principales fonctionnalités

Sources

- OrientDB, an SAP Company :
<http://orientdb.com/>
- Orientdb, Github (@orientechnologies): <https://github.com/orientechnologies/orientdb>
- SQL and databases, *Meenu Daves*
- Quelles différences entre sql et nosql, Sourcemax
- OrientDB, Wikipedia :
<https://en.wikipedia.org/wiki/OrientDB>
- OrientDB - the 2nd generation of (MultiModel) by Luigi Dell'Aquila, Youtube
- Comparison orientdb vs. Mongodb, vschart