

ORACLE®

NoSQL & SQL

Blending the best of both worlds

Andrew Morgan
@andrewmorgan
www.clusterdb.com



Safe Harbour Statement

The following is intended to outline our general product direction. It is intended for information purposes only, and may not be incorporated into any contract.

It is not a commitment to deliver any material, code, or functionality, and should not be relied upon in making purchasing decisions. The development, release, and timing of any features or functionality described for Oracle's products remains at the sole discretion of Oracle.

What NoSQL must deliver

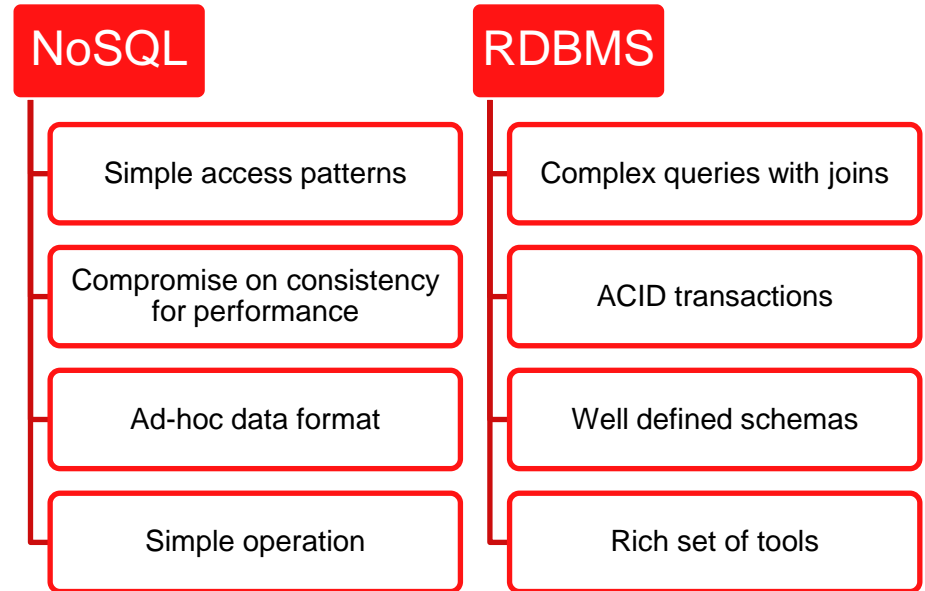
Scalability	
Performance	
HA	
Ease of use	

- Massive scalability
 - No application-level sharding
- Performance
- High Availability/Fault Tolerance
- Ease of use
 - Simple operations/administration
 - Simple APIs
 - Quickly evolve application & schema

Still a role for the RDBMS?

- No best single solution fits all
- Mix and match

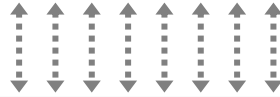
Scalability	
Performance	
HA	
Ease of use	
SQL/Joins	
ACID Transactions	



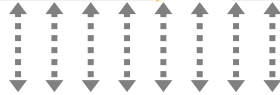
MySQL Cluster Architecture



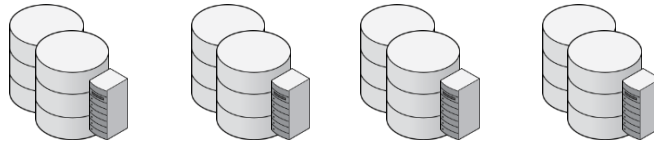
Clients



Application Layer



Data Layer



MySQL Cluster Data Nodes



Management

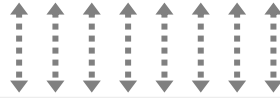
Scalability	
Performance	
HA	
Ease of use	
SQL/Joins	✓
ACID Transactions	✓

MySQL Cluster Architecture

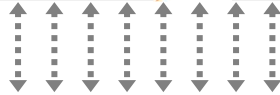
Scalability	✓
Performance	
HA	
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Clients



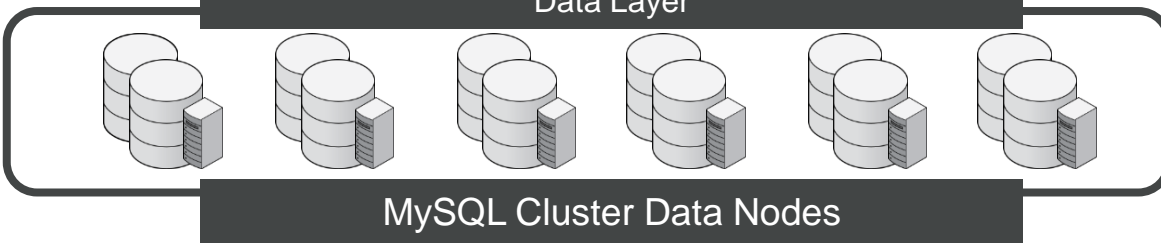
Application Layer



Data Layer



Management



Management

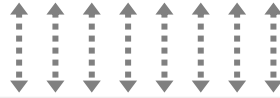
MySQL Cluster Data Nodes

MySQL Cluster Architecture

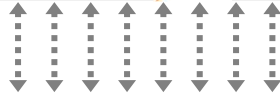
Scalability	✓
Performance	
HA	✓
Ease of use	
SQL/Joins	✓
ACID Transactions	✓



Clients



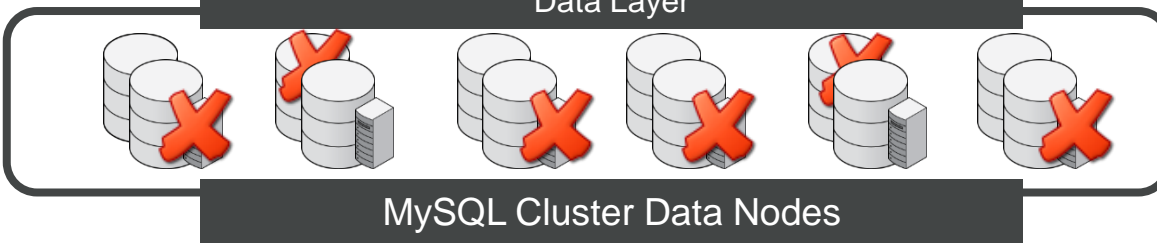
Application Layer



Data Layer



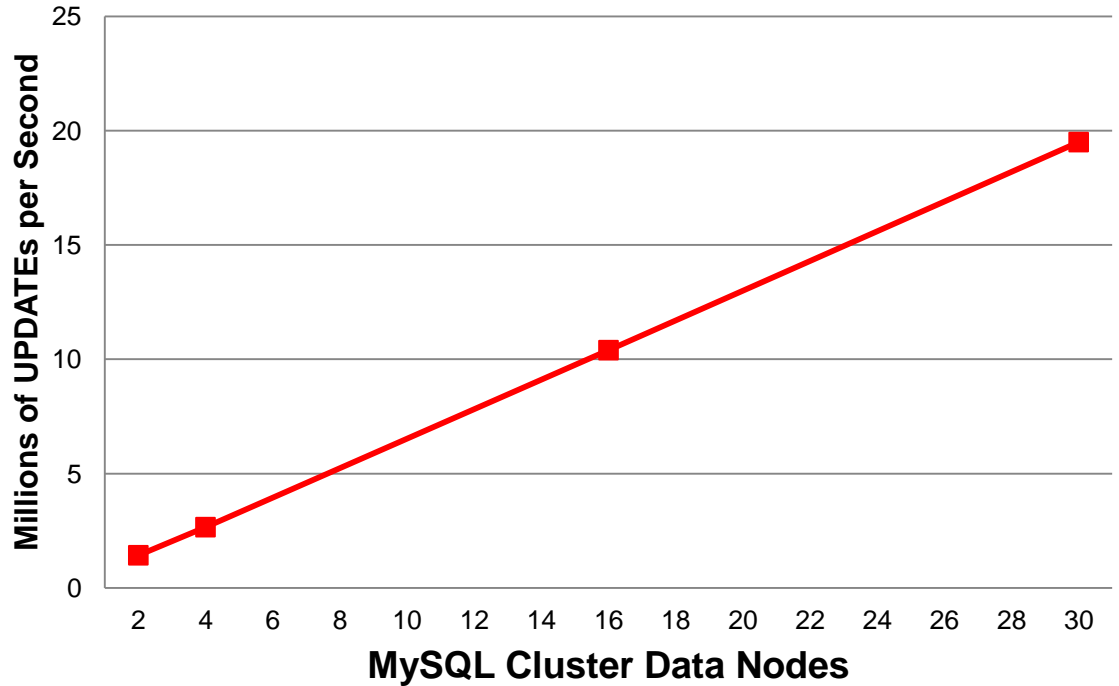
Management



Management

1.2 Billion UPDATES per Minute

- 30 x Intel E5-2600 Intel Servers
- NoSQL C++ API, flexaSynch benchmark
- ACID Transactions, with Synchronous Replication

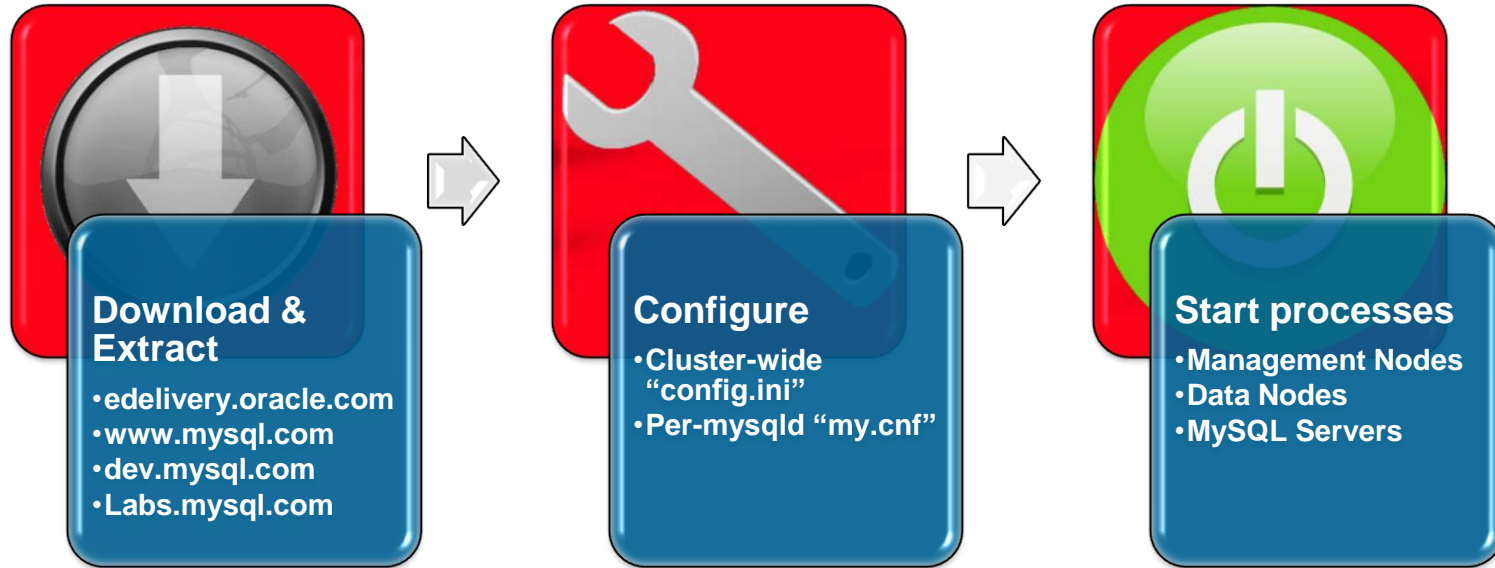


Scalability	✓
Performance	✓
HA	✓
Ease of use	
SQL/Joins	✓
ACID Transactions	✓

Ease of use

Creating & running your first Cluster

The traditional way (pre-MCM) – Up and running in 15 mins



- Up & running in 10-15 minutes using Quick Start guides from <http://dev.mysql.com/downloads/cluster/>
 - Versions for Linux, Windows & Solaris

Scalability	✓
Performance	✓
HA	✓
Ease of use	✓
SQL/Joins	✓
ACID Transactions	✓

MySQL Cluster Manager

Bootstrap single host Cluster

1. Download MCM/Cluster package from edelivery.oracle.com:
2. Unzip
3. Run agent, define, create & start Cluster!

```
$> bin\mcmd --bootstrap
```

```
MySQL Cluster Manager 1.1.2 started
Connect to MySQL Cluster Manager by running "D:\Andrew\Documents\MySQL\mcm\bin\mcmd" -a NOVA:1862
Configuring default cluster 'mycluster'...
Starting default cluster 'mycluster'...
Cluster 'mycluster' started successfully
  ndb_mgmd NOVA:1186
  ndbd NOVA
  ndbd NOVA
  mysqld NOVA:3306
  mysqld NOVA:3307
  ndbapi *
Connect to the database by running "D:\Andrew\Documents\MySQL\mcm\cluster\bin\mysql" -h NOVA -P 3306 -u root
```

MySQL Cluster 7.3 EA: Auto-Installer


- Fast configuration
- Auto-discovery
- Workload optimized
- Repeatable best practices
- For MySQL Cluster 7.2 + 7.3



Downloading MySQL Cluster EA



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MySQL Server Snapshots :: MySQL-Cluster-Auto-Installer

 **Warning! For testing purposes only!**

These binaries were created by MySQL testing servers.


They are **NOT FIT FOR PRODUCTION**.

They are provided solely for testing purposes, to try the latest bug fixes and generally to keep up with the development.

- Please, DO NOT USE THESE BINARIES IN PRODUCTION.
- Instead, install them on a spare server.
- If you are looking for production ready binaries, please visit [MySQL Downloads](#).
- MySQL Software is provided under the [GPL License](#)



<http://labs.mysql.com/>

MySQL-Cluster-Auto-Installer 

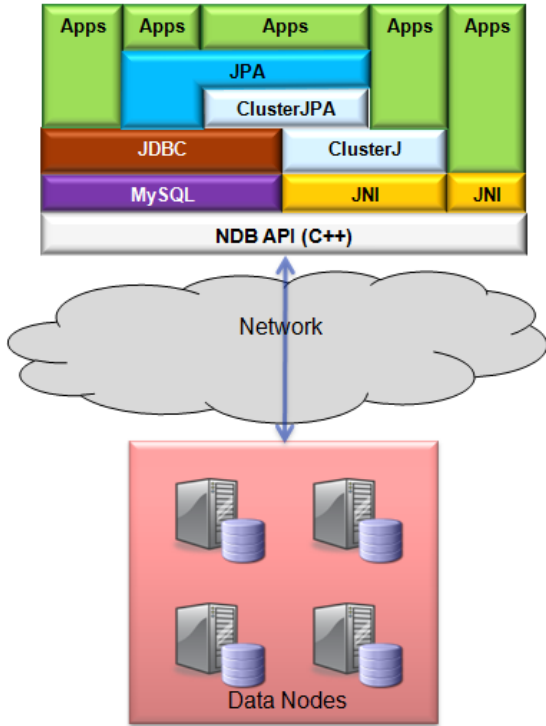
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mysql-cluster-7.2.8-linux-x86_64.tar.gz	7.2.8	2012-09-27	linux-x86_64	253.2 M	12929a15b72027c8a4e91d0be26ef048
mysql-cluster-gpl-7.2.8-solaris10-sparc-64bit.tar.gz	7.2.8	2012-09-27	solaris10-sparc-64bit	561.9 M	663c7a063397bffff751e0accf1aaec3
mysql-cluster-client-gpl-7.2.8-1.el6.i686.rpm	7.2.8	2012-09-27	source	13.8 M	e26858cc20d2cb214b28323eba0e285b

ORACLE

Scalability	✓
Performance	✓
HA	✓
Ease of use	✓
SQL/Joins	✓
ACID Transactions	✓

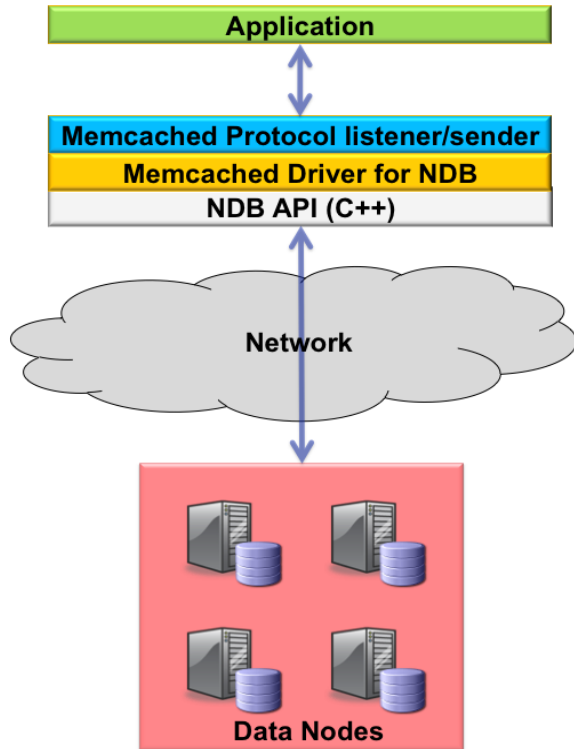
NoSQL APIs

MySQL Cluster 7.1: ClusterJ/JPA



- Domain Object Model Persistence API (ClusterJ):
 - Java API
 - High performance, low latency
 - Feature rich
- JPA interface built upon this new Java layer:
 - Java Persistence API compliant
 - Implemented as an OpenJPA plugin
 - Uses ClusterJ where possible, reverts to JDBC for some operations
 - Higher performance than JDBC
 - More natural for most Java designers
 - Easier Cluster adoption for web applications

MySQL Cluster 7.2: Memcached



- Memcached is a distributed memory based hash-key/value store with no persistence to disk
- NoSQL, simple API, popular with developers
- MySQL Cluster already provides scalable, in-memory performance with NoSQL (hashed) access as well as persistence
 - Provide the Memcached API but map to NDB API calls
- Writes-in-place, so no need to invalidate cache
- Simplifies architecture as caching & database integrated into 1 tier
- Access data from existing relational tables

Cluster & Memcached – Schema-Free

meal:lunch-cod random-96
age:fred-22 home:blog-clusterdb.com
nick:james-jimmy edges:triangle-3
town:maidenhead-SL6 town:reading-RG1
edges:square-4
hair:fred-mohawk

Application view

key value
<town:maidenhead, SL6>

SQL view

key value
<town:maidenhead, SL6>

Key	Value
town:maidenhead	SL6

generic table

Cluster & Memcached – Configured Schema

meal:lunch-cod random-96
 home:blog-clusterdb.com
 edges:triangle-3
 town:reading-RG1
 edges:square-4
 hair:fred-mohawk
 age:fred-22
 nick:james-jimmy
 town:maidenhead-SL6

Application view

key value
 <town:maidenhead, SL6>

SQL view

prefix key value
 <town:maidenhead, SL6>

Prefix	Table	Key-col	Val-col	policy
town:	map.zip	town	code	cluster

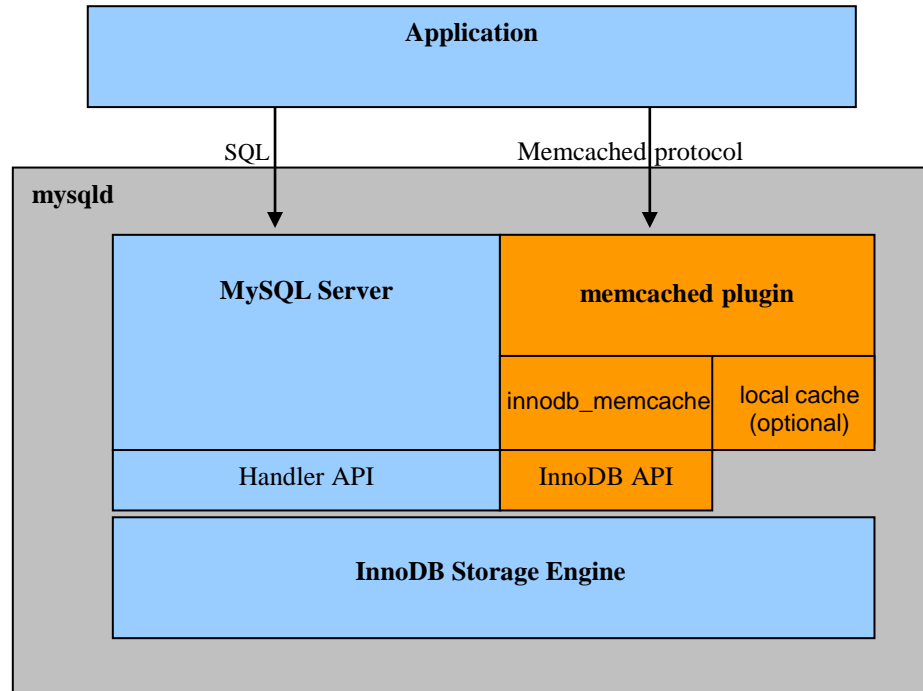
Config tables

town	...	code	...
maidenhead	...	SL6	...

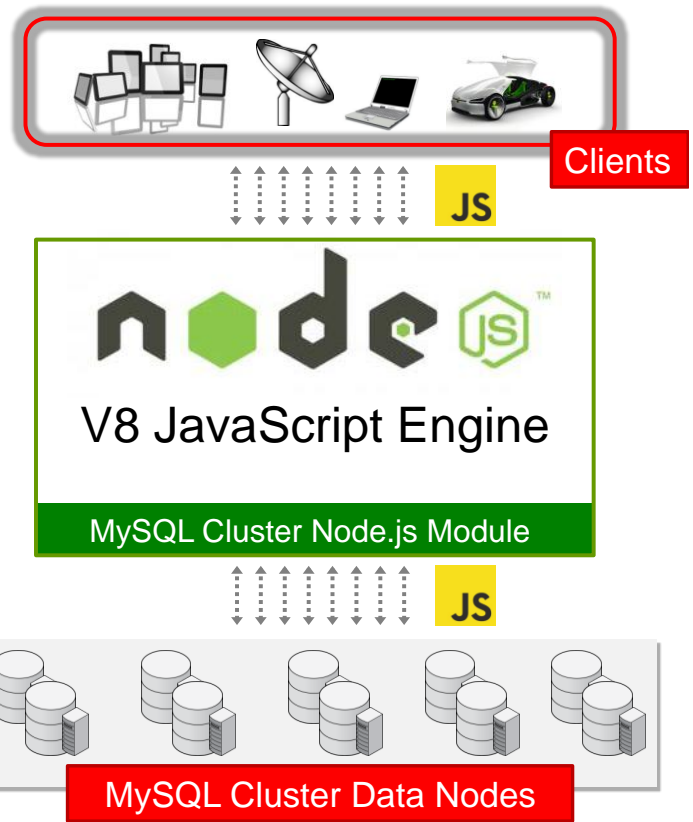
map.zip

Memcached NoSQL Access with InnoDB

- Memcached as a plugin of MySQL Server; same process space, with very low latency access to data
- Memcapable: supports both memcached ascii protocol and binary protocol
- Support multiple columns: users can map multiple columns into “value”
- Optional local caching: “innodb-only”, “cache-only”, and “caching”
- Batch operations for performance



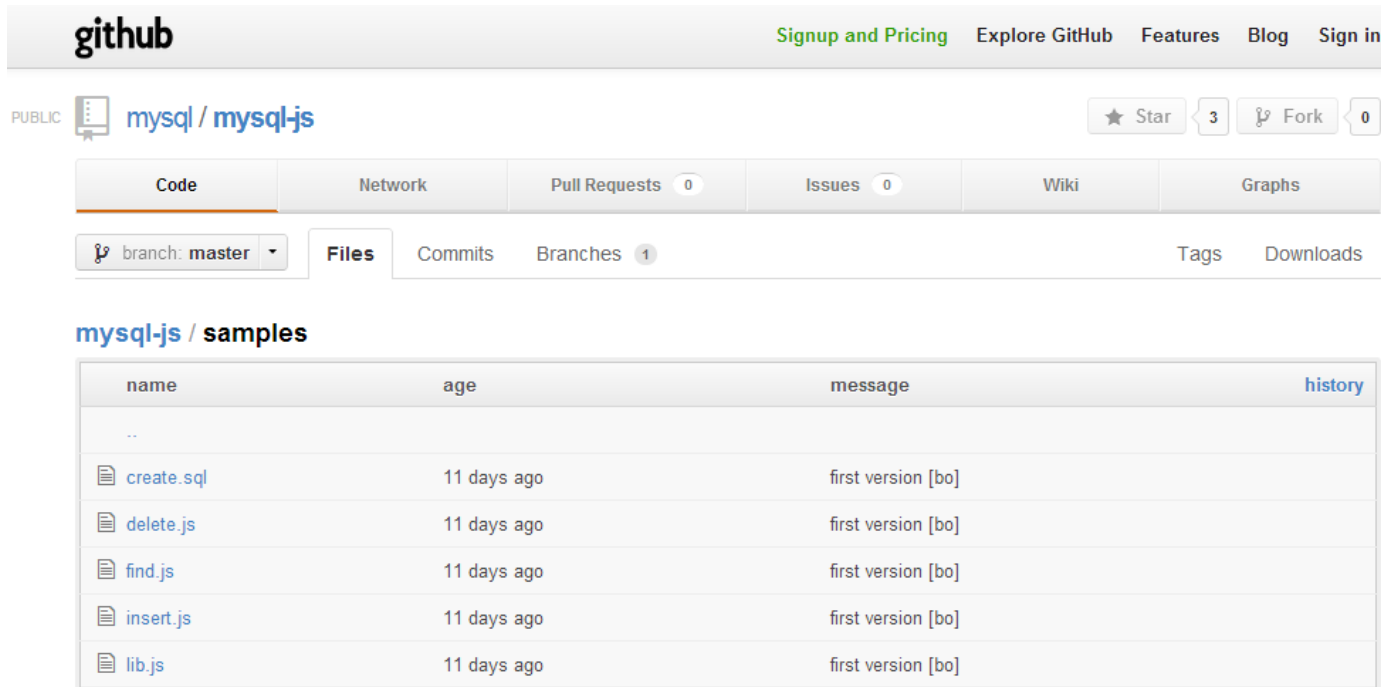
MySQL Cluster 7.3 EA: Node.js NoSQL API








- Native JavaScript access to MySQL Cluster
 - End-to-End JavaScript: browser to the app and database
 - Storing and retrieving JavaScript objects directly in MySQL Cluster
 - Eliminate SQL transformation
- Implemented as a module for node.js
 - Integrates full Cluster API library within the web app
- Couple high performance, distributed apps, with high performance distributed database

Try Node.js example for yourself

<https://github.com/mysql/mysql-js/tree/master/samples>



The screenshot shows the GitHub interface for the repository `mysql/mysql-js`. The repository is public and has 3 stars and 0 forks. The current branch is `master`. The `Files` tab is selected, showing the `samples` directory. A table lists the files in the directory:

name	age	message	history
..			
 <code>create.sql</code>	11 days ago	first version [bo]	
 <code>delete.js</code>	11 days ago	first version [bo]	
 <code>find.js</code>	11 days ago	first version [bo]	
 <code>insert.js</code>	11 days ago	first version [bo]	
 <code>lib.js</code>	11 days ago	first version [bo]	

Next Steps



Learn More

- www.mysql.com/cluster
- Authentic MySQL Curriculum:
<http://oracle.com/education/mysql>



Try it Out

- dev.mysql.com/cluster
- labs.mysql.com
- github.com/mysql/mysql-js



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- forums.mysql.com/list.php?25

