



# MySQL Cluster setup and MaxScale configuration

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Last Updated: 1<sup>st</sup> August 2014



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## Document History

<b>Date</b>	<b>Change</b>	<b>Who</b>
31st July 2014	Initial version	Massimiliano Pinto

## Overview

The document covers the MySQL Cluster 7.2.17 setup and MaxScale configuration in order to load balancing the SQL nodes acces.



## MySQL Cluster setup

The MySQL Cluster 7.2.17 setup is based on two virtual servers with Linux Centos 6.5

- server1:

- NDB Manager process
- SQL data node1
- MySQL 5.5.38 as SQL node1

- server2:

- SQL data node2
- MySQL 5.5.38 as SQL node2

Cluster configuration file is /var/lib/mysql-cluster/config.ini, copied on all servers

```
[ndbd default]
NoOfReplicas=2
DataMemory=60M
IndexMemory=16M

[ndb_mgmd]
hostname=178.62.38.199
id=21
datadir=/var/lib/mysql-cluster

[mysqld]
hostname=178.62.38.199

[mysqld]
hostname=162.243.90.81

[ndbd]
hostname=178.62.38.199

[ndbd]
hostname=162.243.90.81
```



Note, it's possible to specify all node ids and datadir as well for each cluster component

Example:

```
[ndbd]
hostname=162.243.90.81
id=43
datadir=/usr/local/mysql/data
```

and /etc/my.cnf, copied as well in all servers

```
[mysqld]
ndbcluster
ndb-connectstring=178.62.38.199
innodb_buffer_pool_size=16M

[mysql_cluster]
ndb-connectstring=178.62.38.199
```

## Startup of MySQL Cluster

Each cluster node process must be started separately, and on the host where it resides. The management node should be started first, followed by the data nodes, and then finally by any SQL nodes:

- On the management host, server1, issue the following command from the system shell to start the management node process:

```
[root@server1 ~]# ndb_mgmd -f /var/lib/mysql-cluster/config.ini
```

- On each of the data node hosts, run this command to start the ndbd process:

```
[root@server1 ~]# ndbd --initial --initial-start
```

```
[root@server2 ~]# ndbd --initial --initial-start
```

- On each SQL node start the MySQL server process:

```
[root@server1 ~]# /etc/init.d/mysql start
```

```
[root@server2 ~]# /etc/init.d/mysql start
```

## Check the cluster status

If all has gone well, and the cluster has been set up correctly, the cluster should now be operational.

It's possible to test this by invoking the `ndb_mgm` management node client.

The output should look like that shown here, although you might see some slight differences in the output depending upon the exact version of MySQL that you are using:

```
[root@server1 ~]# ndb_mgm
-- NDB Cluster -- Management Client --
ndb_mgm> show
Connected to Management Server at: 178.62.38.199:1186
Cluster Configuration
-----
[ndbd(NDB)]      2 node(s)
id=24@178.62.38.199  (mysql-5.5.38 ndb-7.2.17, Nodegroup: 0, *)
id=25@162.243.90.81  (mysql-5.5.38 ndb-7.2.17, Nodegroup: 0)

[ndb_mgmd(MGM)]  1 node(s)
id=21@178.62.38.199  (mysql-5.5.38 ndb-7.2.17)

[mysqld(API)]   2 node(s)
id=22@178.62.38.199  (mysql-5.5.38 ndb-7.2.17)
id=23@162.243.90.81  (mysql-5.5.38 ndb-7.2.17)

ndb_mgm>
```

The SQL node is referenced here as `[mysqld(API)]`, which reflects the fact that the `mysqld` process is acting as a MySQL Cluster API node.



## Working with NDBCLUSTER engine in MySQL

- First create a table with NDBCLUSTER engine:

```
[root@server1 ~]# mysql
```

```
mysql> CREATE TABLE `t1` (  `a` int(11) DEFAULT NULL )
ENGINE=NDBCLUSTER;
Query OK, 0 rows affected (3.28 sec)
```

```
mysql> show create table t1;
```

```
+-----+-----+
-----+
| Table | Create Table
|
+-----+-----+
-----+
| t1    | CREATE TABLE `t1` (
  `a` int(11) DEFAULT NULL
) ENGINE=ndbcluster DEFAULT CHARSET=latin1 |
+-----+-----+
-----+
1 row in set (0.01 sec)
```

- Just add a row in the table:

```
mysql> insert into test.t1 values(11);
Query OK, 1 row affected (0.15 sec)
```

- Select the current number of rows:

```
mysql> select count(1) from t1;
+-----+
-----+
```

```
| count(1) |  
+-----+  
|          1 |  
+-----+  
1 row in set (0.07 sec)
```

- The same from the MySQL client pointing to SQL node on server2

```
[root@server2 ~]# mysql  
mysql> select count(1) from test.t1;  
+-----+  
| count(1) |  
+-----+  
|          1 |  
+-----+  
1 row in set (0.08 sec)
```



## Configuring MaxScale for connection load balancing of SQL nodes

Add these sections in MaxScale.cnf config file:

```
[Cluster Service]
type=service
router=readconnroute
router_options=ndb
servers=server1,server2
user=test
passwd=test
version_string=5.5.37-CLUSTER
```

```
[Cluster Listener]
type=listener
service=Cluster Service
protocol=MySQLClient
port=4906
```

```
[NDB Cluster Monitor]
type=monitor
module=ndbclustermon
servers=server1,server2
user=monitor
passwd=monitor
monitor_interval=8000
```

```
[server1]
# SQL node1
type=server
address=127.0.0.1
port=3306
```

```
protocol=MySQLBackend
```

```
[server2]  
#SQL node2  
type=server  
address=162.243.90.81  
port=3306  
protocol=MySQLBackend
```

**Assuming MaxScale is installed in server1, start it**

```
[root@server1 ~]# cd /usr/local/skysql/maxscale/bin  
[root@server1 bin]# ./maxscale -c ../
```

**Using the debug interface it's possible to check the status of monitored servers**

```
MaxScale> show monitors
```

```
Monitor: 0x387b880
```

```
    Name:      NDB Cluster Monitor  
    Monitor running  
    Sampling interval: 8000 milliseconds  
    Monitored servers: 127.0.0.1:3306, 162.243.90.81:3306
```

```
MaxScale> show servers
```

```
Server 0x3873b40 (server1)
```

```
    Server:      127.0.0.1  
    Status:      NDB, Running  
    Protocol:    MySQLBackend  
    Port:        3306  
    Server Version: 5.5.38-ndb-7.2.17-cluster-gpl  
    Node Id:     22  
    Master Id:    -1  
    Repl Depth:  0  
    Number of connections: 0  
    Current no. of conns: 0  
    Current no. of operations: 0
```

```
Server 0x3873a40 (server2)
```

```
    Server:      162.243.90.81  
    Status:      NDB, Running  
    Protocol:    MySQLBackend  
    Port:        3306
```



```
Server Version:          5.5.38-ndb-7.2.17-cluster-gpl
Node Id:                 23
Master Id:               -1
Repl Depth:              0
Number of connections:   0
Current no. of conns:    0
Current no. of operations: 0
```

It's now possible to run basic tests with the read connection load balancing for the two configured SQL nodes

(1) test MaxScale load balancing requesting the Ndb\_cluster\_node\_id variable:

```
[root@server1 ~]# mysql -h 127.0.0.1 -P 4906 -u test -ptest -e "SHOW
STATUS LIKE 'Ndb_cluster_node_id'"
+-----+-----+
| Variable_name      | Value |
+-----+-----+
| Ndb_cluster_node_id | 23    |
+-----+-----+
```

```
[root@server1 ~]# mysql -h 127.0.0.1 -P 4906 -u test -ptest -e "SHOW
STATUS LIKE 'Ndb_cluster_node_id'"
+-----+-----+
| Variable_name      | Value |
+-----+-----+
| Ndb_cluster_node_id | 22    |
+-----+-----+
```

The MaxScale connection load balancing is working.

(2) test a select statement on an NDBCLUSTER table, database test and table t1 created before:

```
[root@server1 ~]# mysql -h 127.0.0.1 -P 4906 -u test -ptest -e "SELECT
COUNT(1) FROM test.t1"
```



```
+-----+
| COUNT(1) |
+-----+
|         1 |
+-----+
```

### (3) test an insert statement

```
mysql -h 127.0.0.1 -P 4906 -utest -ptest -e "INSERT INTO test.t1
VALUES (19)"
```

### (4) test again the select and check the number of rows

```
[root@server1 ~] mysql -h 127.0.0.1 -P 4906 -utest -ptest -e "SELECT
COUNT(1) FROM test.t1"
```

```
+-----+
| COUNT(1) |
+-----+
|         2 |
+-----+
```