MySQL Cluster

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MySQLCluster sur docker

Nous allons mettre en place un cluster MySQL basé sur MySQL Cluster.

Mise en place du réseau

```
docker network create cluster --subnet=192.168.0.0/16
```

Puis récupérons les fichiers ou recopier les fichier de configuration:

```
https://github.com/mysql/mysql-docker/tree/mysql-cluster
```

Le fichier my.cnf est ainsi:

```
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[mysqld]
ndbcluster
ndb-connectstring=192.168.0.2
user=mysql

[mysql_cluster]
ndb-connectstring=192.168.0.2
```

et le fichier mysqlcluster.cnf

```
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[ndbd default]
NoOfReplicas=2
DataMemory=80M
IndexMemory=18M


[ndb_mgmd]
NodeId=1
hostname=192.168.0.2
datadir=/var/lib/mysql

[ndbd]
NodeId=2
hostname=192.168.0.3
datadir=/var/lib/mysql

[ndbd]
NodeId=3
hostname=192.168.0.4
datadir=/var/lib/mysql

[mysqld]
NodeId=4
hostname=192.168.0.10
```

Lancement du noeud de management

```
docker run -d --net=cluster --name=management1 --ip=192.168.0.2 mysql/mysql-cluster ndb_mgmd
```

Puis lancons les noeud de données:

```
docker run -d --net=cluster --name=ndb1 --ip=192.168.0.3 mysql/mysql-cluster ndbd
docker run -d --net=cluster --name=ndb2 --ip=192.168.0.4 mysql/mysql-cluster ndbd
```

Et enfin on peux executer le noeud SQL:

```
docker run -d --net=cluster --name=mysql1 --ip=192.168.0.10 -e MYSQL_RANDOM_ROOT_PASSWORD=true
mysql/mysql-cluster mysqld
```

Ce noeud va générer un password aléatoire :

```
docker logs mysql1 2>&1 | grep PASSWORD
[Entrypoint] GENERATED ROOT PASSWORD: =EbISQomAxvOmnam4d9EJigIjwA
```

Changement du mot de passe:

```
docker exec -it mysql1 mysql -uroot -p
Enter password:
Welcome to the MySQL monitor.  Commands end with ; or \g.
Your MySQL connection id is 8
Server version: 5.7.30-ndb-7.6.14-cluster-gpl MySQL Cluster Community Server (GPL)

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owners.

Type 'help;' or '\h' for help.  Type '\c' to clear the current input statement.

mysql> ALTER USER 'root'@'localhost' IDENTIFIED BY 'MyNewPass';
Query OK, 0 rows affected (0.06 sec)
```

Le management du cluster se fait via :

```
docker run -it --net=cluster mysql/mysql-cluster ndb_mgm
```

La modification du fichier mysqlcluster.cnf permet de rajouter un noeud de donnée et de relancer

```
docker run -d --net=cluster --name=management1 --ip=192.168.0.2 -v
/home/pilou/Formation/cluster/mysql-cluster.cnf:/etc/mysql-cluster.cnf mysql/mysql-cluster
ndb_mgmd
9ac595c65ddf47568f20fa835e10d45d0e7adcaf40bab818ac94b9afd20524ec
pilou@pilou-pc:~/Formation/cluster$ docker logs management1[Entrypoint] MySQL Docker Image
7.6.14-1.1.16-cluster
[Entrypoint] Starting ndb_mgmd
MySQL Cluster Management Server mysql-5.7.30 ndb-7.6.14
2020-06-09 20:25:07 [MgmtSrvr] INFO     -- The default config directory '/usr/mysql-cluster'
does not exist. Trying to create it...
2020-06-09 20:25:07 [MgmtSrvr] INFO     -- Sucessfully created config directory
2020-06-09 20:25:07 [MgmtSrvr] WARNING  -- at line 19: [DB] IndexMemory is deprecated, will
use Number bytes on each ndbd(DB) node allocated for storing indexes instead
2020-06-09 20:25:07 [MgmtSrvr] INFO     -- Got initial configuration from '/etc/mysql-
cluster.cnf', will try to set it when all ndb_mgmd(s) started
2020-06-09 20:25:07 [MgmtSrvr] INFO     -- Node 1: Node 1 Connected
2020-06-09 20:25:07 [MgmtSrvr] INFO     -- Id: 1, Command port: *:1186
==INITIAL==
2020-06-09 20:25:07 [MgmtSrvr] INFO     -- MySQL Cluster Management Server mysql-5.7.30 ndb-
7.6.14 started
2020-06-09 20:25:08 [MgmtSrvr] INFO     -- Node 1 connected
2020-06-09 20:25:08 [MgmtSrvr] INFO     -- Starting initial configuration change
2020-06-09 20:25:08 [MgmtSrvr] INFO     -- Configuration 1 commited
2020-06-09 20:25:08 [MgmtSrvr] INFO     -- Config change completed! New generation: 1
==CONFIRMED==
```

Outil NDB

- ndbinfo_select_all - Sélection dans les tables ndbinfo
- ndbmtd - Le démon de nœud de données de cluster NDB (multi-thread)
- ndb_mgmd - Le démon du serveur de gestion de cluster NDB
- ndb_mgm - Le client de gestion de cluster NDB

- ndb_blob_tool - Vérifie et répare les colonnes BLOB et TEXT des tables de cluster NDB
- ndb_config - Extraire les informations de configuration du cluster NDB
- ndb_cpcd - Tests automatiques pour le développement NDB
- ndb_delete_all - Supprime toutes les lignes d'une table NDB
- ndb_desc - Décrit les tables NDB
- ndb_drop_index - Supprime l'index d'une table NDB
- ndb_drop_table - Supprime une table NDB
- ndb_error_reporter - Utilitaire de rapport d’erreurs NDB
- ndb_import - Importer des données CSV dans le NDB

Sizing

Executer

```
perl ./bin/ndb_size.pl --socket /tmp/mysql.sock --user=root --password=piloupilou </source>
   Parameter           Default              4.1               5.0               5.1
          NoOfAttributes              1000             3676*             3676*             3676*
   NoOfUniqueHashIndexes                64                0                 0                 0
         IndexMemory (KB)             18432             4592              3568              3568
      NoOfOrderedIndexes               128              233*              233*              233*
         DataMemory (KB)             81920            55328             55328             52736
            NoOfTriggers               768             1985*             1985*             1985*
              NoOfTables               128              438*              438*              438*
```

Fichier de configuration conseillé:

LE fichier suivant est un fichier config.ini correct pour la plupart des cluster:

[tcp default] SendBufferMemory=2M ReceiveBufferMemory=2M

[ndb_mgmd default] datadir=X

[ndbd default]

1. redundancy:

NoOfReplicas=2

1. avoid swapping:

LockPagesInMainMemory=1

1. Bypass FS cache (you should test if this works for you or not)

Odirect=1

1. DataMemory (memory for records and ordered indexes)

DataMemory=2048M

1. IndexMemory (memory for Primary key hash index and unique hash index)
2. Usually between 1/6 or 1/8 of the DataMemory is enough, but depends on the
3. number of unique hash indexes (UNIQUE in table def)

IndexMemory=256M

1. Redolog
2. size of each redo log fragment, 4 redo log fragment makes up on fragment log file.
3. A bigger Fragment log file size thatn the default 16M works better with high write load
4. and is strongly recommended!!

FragmentLogFileSize=256M

1. Set NoOfFragmentLogFiles to 6xDataMemory [in MB]/(4 *FragmentLogFileSize [in MB]
2. Thus, NoOfFragmentLogFiles=6*2048/1024=12
3. The "6xDataMemory" is a good heuristic and is STRONGLY recommended.

NoOfFragmentLogFiles=12

1. RedoBuffer of 32M should let you restore/provisiong quite a lot of data in parallel.
2. If you still have problems ("out of redobuffer"), then you probably have to slow disks and
3. increasing this will not help, but only postpone the inevitable.

RedoBuffer=32M

1. table related things

MaxNoOfTables=4096 MaxNoOfAttributes=24756 MaxNoOfOrderedIndexes=2048
MaxNoOfUniqueHashIndexes=512

1. Operation records
2. MaxNoOfConcurrentOperations=100000 means that you can load any mysqldump file into cluster.

MaxNoOfConcurrentOperations=100000

1. Checkpointing...

Diskcheckpointspeed=10M Diskcheckpointspeedinrestart=100M
TimeBetweenGlobalCheckpoints=1000

1. the default value for TimeBetweenLocalCheckpoints is very good

TimeBetweenLocalCheckpoints=20

1. Realtime extensions (only in MySQL Cluster 6.3 (CGE 6.3) , read this how to use this)
2. SchedulerSpinTimer=400
3. SchedulerExecutionTimer=100
4. RealTimeScheduler=1
5. LockMaintThreadsToCPU=[cpuid]
6. LockExecuteThreadToCPU=[cpuid]

1. If you use MySQL Cluster 6.3 (CGE 6.3) and are tight on disk space, e.g ATCA.
2. You should also then lock cpu's to a particular core.
3. CompressedLCP=1
4. CompressedBackup=1

datadir=X

[ndb_mgmd] hostname=...

1. second management server for redundancy
2. [ndb_mgmd]
3. hostname=...

[ndbd] hostname=...

[ndbd] hostname=...

[mysqld]

...

[mysqld]

MySQL Cluster On Premisse

Télécharger https://dev.mysql.com/get/Downloads/MySQL-Cluster-8.0/mysql-cluster-8.0.27-linux-glibc2.12-x86_64.tar.gz

puis:

```
tar xvf mysql-cluster-8.0.27-linux-glibc2.12-x86_64.tar.gz
```

Pour un premier cluster, commencez avec un seul serveur MySQL (mysqld), une paire de nœuds de données (ndbd) et un seul nœud de gestion (ndb_mgmd) – tous exécutés sur le même serveur. Créez des dossiers pour stocker les fichiers de configuration et les fichiers de données :

```
mkdir my_cluster my_cluster/ndb_data my_cluster/mysqld_data my_cluster/conf
```

Dans le dossier conf, créez 2 fichiers (notez que "/home/user1" doit être remplacé par votre répertoire personnel).

my.cnf

```
[mysqld]
ndbcluster
datadir=/home/pilou/Formation/my_cluster/mysqld_data
basedir=/home/pilou/Formation/mysql-cluster-8.0.27-linux-glibc2.12-x86_64
log-error=/home/pilou/Formation/my_cluster/logdir/mysqld.log
log-bin=/home/pilou/Formation/my_cluster/logdir/mysqlbin.log
port=5000
```

config.ini

```
[ndb_mgmd]
hostname=localhost
datadir=/home/pilou/Formation/my_cluster/ndb_data
NodeId=1

[ndbd default]
```

```
noofreplicas=2
datadir=/home/pilou/Formation/my_cluster/ndb_data
[ndbd]
hostname=localhost
NodeId=3
[ndbd]
hostname=localhost
NodeId=4
[mysqld]
NodeId=50
```

Tout comme n'importe quel autre serveur MySQL, le processus mysqld nécessite qu'une base de données « mysql » soit créée et remplie avec les données système essentielles :

```
/home/pilou/Formation/mysql-cluster-8.0.27-linux-glibc2.12-x86_64/bin/mysqld --initialize-insecure  --datadir=/home/pilou/Formation/my_cluster/mysqld_data --log-error=/home/pilou/Formation/my_cluster/logdir/error.log --basedir=/home/pilou/Formation/mysql-cluster-8.0.27-linux-glibc2.12-x86_64
```

Les processus doivent être démarrés dans l'ordre du nœud de gestion, des nœuds de données, puis du serveur MySQL :

```
/home/pilou/Formation/mysql-cluster-8.0.27-linux-glibc2.12-x86_64/bin/ndb_mgmd -f /home/pilou/Formation/my_cluster/conf/config.ini --initial --configdir=/home/pilou/Formation/my_cluster/conf/
```

```
/home/pilou/Formation/mysql-cluster-8.0.27-linux-glibc2.12-x86_64/bin/ndbd -c localhost:1186 --foreground
/home/pilou/Formation/mysql-cluster-8.0.27-linux-glibc2.12-x86_64/bin/ndbd -c localhost:1186 --foreground
```

```
/home/pilou/Formation/mysql-cluster-8.0.27-linux-glibc2.12-x86_64/bin/mysqld --defaults-file=/home/pilou/Formation/my_cluster/conf/my.cnf
```

```
ndb_mgm> show;
Cluster Configuration
---------------------
[ndbd(NDB)]     2 node(s)
id=3    @127.0.0.1  (mysql-8.0.27 ndb-8.0.27, Nodegroup:  0)
```

```
id=4    @127.0.0.1  (mysql-8.0.27 ndb-8.0.27, Nodegroup: 0, *)

[ndb_mgmd(MGM)] 1 node(s)
id=1    @127.0.0.1  (mysql-8.0.27 ndb-8.0.27)

[mysqld(API)]   1 node(s)
id=50   @127.0.0.1  (mysql-8.0.27 ndb-8.0.27)
```