Fonctions avancées de l'administration

- MySQLd Multi
- Tuning InnoDB
- Mysql Query Rewriter
- my.ini

MySQLd Multi

Lors de la mise en place de la replication, il est interessant de pouvoir lancer plusieurs MySQL en une fois. L'utilitaire mysql_multi est la pour ca La première étape de la configuration de mysqld_multi est la création de deux groupes [mysqld] distincts dans le fichier my.cnf existant.

Assurez-vous que l'utilisateur MySQL, qui arrête les services mysqld, a le même mot de passe pour tous les serveurs MySQL accessibles par mysqld_multi.

Cet utilisateur doit avoir le privilège 'Shutdown_priv', mais pour des raisons de sécurité raisons ne devraient pas avoir d'autres privilèges. Il est conseillé de créer un utilisateur 'multi_admin' commun à tous les serveurs MySQL contrôlés par mysqld_multi.

```
GRANT SHUTDOWN ON *. * TO multi_admin @ localhost IDENTIFIÉ PAR 'password'
```

Sur les serveurs, il faut:

- Chaque serveur en nécessite un port TCP et un socket Unix unique.
- Chaque serveur doit avoir un datadir différents

Creation des serveurs

```
pilou@pilou-pc:~/Formation/mysql-8.0.20-linux-glibc2.12-x86_64$ ./bin/mysqld --initialize --basedir=/home/pilou/Formation/mysql-8.0.20-linux-glibc2.12-x86_64 --datadir=/home/pilou/Formation/mysqld_multi/data1 --log-error=/home/pilou/Formation/mysqld_multi/logerror1
pilou@pilou-pc:~/Formation/mysql-8.0.20-linux-glibc2.12-x86_64$ ./bin/mysqld --initialize --basedir=/home/pilou/Formation/mysql-8.0.20-linux-glibc2.12-x86_64 --datadir=/home/pilou/Formation/mysqld_multi/data2 --log-error=/home/pilou/Formation/mysqld_multi/logerror2
```

Sur chaque serveur, on modifie le mot de passe de root et on crée l'utilisateur multi_admin

```
mysql> ALTER USER 'root'@'localhost'  IDENTIFIED BY 'piloupilou'
    -> ;
Query OK, 0 rows affected (0.02 sec)

mysql> create user 'mysqlmulti'@'localhost'  IDENTIFIED BY 'mysqlmulti'
    -> ;
Query OK, 0 rows affected (0.02 sec)

mysql> GRANT SHUTDOWN ON *.* to 'mysqlmulti'@'localhost';
Query OK, 0 rows affected (0.02 sec)
```

Fichier de configuration.

Il faut ensuite créer le fichier de configuration pour mysqld_multi

```
[mysqld_multi]
mysqld = /home/pilou/Formation/mysql-8.0.20-linux-glibc2.12-x86_64/bin/mysqld
mysqladmin = /home/pilou/Formation/mysql-8.0.20-linux-glibc2.12-x86_64/bin/mysqladmin
log=/home/pilou/Formation/mysqld_multi/mysqld_multi.log
user = mysqlmulti
pass = mysqlmulti

[mysqld1]
port = 3306
mysqld = /home/pilou/Formation/mysql-8.0.20-linux-glibc2.12-x86_64/bin/mysqld
socket = /tmp/mysql.sock1
skip-external-locking
key_buffer_size = 16K
max_allowed_packet = 1M
table_open_cache = 4
sort_buffer_size = 64K
read_buffer_size = 256K
read_rnd_buffer_size = 256K
net_buffer_length = 2K
thread_stack = 128K
table_open_cache=500
datadir = "/home/pilou/Formation/mysqld_multi/data1"
pid-file = /home/pilou/Formation/mysqld_multi/data1/mysql1.pid
log-error=/home/pilou/Formation/mysqld_multi/logerror1.err
```

```
[mysqld2]
port = 3307
mysqld = /home/pilou/Formation/mysql-8.0.20-linux-glibc2.12-x86_64/bin/mysqld
socket = /tmp/mysql.sock2
skip-external-locking
key_buffer_size = 16K
max_allowed_packet = 1M
table_open_cache = 4
sort_buffer_size = 64K
read_buffer_size = 256K
read_rnd_buffer_size = 256K
net_buffer_length = 2K
thread_stack = 128K
table_open_cache=500
datadir = "/home/pilou/Formation/mysqld_multi/data2"
pid-file = /home/pilou/Formation/mysqld_multi/data2/mysql2.pid
log-error=/home/pilou/Formation/mysqld_multi/logerror2.err
```

Le lancement se fait ainsi

```
./bin/mysqld_multi --defaults-file=/home/pilou/Formation/mysql-8.0.20-linux-glibc2.12-
x86_64/mysqld_multi.ini  --verbose start 1
```

et l'arret

```
./bin/mysqld_multi --defaults-file=/home/pilou/Formation/mysql-8.0.20-linux-glibc2.12-
x86_64/mysqld_multi.ini  --verbose stop
```

Tuning InnoDB

Il est complexe de faire le tuning d'InnoDB.

Une facon de faire est de laisser mysqltuner, un outil client vérifier la configuration.

Soit un fichier my.ini de base

```
[mysqld]
basedir=/home/pilou/Formation/mysql-8.0.20-linux-glibc2.12-x86_64
datadir=/home/pilou/Formation/simpleinit/data
log-error=/home/pilou/Formation/simpleinit/mysqld.log
port = 3306
socket = /tmp/mysql.sock skip-external-locking
key_buffer_size = 16K
max_allowed_packet = 1M
table_open_cache = 4
sort_buffer_size = 64K
read_buffer_size = 256K
read_rnd_buffer_size = 256K
net_buffer_length = 2K
thread_stack = 128K
```

et executons mysqltuner au regard de ce fichier

```
wget https://raw.githubusercontent.com/major/MySQLTuner-perl/master/mysqltuner.pl
chmod +x mysqltuner.pl
wget https://raw.githubusercontent.com/major/MySQLTuner-perl/master/basic_passwords.txt -O
basic_passwords.txt
wget https://raw.githubusercontent.com/major/MySQLTuner-perl/master/vulnerabilities.csv -O
vulnerabilities.csv
```

Au premier run, nous avons:

```
/mysqltuner.pl --host 127.0.0.1 --user root --pass piloupilou
 >>  MySQLTuner 1.7.19 - Major Hayden <major@mhtx.net>
 >>  Bug reports, feature requests, and downloads at http://mysqltuner.com/
 >>  Run with '--help' for additional options and output filtering
```

```
[--] Skipped version check for MySQLTuner script
[--] Performing tests on 127.0.0.1:3306
[OK] Logged in using credentials passed on the command line
[OK] Currently running supported MySQL version 8.0.20
[OK] Operating on 64-bit architecture

-------- Log file Recommendations ------------------------------------------------------------------
[OK] Log file /home/pilou/Formation/simpleinit/mysqld.log exists
[--] Log file: /home/pilou/Formation/simpleinit/mysqld.log(11K)
[OK] Log file /home/pilou/Formation/simpleinit/mysqld.log is readable.
[OK] Log file /home/pilou/Formation/simpleinit/mysqld.log is not empty
[OK] Log file /home/pilou/Formation/simpleinit/mysqld.log is smaller than 32 Mb
[!!] /home/pilou/Formation/simpleinit/mysqld.log contains 8 warning(s).
[!!] /home/pilou/Formation/simpleinit/mysqld.log contains 25 error(s).
[--] 9 start(s) detected in /home/pilou/Formation/simpleinit/mysqld.log
[--] 1) 2020-05-28T20:09:32.463843Z 0 [System] [MY-010931] [Server]
/home/pilou/Formation/mysql-8.0.20-linux-glibc2.12-x86_64/bin/mysqld: ready for connections.
Version: '8.0.20'  socket: '/tmp/mysql.sock skip-external-locking'  port: 3306  MySQL
Community Server - GPL.
[--] 2) 2020-05-28T20:09:32.188942Z 0 [System] [MY-011323] [Server] X Plugin ready for
connections. Socket: '/tmp/mysqlx.sock' bind-address: '::' port: 33060
[--] 3) 2020-05-28T20:06:01.472567Z 0 [System] [MY-010931] [Server]
/home/pilou/Formation/mysql-8.0.20-linux-glibc2.12-x86_64/bin/mysqld: ready for connections.
Version: '8.0.20'  socket: '/tmp/mysql.sock skip-external-locking'  port: 0  MySQL Community
Server - GPL.
[--] 4) 2020-05-28T20:06:01.309759Z 0 [System] [MY-011323] [Server] X Plugin ready for
connections. Socket: '/tmp/mysqlx.sock'
[--] 5) 2020-05-28T19:56:56.960909Z 0 [System] [MY-010931] [Server]
/home/pilou/Formation/mysql-8.0.20-linux-glibc2.12-x86_64/bin/mysqld: ready for connections.
Version: '8.0.20'  socket: '/tmp/mysql.sock skip-external-locking'  port: 3306  MySQL
Community Server - GPL.
[--] 6) 2020-05-28T19:56:56.807408Z 0 [System] [MY-011323] [Server] X Plugin ready for
connections. Socket: '/tmp/mysqlx.sock' bind-address: '::' port: 33060
[--] 7) 2020-05-28T19:56:23.191817Z 0 [System] [MY-011323] [Server] X Plugin ready for
connections. Socket: '/tmp/mysqlx.sock'
[--] 8) 2020-05-11T21:03:33.700583Z 0 [System] [MY-010931] [Server]
/home/pilou/Formation/mysql-8.0.20-linux-glibc2.12-x86_64/bin/mysqld: ready for connections.
Version: '8.0.20'  socket: '/tmp/mysql.sock'  port: 3306  MySQL Community Server - GPL.
```

```
[--] 9) 2020-05-11T21:03:33.566923Z 0 [System] [MY-011323] [Server] X Plugin ready for
connections. Socket: '/tmp/mysqlx.sock' bind-address: '::' port: 33060
[--] 11 shutdown(s) detected in /home/pilou/Formation/simpleinit/mysqld.log
[--] 1) 2020-05-28T20:08:34.761588Z 0 [System] [MY-010910] [Server]
/home/pilou/Formation/mysql-8.0.20-linux-glibc2.12-x86_64/bin/mysqld: Shutdown complete
(mysqld 8.0.20)  MySQL Community Server - GPL.
[--] 2) 2020-05-28T20:08:12.745558Z 0 [System] [MY-010910] [Server]
/home/pilou/Formation/mysql-8.0.20-linux-glibc2.12-x86_64/bin/mysqld: Shutdown complete
(mysqld 8.0.20)  MySQL Community Server - GPL.
[--] 3) 2020-05-28T20:07:50.132900Z 0 [System] [MY-010910] [Server]
/home/pilou/Formation/mysql-8.0.20-linux-glibc2.12-x86_64/bin/mysqld: Shutdown complete
(mysqld 8.0.20)  MySQL Community Server - GPL.
[--] 4) 2020-05-28T20:05:52.370915Z 0 [System] [MY-010910] [Server]
/home/pilou/Formation/mysql-8.0.20-linux-glibc2.12-x86_64/bin/mysqld: Shutdown complete
(mysqld 8.0.20)  MySQL Community Server - GPL.
[--] 5) 2020-05-28T19:56:24.617889Z 0 [System] [MY-010910] [Server]
/home/pilou/Formation/mysql-8.0.20-linux-glibc2.12-x86_64/bin/mysqld: Shutdown complete
(mysqld 8.0.20)  MySQL Community Server - GPL.
[--] 6) 2020-05-11T21:21:48.880403Z 0 [System] [MY-010910] [Server]
/home/pilou/Formation/mysql-8.0.20-linux-glibc2.12-x86_64/bin/mysqld: Shutdown complete
(mysqld 8.0.20)  MySQL Community Server - GPL.
[--] 7) 2020-05-11T21:03:07.368654Z 0 [System] [MY-010910] [Server]
/home/pilou/Formation/mysql-8.0.20-linux-glibc2.12-x86_64/bin/mysqld: Shutdown complete
(mysqld 8.0.20)  MySQL Community Server - GPL.
[--] 8) 2020-05-11T21:02:10.209497Z 0 [System] [MY-010910] [Server]
/home/pilou/Formation/mysql-8.0.20-linux-glibc2.12-x86_64/bin/mysqld: Shutdown complete
(mysqld 8.0.20)  MySQL Community Server - GPL.
[--] 9) 2020-05-11T21:02:00.245998Z 0 [System] [MY-010910] [Server]
/home/pilou/Formation/mysql-8.0.20-linux-glibc2.12-x86_64/bin/mysqld: Shutdown complete
(mysqld 8.0.20)  MySQL Community Server - GPL.
[--] 10) 2020-05-11T21:01:56.588580Z 0 [System] [MY-010910] [Server]
/home/pilou/Formation/mysql-8.0.20-linux-glibc2.12-x86_64/bin/mysqld: Shutdown complete
(mysqld 8.0.20)  MySQL Community Server - GPL.

-------- Storage Engine Statistics
-------------------------------------------------------------------
[--] Status: +ARCHIVE +BLACKHOLE +CSV -FEDERATED +InnoDB +MEMORY +MRG_MYISAM +MyISAM
+PERFORMANCE_SCHEMA
[--] Data in InnoDB tables: 16.0K (Tables: 1)
[OK] Total fragmented tables: 0
```

```
-------- Analysis Performance Metrics
------------------------------------------------------------------
[--] innodb_stats_on_metadata: OFF
[OK] No stat updates during querying INFORMATION_SCHEMA.

-------- Security Recommendations
------------------------------------------------------------------
[--] Skipped due to unsupported feature for MySQL 8

-------- CVE Security Recommendations
------------------------------------------------------------------
[OK] NO SECURITY CVE FOUND FOR YOUR VERSION

-------- Performance Metrics
------------------------------------------------------------------------
[--] Up for: 14m 50s (102 q [0.115 qps], 43 conn, TX: 254K, RX: 11K)
[--] Reads / Writes: 100% / 0%
[--] Binary logging is enabled (GTID MODE: OFF)
[--] Physical Memory     : 2.9G
[--] Max MySQL memory    : 452.6M
[--] Other process memory: 0B
[--] Total buffers: 160.0M global + 1.9M per thread (151 max threads)
[--] P_S Max memory usage: 72B
[--] Galera GCache Max memory usage: 0B
[OK] Maximum reached memory usage: 163.9M (5.48% of installed RAM)
[OK] Maximum possible memory usage: 452.6M (15.12% of installed RAM)
[OK] Overall possible memory usage with other process is compatible with memory available
[OK] Slow queries: 0% (0/102)
[OK] Highest usage of available connections: 1% (2/151)
[OK] Aborted connections: 0.00%  (0/43)
[!!] name resolution is active : a reverse name resolution is made for each new connection and
can reduce performance
[--] Query cache have been removed in MySQL 8
[OK] Sorts requiring temporary tables: 0% (0 temp sorts / 7 sorts)
[OK] No joins without indexes
[!!] Temporary tables created on disk: 52% (12 on disk / 23 total)
[OK] Thread cache hit rate: 95% (2 created / 43 connections)
[!!] Table cache hit rate: 0% (1 open / 6K opened)
[OK] table_definition_cache(402) is upper than number of tables(311)
```

```
[OK] Open file limit used: 0% (2/5K)
[OK] Table locks acquired immediately: 100% (8 immediate / 8 locks)
[OK] Binlog cache memory access: 100.00% (1 Memory / 1 Total)

-------- Performance schema
------------------------------------------------------------------------
[--] Memory used by P_S: 72B
[--] Sys schema is installed.

-------- ThreadPool Metrics
------------------------------------------------------------------------
[--] ThreadPool stat is disabled.

-------- MyISAM Metrics
------------------------------------------------------------------------
[--] MyISAM Metrics are disabled on last MySQL versions.

-------- InnoDB Metrics
------------------------------------------------------------------------
[--] InnoDB is enabled.
[--] InnoDB Thread Concurrency: 0
[OK] InnoDB File per table is activated
[OK] InnoDB buffer pool / data size: 128.0M/16.0K
[!!] Ratio InnoDB log file size / InnoDB Buffer pool size (75 %): 48.0M * 2/128.0M should be
equal to 25%
[OK] InnoDB buffer pool instances: 1
[--] Number of InnoDB Buffer Pool Chunk : 1 for 1 Buffer Pool Instance(s)
[OK] Innodb_buffer_pool_size aligned with Innodb_buffer_pool_chunk_size &
Innodb_buffer_pool_instances
[OK] InnoDB Read buffer efficiency: 97.89% (40289 hits/ 41156 total)
[OK] InnoDB Write log efficiency: 96.15% (4891 hits/ 5087 total)
[OK] InnoDB log waits: 0.00% (0 waits / 196 writes)

-------- AriaDB Metrics
------------------------------------------------------------------------
[--] AriaDB is disabled.

-------- TokuDB Metrics
------------------------------------------------------------------------
[--] TokuDB is disabled.
```

```
-------- XtraDB Metrics
-----------------------------------------------------------------------------
[--] XtraDB is disabled.

-------- Galera Metrics
-----------------------------------------------------------------------------
[--] Galera is disabled.

-------- Replication Metrics
-------------------------------------------------------------------
[--] Galera Synchronous replication: NO
[--] No replication slave(s) for this server.
[--] Binlog format: ROW
[--] XA support enabled: ON
[--] Semi synchronous replication Master: Not Activated
[--] Semi synchronous replication Slave: Not Activated
[--] This is a standalone server

-------- Recommendations
-----------------------------------------------------------------------------
General recommendations:
    Control warning line(s) into /home/pilou/Formation/simpleinit/mysqld.log file
    Control error line(s) into /home/pilou/Formation/simpleinit/mysqld.log file
    MySQL was started within the last 24 hours - recommendations may be inaccurate
    Configure your accounts with ip or subnets only, then update your configuration with skip-
name-resolve=1
    When making adjustments, make tmp_table_size/max_heap_table_size equal
    Reduce your SELECT DISTINCT queries which have no LIMIT clause
    Increase table_open_cache gradually to avoid file descriptor limits
    Read this before increasing table_open_cache over 64: https://bit.ly/2Fulv7r
    Read this before increasing for MariaDB https://mariadb.com/kb/en/library/optimizing-
table_open_cache/
    This is MyISAM only table_cache scalability problem, InnoDB not affected.
    See more details here: https://bugs.mysql.com/bug.php?id=49177
    This bug already fixed in MySQL 5.7.9 and newer MySQL versions.
    Beware that open_files_limit (5000) variable
    should be greater than table_open_cache (4)
    Before changing innodb_log_file_size and/or innodb_log_files_in_group read this:
https://bit.ly/2TcGgtU
```

```
Variables to adjust:
    tmp_table_size (> 16M)
    max_heap_table_size (> 16M)
    table_open_cache (> 4)
    innodb_log_file_size should be (=16M) if possible, so InnoDB total log files size equals
to 25% of buffer pool size.
```

Ajustement 1

Il n'est pas nécéssaire de charger des moteurs de stockage inutile dans la base de donnée:

`Status: +ARCHIVE +BLACKHOLE +CSV -FEDERATED +InnoDB +MEMORY +MRG_MYISAM +MyISAM +PERFORMANCE_SCHEMA`

On rajoute dans le fichier my.ini

```
disabled_storage_engines="ARCHIVE,BLACKHOLE,CSV,FEDERATED,MEMORY,MRG_MYISAM,MyISAM"
default_storage_engine=InnoDB
```

```
[mysqld]
# Required Settings
basedir=/home/pilou/Formation/mysql-8.0.20-linux-glibc2.12-x86_64
datadir=/home/pilou/Formation/simpleinit/data
log-error=/home/pilou/Formation/simpleinit/mysqld.log
bind_address                    = 127.0.0.1 # Change to 0.0.0.0 to allow remote connections
max_allowed_packet              = 256M
max_connect_errors              = 1000000
pid_file                        = /tmp/mysqld.pid
port                            = 3306
skip_external_locking
skip_name_resolve
socket                          = /tmp/mysqld.sock
```

```
# Enable for b/c with databases created in older MySQL/MariaDB versions (e.g. when using null dates)
#sql_mode                       = ERROR_FOR_DIVISION_BY_ZERO,NO_AUTO_CREATE_USER,NO_ENGINE_SUBSTITUTION,ONLY_FULL_GROUP_BY,STRICT_TRANS_TABLES

tmpdir                          = /tmp

# InnoDB Settings
default_storage_engine          = InnoDB
innodb_buffer_pool_instances    = 2     # Use 1 instance per 1GB of InnoDB pool size
innodb_buffer_pool_size         = 2G    # Use up to 70-80% of RAM
innodb_file_per_table           = 1
innodb_flush_log_at_trx_commit  = 0
innodb_flush_method             = O_DIRECT
innodb_log_buffer_size          = 16M
innodb_log_file_size            = 512M
innodb_stats_on_metadata        = 0

#innodb_temp_data_file_path     = ibtmp1:64M:autoextend:max:20G # Control the maximum size for the ibtmp1 file
#innodb_thread_concurrency      = 4     # Optional: Set to the number of CPUs on your system (minus 1 or 2) to better
                                        # contain CPU usage. E.g. if your system has 8 CPUs, try 6 or 7 and check
                                        # the overall load produced by MySQL/MariaDB.
innodb_read_io_threads          = 64
innodb_write_io_threads         = 64

# MyISAM Settings

#query_cache_limit               = 4M    # UPD - Option supported by MariaDB & up to MySQL 5.7, remove this line on MySQL 8.x
#query_cache_size                = 64M   # UPD - Option supported by MariaDB & up to MySQL 5.7, remove this line on MySQL 8.x
#query_cache_type                = 1     # Option supported by MariaDB & up to MySQL 5.7, remove this line on MySQL 8.x

key_buffer_size                 = 32M   # UPD
```

```
low_priority_updates            = 1
concurrent_insert               = 2

# Connection Settings
max_connections                 = 100   # UPD

back_log                        = 512
thread_cache_size               = 100
thread_stack                    = 192K

interactive_timeout             = 180
wait_timeout                    = 180

# For MySQL 5.7+ only (disabled by default)
#max_execution_time             = 30000 # Set a timeout limit for SELECT statements (value in
milliseconds).
                                        # This option may be useful to address aggressive
crawling on large sites,
                                        # but it can also cause issues (e.g. with backups). So
use with extreme caution and test!
                                        # More info at:
https://dev.mysql.com/doc/refman/5.7/en/server-system-variables.html#sysvar_max_execution_time

# For MariaDB 10.1.1+ only (disabled by default)
#max_statement_time             = 30    # The equivalent of "max_execution_time" in MySQL 5.7+
(set above)
                                        # The variable is of type double, thus you can use
subsecond timeout.
                                        # For example you can use value 0.01 for 10
milliseconds timeout.
                                        # More info at: https://mariadb.com/kb/en/aborting-
statements/

# Buffer Settings
join_buffer_size                = 4M    # UPD
read_buffer_size                = 3M    # UPD
read_rnd_buffer_size            = 4M    # UPD
sort_buffer_size                = 4M    # UPD
```

```
# Table Settings
# In systemd managed systems like Ubuntu 16.04+ or CentOS 7+, you need to perform an extra
action for table_open_cache & open_files_limit
# to be overriden (also see comment next to open_files_limit).
# E.g. for MySQL 5.7, please check: https://dev.mysql.com/doc/refman/5.7/en/using-systemd.html
# and for MariaDB check: https://mariadb.com/kb/en/library/systemd/
table_definition_cache          = 40000 # UPD
table_open_cache                = 40000 # UPD
open_files_limit                = 60000 # UPD - This can be 2x to 3x the table_open_cache
value or match the system's
                                        # open files limit usually set in /etc/sysctl.conf or
/etc/security/limits.conf
                                        # In systemd managed systems this limit must also be
set in:
                                        # /etc/systemd/system/mysqld.service.d/override.conf
(for MySQL 5.7+) and
                                        # /etc/systemd/system/mariadb.service.d/override.conf
(for MariaDB)

max_heap_table_size             = 128M
tmp_table_size                  = 128M

# Search Settings
ft_min_word_len                 = 3     # Minimum length of words to be indexed for search
results

# Logging
log_queries_not_using_indexes   = 1
long_query_time                 = 5
slow_query_log                  = 0     # Disabled for production
slow_query_log_file             = /home/pilou/Formation/simpleinit/mysql_slow.log

[mysqldump]
# Variable reference
# For MySQL 5.7: https://dev.mysql.com/doc/refman/5.7/en/mysqldump.html
# For MariaDB:   https://mariadb.com/kb/en/library/mysqldump/
quick
quote_names
max_allowed_packet              = 64M
```

Mysql Query Rewriter

Pour installer le plug-in de réécriture de requête Rewriter, exécutez install_rewriter.sql situé dans le répertoire de share de votre installation MySQL.

```
mysql -h localhost -u root --protocol=tcp -p < /home/pilou/Formation/mysql-8.0.20-linux-glibc2.12-x86_64/share/install_rewriter.sql
```

L'installation se constate :

```
mysql> SELECT * FROM mysql.plugin;
+----------+-------------+
| name     | dl          |
+----------+-------------+
| rewriter | rewriter.so |
+----------+-------------+
1 row in set (0.00 sec)

mysql> SHOW GLOBAL VARIABLES LIKE 'rewriter%';
+------------------+-------+
| Variable_name    | Value |
+------------------+-------+
| rewriter_enabled | ON    |
| rewriter_verbose | 1     |
+------------------+-------+
2 rows in set (0.00 sec)
```

La table rewrite_rules est une table persistante pour le plugin query_rewrite:

```
mysql> SHOW CREATE TABLE query_rewrite.rewrite_rules\G
*************************** 1. row ***************************
       Table: rewrite_rules
Create Table: CREATE TABLE `rewrite_rules` (
  `id` int NOT NULL AUTO_INCREMENT,
```

```
  `pattern` varchar(5000) CHARACTER SET utf8mb4 COLLATE utf8mb4_bin NOT NULL,
  `pattern_database` varchar(20) CHARACTER SET utf8mb4 COLLATE utf8mb4_bin DEFAULT NULL,
  `replacement` varchar(5000) CHARACTER SET utf8mb4 COLLATE utf8mb4_bin NOT NULL,
  `enabled` enum('YES','NO') CHARACTER SET utf8mb4 COLLATE utf8mb4_bin NOT NULL DEFAULT 'YES',
  `message` varchar(1000) CHARACTER SET utf8mb4 COLLATE utf8mb4_bin DEFAULT NULL,
  `pattern_digest` varchar(64) DEFAULT NULL,
  `normalized_pattern` varchar(100) DEFAULT NULL,
  PRIMARY KEY (`id`)
) ENGINE=InnoDB DEFAULT CHARSET=utf8mb4 COLLATE=utf8mb4_0900_ai_ci
1 row in set (0.01 sec)
```

Vous pouvez activer le plugin soit via le my.ini soit

```
mysql> SET GLOBAL rewriter_enabled = ON;


mysql> SET GLOBAL rewriter_enabled = OFF;
```

Le plug-in de réécriture ne fonctionne qu'avec les instructions SELECT.

Commencons avec un exemple:

```
mysql> INSERT INTO query_rewrite.rewrite_rules (pattern, replacement) VALUES('SELECT ?',
'SELECT ? + 1');
```

Il est possible de les afficher sachant quel ne sont pas "compilé"

```
mysql> SELECT * FROM query_rewrite.rewrite_rules\G
*************************** 1. row ***************************
                id: 1
           pattern: SELECT ?
  pattern_database: NULL
       replacement: SELECT ? + 1
           enabled: YES
           message: NULL
    pattern_digest: NULL
normalized_pattern: NULL
1 row in set (0.00 sec)
```

Puis nous allons les compiler:

```
mysql> CALL query_rewrite.flush_rewrite_rules();
Query OK, 1 row affected (0.01 sec)

mysql> SELECT * FROM query_rewrite.rewrite_rules\G
*************************** 1. row ***************************
                id: 1
           pattern: SELECT ?
  pattern_database: NULL
       replacement: SELECT ? + 1
           enabled: YES
           message: NULL
    pattern_digest: d1b44b0c19af710b5a679907e284acd2ddc285201794bc69a2389d77baedddae
normalized_pattern: select ?
1 row in set (0.00 sec)
```

La requete est ainsi mise :

```
mysql> select 1;
+-------+
| 1 + 1 |
+-------+
|     2 |
+-------+
1 row in set, 1 warning (0.00 sec)
```

Usage 1: Optimization

Pour des raisons de performances, il est parfois souhaitable de réécrire une requete sans pouvoir le faire

-> SELECT count(distinct emp_no) FROM employees.employees INNER JOIN employees.salaries USING(emp_no) WHERE DATEDIFF(to_date, from_date) < {integer};

<= SELECT count(emp_no) FROM employees.employees WHERE emp_no IN (SELECT emp_no FROM employees.salaries WHERE DATEDIFF(to_date, from_date) < {integer});

```
INSERT INTO query_rewrite.rewrite_rules
(
pattern,
replacement
)
VALUES
(
'SELECT count(distinct emp_no) FROM employees.employees INNER JOIN employees.salaries
USING(emp_no) WHERE DATEDIFF(to_date, from_date) < ?',
'SELECT count(emp_no) FROM employees.employees WHERE emp_no IN ( SELECT emp_no FROM
employees.salaries WHERE DATEDIFF(to_date, from_date) < ?)'
);


CALL query_rewrite.flush_rewrite_rules();
```

Usage 2: Optimization

Il est possible de rajouter des optimizations en commentaires dans le SQL de MySQL. Par exemple,

-> SELECT count(distinct emp_no) FROM employees.employees INNER JOIN employees.salaries USING(emp_no) WHERE salary = {integer};

<= SELECT /*+ MAX_EXECUTION_TIME(10000)*/ count(distinct emp_no) FROM employees.employees INNER JOIN employees.salaries USING(emp_no) WHERE salary = {integer};

my.ini

Le but de ce chapitre est de mettre en place un bon fichier my.ini

En premier lieu, on regarde la mémoire libre ainsi que le nombre de processeur

```
cat /proc/meminfo
MemTotal:        3064328 kB
MemFree:          697228 kB
MemAvailable:    1337368 kB

cat /proc/cpuinfo
2 processeur
```

Regardons ensuite le nombre de tables (nous prenons ici l'exemple de https://dev.mysql.com/doc/employee/en/employees-installation.html)

Remplissons la et faisons les requetes automatiques

```
mysql < employees.sql
mysql -t < test_employees_md5.sql
```

Configuration réseau et de base

```
bind_address                    = 127.0.0.1 # mettre  0.0.0.0 pour les connexions distantes
max_allowed_packet              = 256M # taille d'un packet de donnée
max_connect_errors              = 1000000 # eviction d'un client apres max_connect_errors
skip_external_locking # pour MyISAM desaloue les lock systeme
skip_name_resolve # pas de résolution DNS
sql_mode                       ="NO_ENGINE_SUBSTITUTION,STRICT_TRANS_TABLES"
tmpdir                          = /tmp
#user                            = mysql En cas d'installation en mode service, il faut
préciser l'utilisateur qui execute le service
```

Parametrage du nombre de connexion:

Cela est issue au runtime de :

show status like '%connected%'

et faire

```
max_connections                = 151                                    # nombre de connexion
maximal
max_user_connections           = 145                                    # nombre de connexion
pour un utilisateur
thread_cache_size              = 151                                    # =max_connexions
```

Variable de sessions

```
sort_buffer_size               = 2M                                     # Could be too big for
many small sorts
tmp_table_size                 = 32M                                    # taille des table
temporaire

read_buffer_size               = 128k                                   # a verifier avec le
calcul mémoire
read_rnd_buffer_size           = 256k                                   # a verifier avec le
calcul mémoire
join_buffer_size               = 128k                                   # a verifier avec le
calcul mémoire



# Other buffers and caches

table_definition_cache         = 1400                                   # nombre de table dans la
base de donnée au max au min show global status like 'open_tables';
table_open_cache               = 2000                                   # approximativement show
global status like 'opened_tables'; / max_connection
table_open_cache_instances     = 16                                     # New default in 5.7
```

Parametrage de InnoDB

```
default_storage_engine          = InnoDB # le moteur de stockage est InnoDB
innodb_buffer_pool_instances    = 1     # 1 instance par Giga, donc ici 1 pour buffer pool
chunk size de 1G
innodb_buffer_pool_size         = 410M    # 80% de la RAM
innodb_file_per_table           = 1
innodb_flush_log_at_trx_commit  = 0
innodb_flush_method             = O_DIRECT
```

```
innodb_file_format             = Barracuda # format du fichier interne
innodb_log_buffer_size          = 5M # entre 5 et 10% du log file size
innodb_log_file_size            = 64M # 25% du buffer pool
innodb_stats_on_metadata        = 0
#innodb_temp_data_file_path     = ibtmp1:64M:autoextend:max:20G # Control the maximum size for
the ibtmp1 file
innodb_thread_concurrency      = 4     # nombre de CPU -1/2
innodb_read_io_threads          = 8
innodb_write_io_threads         = 8
```

Les deux derniers paramètres sont issue de SHOW ENGINE INNODB STATUS et en particulier du nombre de requete pending qui doivent être intéfieur a pending*64<io_thread

Parametrage de MyISAM

```
key_buffer_size                = 8M                                    # 25% de la RAM
myisam_recover_options         = 'BACKUP,FORCE'
```

Et enfin les logs:

```
log_warnings                   = 2                                     # MySQL 5.6, equivalent à
log_error_verbosity = 3
# log_error_verbosity            = 3                                     # MySQL 5.7, equivalent
) log_warnings = 2,a supprimer pour mariadb
innodb_print_all_deadlocks     = 1



# Slow Query Log

slow_query_log_file            = %INSTANCEDIR%/log/%UNAME%_%INSTANCE%_slow.log
slow_query_log                 = 0
log_queries_not_using_indexes  = 0                                     # pour les developpeurs
long_query_time                = 0.5
min_examined_row_limit         = 100

# Replication

#server_id                      = %SERVERID%                              # id
#log_bin                        = %INSTANCEDIR%/binlog/%UNAME%_%INSTANCE%_binlog
#emplacement
# master_verify_checksum         = ON                                    # MySQL 5.6
```

```
#binlog_cache_size              = 1M
#binlog_stmt_cache_size         = 1M
#max_binlog_size                = 128M                                  # en fonction du trafic
#sync_binlog                    = 1                                     # Mettre a 0 pour avoir
des problemes
#expire_logs_days               = 5                                     # We will survive easter
holidays
#binlog_format                  = ROW                                   # ROW est ok pour la
replication
# binlog_row_image               = MINIMAL                               # Since 5.6
# auto_increment_increment       = 2                                     # Pour Master/Master
mettre 2
# auto_increment_offset          = 1                                     # Pour Master/Master
mettre 1 et 2
```

Calcul de la mémoire

Utiliser https://www.mysqlcalculator.com/ qui fait le calcul de la mémoire du serveur:

key_buffer_size
+ query_cache_size
+ tmp_table_size
+ innodb_buffer_pool_size
+ innodb_additional_mem_pool_size
+ innodb_log_buffer_size
+ max_connections
×
(sort_buffer_size
+ read_buffer_size
+ read_rnd_buffer_size
+ join_buffer_size
+ thread_stack
+ binlog_cache_size)

On remarqueras le nombre de connexions maximuns influe enormément sur la mémoire