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
```

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