



MySQL 5.1 Configuration Files & Options Part II

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About Pythian



- Recognized Leader:

- Global industry-leader in database infrastructure services for Oracle, Oracle Applications, MySQL and SQL Server
- 150 current multinational companies such as Forbes.com, Fox Sports and Western Union to help manage their complex IT deployments

- Expertise:

- One of the world's largest concentrations of dedicated, full-time DBA expertise.

- Global Reach & Scalability:

- 24/7/365 global remote support for DBA and consulting, systems administration, special projects or emergency response



INSERT DELAYED

- `max_delayed_threads` (20)
 - if 0, INSERT DELAYED is disabled
- `Delayed_insert_threads` (0)
- `Delayed_writes` (0), `Delayed_errors` (0)
- `Not_flushed_delayed_rows` (0)

INSERT DELAYED

- `delayed_insert_limit` (100)
- `delayed_insert_timeout` (300)
- `delayed_queue_size` (1000)
- `max_insert_delayed_threads` (20)
 - `max_delayed_threads`
 - `Delayed_insert_threads`

Timeouts

- `back_log` (50)
- `net_read_timeout` (30)
 - `net_retry_count` (10)
- `net_write_timeout` (60)

More Timeouts

- `connect_timeout` (10)
- `wait_timeout` (28800)
- `interactive_timeout` (28800)

Non-InnoDB Disk I/O

- flush (OFF)
 - Sync changes to disk after every SQL statement
 - If ON, write changes to disk; let OS handle sync
- flush_time (0)
 - Close tables and sync data to disk every x seconds
 - 0 = disabled
 - Enable for systems with very few resources

OS-Related Variables

- `skip_external_locking` (ON)
- `thread_handling` (one-thread-per-connection)
- `Open_streams` (0)

Linux Parameters

- `large_files_support` (ON)
 - Use files >2Gb
- `large_pages` (OFF)
 - Use pages >4Kb
- `large_page_size`
 - Size of memory pages if large pages are used

File Descriptors

- `table_open_cache` (8,128)
 - Independent of `innodb_open_files`
- `Open_tables` (224)
- `Opened_tables` (519)

File Descriptor Usage

- `Open_files` (152)
- `Opened_files` (974,785)
- `open_files_limit` (25,000)

TCP/Networking

- skip_networking (OFF)
- max_allowed_packet (24M)
 - net_buffer_length

Locking Status Variables

- Table_locks_immediate (52,016,680)
- Table_locks_waited (4)
- Com_lock_tables (0)
- Com_unlock_tables (400)

Locking System Variables

- `sql_buffer_result` (OFF)
- `low_priority_updates` (OFF)
 - `sql_low_priority_updates`
- `max_write_lock_count` (4,294,967,295)

Storage Engines

- `have_csv` (YES)
- `have_innodb` (YES)
- `have_ndbcluster` (NO)

MyISAM-specific

- `concurrent_insert` (2)
- `delay_key_write` (ON)
- `keep_files_on_create` (OFF)

MyISAM-specific

- `myisam_data_pointer_size` (6)
- `myisam_stats_method` (`nulls_unequal`)
- `myisam_use_mmap` (OFF)

Repairing MyISAM Tables

- `myisam_recover_options` (FORCE,BACKUP)
- `myisam_repair_threads` (1)
 - multi-threaded repair by sorting is beta-quality

MyISAM Index Sorting

- Done with REPAIR TABLE, ALTER TABLE, LOAD DATA INFILE, CREATE INDEX
- `myisam_sort_buffer_size` (56M)
- `myisam_max_sort_file_size` (10G)

FULLTEXT search

- MyISAM only
- `ft_min_word_len` (4)
- `ft_max_word_len` (84)
- `ft_stopword_file` (built-in)

FULLTEXT search

- `ft_boolean_syntax (+ -><()~*:""&|)`
- `ft_query_expansion_limit (20)`

MyISAM Key Cache

- Can have more than one
 - CACHE INDEX IN
- `key_buffer_size` (16M)
- `key_cache_block_size` (1024)

MyISAM Key Cache

- Uses LRU; hot/warm sub-chains
- `key_cache_age_threshold` (300)
- `key_cache_division_limit` (100)

MyISAM Key Cache Sizing

- Percentage used for all key caches:
 - $1 - (\text{Key_blocks_unused} * \text{key_cache_block_size}) / \text{key_buffer_size}$
 - $1 - (13360 * 1024) / 16 * 1024 * 1024 = 0.1846$ bytes
- `Key_blocks_used(36)`
 - max used at any time
- `Key_blocks_not_flushed (0)`

MyISAM Key Cache Efficiency

- Cache miss %
 - $\text{Key_reads (from disk)} / \text{Key_read_requests} * 100$
 - $34 / 254122 * 100 = 0.01 \%$
- Key_write_requests (10)
- Key_writes (10)

Transaction Basics

- autocommit (ON)
- tx_isolation (READ-COMMITTED)
- completion-type (0)

Transaction Basics

- `foreign_key_checks` (ON, session only)
- `transaction_prealloc_size` (4 Kb)
 - Starting/ending size of a shared per-transaction memory pool
- `transaction_alloc_block_size` (8 Kb)
 - if a per-transaction memory pool needs more memory, increase by this much

InnoDB Basics

- `innodb_data_file_path`
(`ibdata_primary:128M:autoextend`)
- `innodb_autoextend_increment` (8)
- `innodb_data_home_dir` ()

InnoDB Flags

- `ignore_built_in_innodb` (OFF)
- `innodb_flush_log_at_trx_commit` (1)
- `innodb_fast_shutdown` (1)

InnoDB Flags

- `innodb_file_per_table` (ON)
- `innodb_locks_unsafe_for_binlog` (OFF)
- `innodb_stats_on_metadata` (ON)
- `innodb_use_legacy_cardinality_algorithm` (ON)

InnoDB Flags

- `innodb_adaptive_hash_index` (ON)
- `innodb_checksums` (ON)
- `innodb_autoinc_lock_mode` (1)

InnoDB Flags

- `innodb_force_recovery (0)`
- `innodb_table_locks (ON)`
- `innodb_support_xa (ON)`

InnoDB Flags

- innodb_lock_wait_timeout (240)
 - innodb_rollback_on_timeout (OFF)
- timed_mutexes (OFF)
- unique_checks (ON)

InnoDB Doublewrite

- innodb_doublewrite (ON)
- Innodb_dblwr_writes (592,341)
- Innodb_dblwr_pages_written (4,537,224)

InnoDB Concurrency Variables

- `innodb_thread_concurrency` (16)
- `innodb_commit_concurrency` (0)
- `innodb_concurrency_tickets` (500)
- `innodb_sync_spin_loops` (20)

InnoDB Buffer Pool

- `innodb_buffer_pool_size` (8G)
 - innodb data/index cache
- `innodb_page_size` (16 Kb)
- `innodb_buffer_pool_pages_total` (524,288)
 - `innodb_buffer_pool_pages_data` (46,905)
 - `innodb_buffer_pool_pages_free` (477177)
 - `innodb_buffer_pool_pages_misc` (206)

Dirty Pages

- `innodb_max_dirty_pages_pct` (90)
 - after this % is reached, wait while dirty pages are flushed to disk
- `Innodb_buffer_pool_wait_free` (0)
- `Innodb_buffer_pool_pages_dirty` (9)
 - Included in the `Innodb_buffer_pool_pages_data`

Flush / Sync

- Innodb_buffer_pool_pages_flushed (4,537,224)
 - counter of # times flushed
- Innodb_data_fsyncs (10,201,211)
 - Innodb_data_pending_fsyncs (0)

InnoDB Row Locks

- InnoDB_row_lock_waits (269)
 - InnoDB_row_lock_current_waits (0)
- InnoDB_row_lock_time (31,637 ms)
 - InnoDB_row_lock_time_avg (117 ms)
 - InnoDB_row_lock_time_max (4,599 ms)

InnoDB Reads

- InnoDB_buffer_pool_read_requests (1,360,965,036)
- InnoDB_buffer_pool_reads (27,482)
 - reads buffer pool could not do & single page read
- InnoDB_data_reads (28,754)
 - InnoDB_data_pending_reads (0)

InnoDB Reads

- InnoDB_data_read (695.47 Mb)
- InnoDB_pages_read (44,377)
- InnoDB_rows_read (2,721,225,514)

InnoDB Writes

- InnoDB_buffer_pool_write_requests (47,307,349)
- InnoDB_data_writes (12,468,811)
 - InnoDB_data_pending_writes (0)

InnoDB Writes

- Innodb_data_written (153 Gb)
- Innodb_pages_written (4,537,224)
- Innodb_pages_created (3,664)

InnoDB Rows Written

- Innodb_rows_inserted (32,681)
- Innodb_rows_deleted (1,555,539)
- Innodb_rows_updated (3,908,062)

InnoDB Log Basics

- `innodb_log_file_size` (1G)
- `innodb_log_files_in_group` (3)
 - `innodb_mirrored_log_groups` (1)
- `innodb_log_group_home_dir` (./)

InnoDB Logs

- innodb_log_buffer_size (8M)
 - Innodb_log_waits (0)
- Innodb_os_log_fsyncs (8,464,144)
 - Innodb_os_log_pending_fsyncs (0)

InnoDB Log Writes

- InnoDB_log_write_requests (26,175,407)
- InnoDB_log_writes (8,166,171)
 - InnoDB_os_log_pending_writes (0)
- InnoDB_os_log_written (14.42 Gb)

Other InnoDB Variables

- `innodb_additional_mem_pool_size` (16Mb)
- `innodb_open_files` (300)
- `innodb_thread_sleep_delay` (10,000 = .01 sec)

Advanced InnoDB Variables

- `innodb_flush_method ()`
- `innodb_max_purge_lag (0)`

InnoDB Status for Performance

- `Innodb_buffer_pool_read_ahead_rnd` (16)
- `Innodb_buffer_pool_read_ahead_seq` (286)

Percona patch extensions

- XtraDB
- Percona build of MySQL
 - (5.x.xx-percona-log)
 - Standard and InnoDB Plugin
- Slides are current up to 5.1.36-percona-log
- <http://www.percona.com/docs/wiki/percona-xtradb:reference:variables:alphabetically>

I/O Extensions

- `innodb_read_io_threads`
- `innodb_write_io_threads`
- `innodb_io_capacity`
- `innodb_use_purge_thread`

More I/O extensions

- `innodb_ibuf_accel_rate`
- `innodb_ibuf_active_contract`
- `innodb_ibuf_max_size`

More I/O extensions

- `innodb_enable_unsafe_group_commit`
- `innodb_flush_neighbor_pages`
- `innodb_read_ahead`
 - none
 - random
 - linear
 - **both**

Checkpointing

- `innodb_adaptive_checkpoint`
- `innodb_checkpoint_age_target`

SHOW ENGINE INNODB STATUS

```
-----  
BUFFER POOL AND MEMORY  
-----
```

```
Total memory allocated 328830416; in additional pool allocated  
2117120  
+ Internal hash tables (constant factor + variable factor)  
+   Adaptive hash index 4839388          (4425628 + 413760)  
+   Page hash           138716  
+   Dictionary cache    3383508          (3320220 + 63288)  
+   File system         41848           (41336 + 512)  
+   Lock system         332788          (332468 + 320)  
+   Recovery system     0              (0 + 0)  
+   Threads             41900           (41348 + 552)  
Buffer pool size           16384  
+ Buffer pool size, bytes 268435456  
Free buffers               12396  
Database pages            3963  
Modified db pages         1510  
Pending reads 0
```


Statistics/Info

- innodb_show_locks_held
- innodb_show_verbose_locks
- innodb_stats_auto_update
- innodb_stats_method
- innodb_stats_update_need_locks

New in INFORMATION_SCHEMA

- innodb_table_stats
- innodb_index_stats

Recovery

- `innodb_fast_recovery`
- `innodb_recovery_stats`

Recovery Stats

RECOVERY STATISTICS

Recovery time: 18 sec. (1 turns)

Data page IO statistics

Requested pages: 9126

Read pages: 9126

Written pages: 7957

(Dirty blocks): 1156

Grouping IO [times]:

number of pages,

read request neighbors (in 32 pages chunk),

combined read IO,

combined write IO

1, 32, 335, 548

2, 0, 121, 97

3, 7, 49, 44

4, 4, 43, 26

....

64, 0, 2, 25

Recovery Stats

Recovery process statistics

```
Checked pages by doublewrite buffer: 128
Overwritten pages from doublewrite: 0
Recovered pages by io_thread: 9145
Recovered pages by main thread: 0
Parsed log records to apply: 2572491
    Sum of the length: 71274689
Applied log records: 2376356
    Sum of the length: 68098300
Pages which are already new enough: 93
Oldest page's LSN: 926917970
Newest page's LSN: 1526578232
```

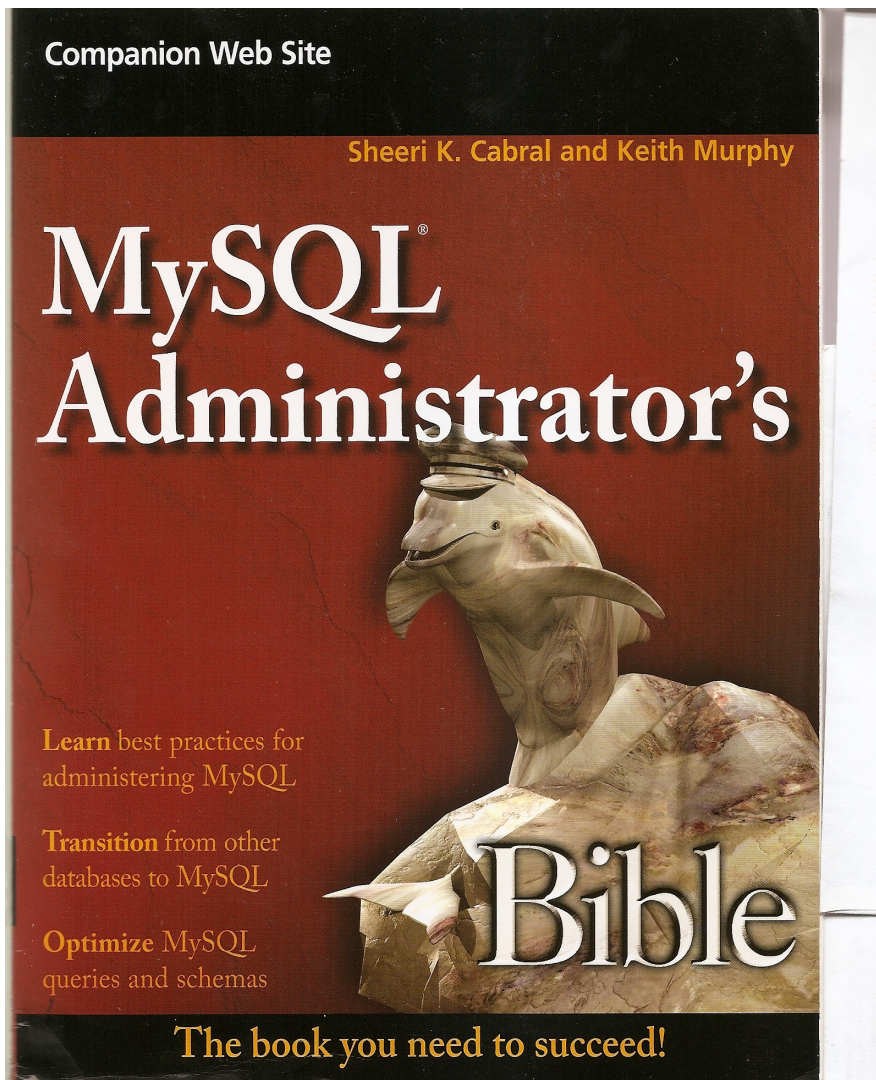
Other Extensions

- **innodb_thread_concurrency_timer_based**
- innodb_relax_table_creation
- innodb_extra_rsegments
 - INFORMATION_SCHEMA.innodb_rseg

Other Extensions

- `innodb_dict_size_limit`
 - `Innodb_dict_tables`
- `innodb_expand_import`
- `innodb_extra_undoslots`
- `innodb_overwrite_relay_log_info`

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