Performance Schema and PmaControl Dashboards: Tracking Slow Queries

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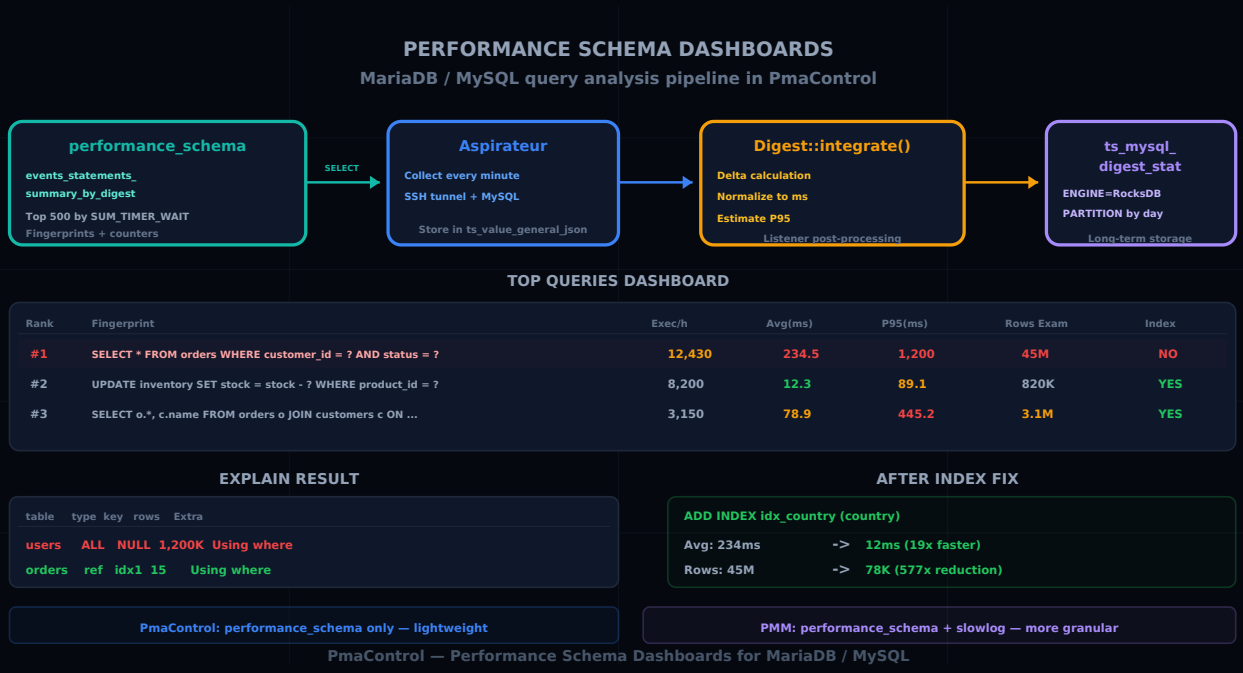
MARIADB MYSQL PERFORMANCE-SCHEMA DIAGNOSTICS PMACONTROL



Performance Schema: The Untapped Gold Mine

`performance_schema` has been enabled by default in MariaDB / MySQL for years. And yet, most DBAs do not use it daily. The reason is simple: the raw data is hard to read. Dozens of tables, millions of rows, cumulative counters -- without an aggregation tool, it is noise.

PmaControl transforms this noise into signal. It collects `performance_schema` data via the Aspirateur, aggregates it via the Listener (Digest::integrate), and presents it in actionable dashboards. This article explains the complete pipeline, from source to dashboard.

Verify That performance_schema Is Enabled

MariaDB

```
SHOW GLOBAL VARIABLES LIKE 'performance_schema';
+--------------------+-------+
| Variable_name      | Value |
+--------------------+-------+
| performance_schema | ON    |
+--------------------+-------+
```

If `OFF`, add to the configuration file:

```
[mysqld]
performance_schema = ON
```

A restart is required -- this variable is not dynamic.

MySQL

Same on MySQL. The variable is read-only and requires a restart:

```
[mysqld]
performance_schema = ON
```

Performance Impact

The classic question: "does performance_schema slow down my server?" The answer in 2026 is **no, not measurably**. The overhead is in the range of 1-3% on typical workloads. The visibility benefit far outweighs this cost.

The only exception: servers with extreme workloads (>100,000 queries/second) where every percentage counts. In that case, disable unnecessary instruments rather than performance_schema entirely.

The Source: events_statements_summary_by_digest

The key table that PmaControl exploits is:

```
SELECT * FROM performance_schema.events_statements_summary_by_digest
ORDER BY SUM_TIMER_WAIT DESC
LIMIT 10\G
```

This table contains a summary by **fingerprint** (normalized signature) of each executed query. Here are the most useful columns:

Column	Description
`DIGEST`	Unique hash of the fingerprint
`DIGEST_TEXT`	Normalized query text (parameters replaced with `?`)
`COUNT_STAR`	Total execution count
`SUM_TIMER_WAIT`	Total execution time (in picoseconds)
`AVG_TIMER_WAIT`	Average time per execution
`SUM_ROWS_EXAMINED`	Total rows examined
`SUM_ROWS_SENT`	Total rows returned
`FIRST_SEEN`	First execution
`LAST_SEEN`	Last execution

The fingerprint is the cornerstone: it normalizes `SELECT * FROM users WHERE id = 42` and `SELECT * FROM users WHERE id = 1337` into a single fingerprint `SELECT * FROM users WHERE id = ?`. This allows aggregating statistics regardless of parameter values.

The PmaControl Pipeline

Step 1: Collection by the Aspirateur

The Aspirateur periodically executes the following query on each monitored server:

```
SELECT
    DIGEST,
    DIGEST_TEXT,
    COUNT_STAR,
    SUM_TIMER_WAIT,
    AVG_TIMER_WAIT,
    SUM_ROWS_EXAMINED,
    SUM_ROWS_SENT,
    SUM_NO_INDEX_USED,
    SUM_NO_GOOD_INDEX_USED,
```

```
    FIRST_SEEN,
    LAST_SEEN
FROM performance_schema.events_statements_summary_by_digest
WHERE DIGEST IS NOT NULL
ORDER BY SUM_TIMER_WAIT DESC
LIMIT 500;
```

The `LIMIT 500` is intentional: PmaControl focuses on the 500 most expensive queries by cumulative time. Fast, infrequent queries are not interesting for optimization.

Results are stored in `ts_value_general_json` with a timestamp.

Step 2: Processing by the Listener

When the Listener detects new digest data, it triggers `Digest::integrate()`. This function:

1. **Calculates deltas**: since `performance_schema` provides cumulative counters (since the last `TRUNCATE` or restart), Digest::integrate calculates the difference between two collections to get period metrics.
2. **Normalizes times**: picoseconds are converted to milliseconds for display.
3. **Calculates percentiles**: the P95 (95th percentile) execution time is estimated from distributions.
4. **Stores in ts_mysql_digest_stat**: the dedicated digest statistics table, partitioned by day and using the RocksDB engine for compression.

```
Aspirateur
  -> SELECT FROM performance_schema (every minute)
  -> INSERT INTO ts_value_general_json

Listener
  -> Detect new data (ts_max_date changed)
  -> Digest::integrate()
     -> Delta calculation (current - previous)
     -> Normalize to milliseconds
     -> Estimate P95
     -> INSERT INTO ts_mysql_digest_stat
```

The ts_mysql_digest_stat Table

This is the long-term storage for digest statistics:

```
CREATE TABLE ts_mysql_digest_stat (
    id BIGINT UNSIGNED AUTO_INCREMENT,
    server_id INT UNSIGNED,
    digest VARCHAR(64),
    digest_text TEXT,
    period_start DATETIME,
    period_end DATETIME,
    exec_count BIGINT UNSIGNED,
    total_time_ms DECIMAL(20,3),
    avg_time_ms DECIMAL(15,3),
    p95_time_ms DECIMAL(15,3),
    rows_examined BIGINT UNSIGNED,
    rows_sent BIGINT UNSIGNED,
    no_index_used BIGINT UNSIGNED,
    PRIMARY KEY (id),
    KEY idx_server_digest (server_id, digest, period_start)
) ENGINE=ROCKSDB
PARTITION BY RANGE (TO_DAYS(period_start)) (
    PARTITION p20260413 VALUES LESS THAN (TO_DAYS('2026-04-14')),
    PARTITION p20260414 VALUES LESS THAN (TO_DAYS('2026-04-15')),
    ...
);
```

Partitioning by day enables:

- Fast cleanup: `ALTER TABLE ts_mysql_digest_stat DROP PARTITION p20260401;`
- Fast queries on date ranges
- Fine-grained retention control

The Dashboards

Top Queries View

The main dashboard displays the most expensive queries, sorted by cumulative time:

```
Rank  Fingerprint                              Exec/h    Avg(ms)   P95(ms)  Rows Exam
----- ---------------------------------------- --------  --------  -------- ---------
  1   SELECT * FROM orders WHERE customer_id    12,430     45.2     234.5   1,245,000
```

```
    = ? AND status = ?
2   UPDATE inventory SET stock = stock - ?     8,200     12.3      89.1     820,000
    WHERE product_id = ?
3   SELECT o.*, c.name FROM orders o JOIN      3,150     78.9     445.2   3,150,000
    customers c ON o.customer_id = c.id
4   INSERT INTO audit_log (...)               45,600      1.2       5.3           0
5   SELECT COUNT(*) FROM sessions WHERE         980    234.5     890.1  98,000,000
    last_active < ?
```

Each row is clickable to access the details.

Fingerprint Detail View

Clicking on a fingerprint, PmaControl displays:

- **The full text** of the normalized query
- **History**: evolution of average execution time and P95 over the last 30 days
- **The ratio** rows_examined / rows_sent -- a high ratio (>100:1) indicates a table scan or missing index
- **The no_index_used flag** -- how many executions used no index

Identifying Missing Indexes

The rows_examined / rows_sent ratio is the most powerful indicator. Consider an example:

```
Fingerprint: SELECT * FROM orders WHERE customer_id = ?
Rows examined: 1,245,000 (total)
Rows sent: 12,430 (total)
Ratio: 100:1
```

This 100:1 ratio means MariaDB / MySQL examines 100 rows to return 1. This is the classic sign of a full table scan or an ineffective index.

Action: check for an index on `customer_id`:

```
SHOW INDEX FROM orders WHERE Column_name = 'customer_id';
```

If the index does not exist:

```
ALTER TABLE orders ADD INDEX idx_customer_id (customer_id);
```

The SUM_NO_INDEX_USED Flag

PmaControl displays in red any queries where `SUM_NO_INDEX_USED` is high. This flag is set when MariaDB / MySQL performs a full table scan -- this is often the number one performance problem.

EXPLAIN from PmaControl

For queries identified as problematic, PmaControl can execute an `EXPLAIN` directly:

```
EXPLAIN SELECT * FROM orders WHERE customer_id = 42 AND status = 'pending';
```

The result is displayed with color coding:

- **Green**: `type = ref` or `type = eq_ref` -- index usage, good
- **Amber**: `type = range` -- range scan, acceptable
- **Red**: `type = ALL` -- full table scan, needs fixing

Integration with Marina+ Agent

Marina+ is PmaControl's automatic optimization agent. It analyzes digest data and proposes suggestions:

1. **Missing indexes**: detects queries with high rows_examined/rows_sent ratio and suggests indexes to create
2. **Queries to rewrite**: identifies inefficient patterns (SELECT *, correlated subqueries, ORDER BY on non-indexed column)
3. **Configuration**: adjusts server parameters based on query patterns (sort_buffer_size, join_buffer_size, etc.)

Marina+ does not modify anything automatically -- it generates recommendations that the DBA validates and applies.

Comparison with PMM (Percona Monitoring and Management)

PMM and PmaControl exploit the same data source (`performance_schema`), but with different approaches:

Aspect	PmaControl	PMM

Source	performance_schema	performance_schema + slowlog
Agent	Aspirateur (SSH + MySQL)	mysqld_exporter + QAN
Storage	ts_mysql_digest_stat (RocksDB)	ClickHouse (QAN)
Fingerprinting	Server-side (MariaDB / MySQL native)	Client-side (Percona agent)
P95	Estimated from distributions	Calculated from slowlog
History	Partitioned by day, configurable retention	ClickHouse, configurable retention
Actions	Integrated EXPLAIN, Marina+ suggestions	Query Analytics + PMM UI

The main difference: **PMM combines performance_schema and slowlog** for more precise percentiles. PmaControl relies solely on performance_schema, which is lighter but less granular.

PmaControl's advantage: integration with the rest of the ecosystem (replication, topology, alerts, actions). PMM is better for pure query analysis, PmaControl is better for the global infrastructure view.

Practical Case: Find and Fix a Slow Query

Scenario: the PmaControl dashboard shows a query consuming 40% of the server's total time.

Step 1: Identify

In the Top Queries dashboard:

```
#1  SELECT u.*, p.* FROM users u
    JOIN purchases p ON u.id = p.user_id
    WHERE p.created_at > ? AND u.country = ?

    Exec/h: 5,200   Avg: 234ms   P95: 1,200ms   Rows exam: 45M
```

Step 2: Analyze

The rows_examined / rows_sent ratio is catastrophic: 45 million rows examined for approximately 5,200 results per hour.

EXPLAIN from PmaControl:

```
+----+------+----------+------+------+------+----------+
| id | type | table    | key  | rows | filt | Extra    |
+----+------+----------+------+------+------+----------+
|  1 | ALL  | users    | NULL | 1.2M | 10%  | where    |
|  1 | ref  | purchases| idx1 | 15   | 33%  | where    |
+----+------+----------+------+------+------+----------+
```

The problem: `users` is full table scanned (`type = ALL`). There is no index on `country` .

Step 3: Fix

```
ALTER TABLE users ADD INDEX idx_country (country);
```

Step 4: Verify

After adding the index, the PmaControl dashboard shows improvement within the hour:

```
#1  SELECT u.*, p.* FROM users u
    JOIN purchases p ON u.id = p.user_id
    WHERE p.created_at > ? AND u.country = ?

    Exec/h: 5,200   Avg: 12ms   P95: 45ms   Rows exam: 78K
```

Average time dropped from 234ms to 12ms (19x), and rows examined from 45M to 78K (577x).

Best Practices

1. Do Not TRUNCATE performance_schema Manually

PmaControl calculates deltas between two collections. If you run `TRUNCATE TABLE performance_schema.events_statements_summary_by_digest` , counters restart at zero and the first delta will be incorrect. Let PmaControl handle it.

2. Increase performance_schema_digests_size If Needed

By default, MariaDB / MySQL stores the first N fingerprints. If your application has more distinct queries than the limit, the least frequent ones are evicted:

```
[mysqld]
performance_schema_digests_size = 10000  ; default ~5000
```

3. Correlate with the Slow Query Log

PmaControl via performance_schema gives the "what" (which queries are slow). The slow query log gives the "when" (at what exact moment). The two are complementary.

4. Watch the rows_examined / rows_sent Ratio

This is the most actionable indicator. A ratio > 100:1 is almost always a missing index. A ratio > 1000:1 is an urgent problem.

5. Use P95, Not the Average

The average hides outliers. A query with an average of 10ms but a P95 of 500ms has an intermittent problem (lock contention, cold cache, unstable execution plan). The P95 reveals these problems.

Conclusion

Performance_schema is the best data source for MariaDB / MySQL query optimization. PmaControl automates the collection, aggregation, and presentation of this data via the Aspirateur -> Digest::integrate -> ts_mysql_digest_stat -> dashboard pipeline.

The result: continuous visibility into the most expensive queries, missing indexes, and performance trends over time. Combined with Marina+ for automated suggestions, it is a complete performance optimization workflow -- from detection to correction.