# Monitor Multi-Source Replication with PmaControl

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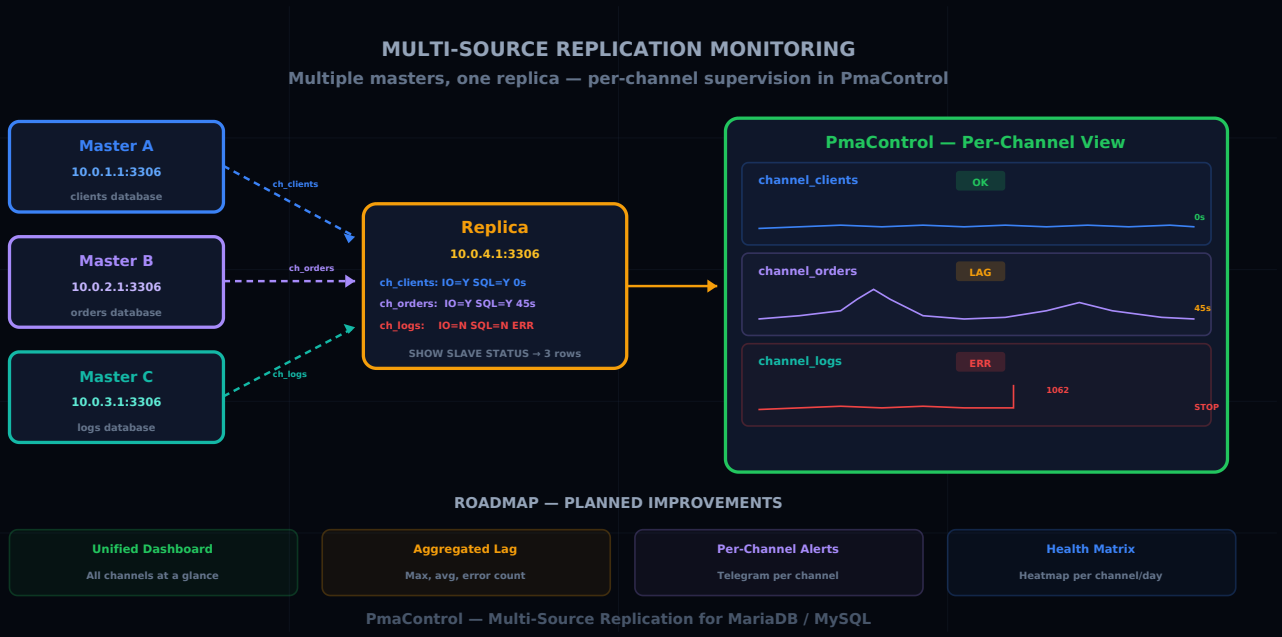
MARIADB MYSQL MULTI-SOURCE REPLICATION MONITORING PMACONTROL




## Multi-Source: Multiple Masters, One Replica

Multi-source replication allows a single replica server to receive data from **multiple masters simultaneously**. Each master connection is a distinct **channel**, with its own IO thread, its own SQL thread, and its own replication state.

This is a powerful pattern for:

- **Consolidation**: aggregating data from multiple business databases onto an analytics replica
- **Migration**: receiving data from both the old and new system during transition
- **Data warehouse**: feeding a warehouse from multiple MariaDB / MySQL sources

In our previous article on MySQL 8.4 multi-source replication, we covered the configuration. Here, we focus on monitoring: how PmaControl detects, displays, and monitors these multiple channels.

## Quick Setup (Recap)

### MariaDB

MariaDB has supported multi-source natively since version 10.0:

```
-- Channel 1: clients database
CHANGE MASTER 'channel_clients' TO
  MASTER_HOST = '10.0.1.1',
  MASTER_USER = 'repl',
  MASTER_PASSWORD = 'secret',
  MASTER_USE_GTID = slave_pos;
START SLAVE 'channel_clients';

-- Channel 2: orders database
CHANGE MASTER 'channel_orders' TO
  MASTER_HOST = '10.0.2.1',
  MASTER_USER = 'repl',
  MASTER_PASSWORD = 'secret',
  MASTER_USE_GTID = slave_pos;
START SLAVE 'channel_orders';
```

### MySQL 8.0+

MySQL uses the `FOR CHANNEL` clause:

```
-- Channel 1
CHANGE REPLICATION SOURCE TO
  SOURCE_HOST = '10.0.1.1',
  SOURCE_USER = 'repl',
  SOURCE_PASSWORD = 'secret',
  SOURCE_AUTO_POSITION = 1
  FOR CHANNEL 'channel_clients';
START REPLICA FOR CHANNEL 'channel_clients';

-- Channel 2
CHANGE REPLICATION SOURCE TO
  SOURCE_HOST = '10.0.2.1',
  SOURCE_USER = 'repl',
  SOURCE_PASSWORD = 'secret',
  SOURCE_AUTO_POSITION = 1
  FOR CHANNEL 'channel_orders';
START REPLICA FOR CHANNEL 'channel_orders';
```

## How PmaControl Detects Multi-Source

### The Detection Query

When the Aspirateur collects replication data, it executes:

```
SHOW SLAVE STATUS;
-- or in MySQL 8.0+:
SHOW REPLICA STATUS;
```

In classic replication (single master), this query returns **a single row**. In multi-source, it returns **one row per channel**.

PmaControl automatically detects multi-source when `SHOW SLAVE STATUS` returns more than one row. No special configuration is needed on the PmaControl side.

### Internal Storage

Each channel is stored as an independent replication entry in the time series tables. The channel name is preserved and used as a discriminator:

```
ts_value_general_json:
  server_id = 42
  variable  = slave_status
  channel   = 'channel_clients'
  value     = { "Slave_IO_Running": "Yes", "Seconds_Behind_Master": 3, ... }

  server_id = 42
  variable  = slave_status
  channel   = 'channel_orders'
  value     = { "Slave_IO_Running": "Yes", "Seconds_Behind_Master": 0, ... }
```

## The Slave Page in Multi-Source Mode

When PmaControl detects multiple channels on a server, the slave page displays **each channel independently**. In practice:

### One Block Per Channel

Each channel has its own block with:

- **Channel name** displayed in the header (e.g., `channel_clients`)
- **IO/SQL status**: the `Slave_IO_Running` and `Slave_SQL_Running` indicators specific to the channel
- **Lag**: `Seconds_Behind_Master` specific to the channel
- **GTID**: the GTID state specific to the channel
- **Last error**: `Last_SQL_Error` for the channel

### One Lag Chart Per Channel

Each channel has its own Chart.js graph with 5-day lag history. Charts are stacked vertically on the page.

This allows visual comparison: if `channel_clients` has stable lag at 0 seconds but `channel_orders` shows recurring spikes, the problem is clearly localized to the orders master.

### Health Strip Per Channel

Each channel has its own health strip. One channel in green and another in red immediately tells you: the problem is on a single channel, not on the replica itself.

### Per-Channel Actions

Actions (START, STOP, SKIP) are available **per channel**:

```
-- Stop a single channel
STOP SLAVE 'channel_orders';

-- Skip an error on a channel
SET GLOBAL sql_slave_skip_counter = 1;
START SLAVE 'channel_orders';

-- MariaDB: stop a specific channel
STOP SLAVE 'channel_clients';
```

## REPLICATE_REWRITE_DB Per Channel

In multi-source setups, it is common to use `REPLICATE_REWRITE_DB` to remap database names:

```
CHANGE REPLICATION SOURCE TO
  SOURCE_HOST = '10.0.1.1',
```

```
  ...
  FOR CHANNEL 'channel_clients';

-- Remap 'clients' to 'dw_clients' on the replica
CHANGE REPLICATION FILTER
  REPLICATE_REWRITE_DB = ((clients, dw_clients))
  FOR CHANNEL 'channel_clients';
```

PmaControl detects and displays these filters in the channel details. This is important for debugging: if a table does not appear on the replica, checking the rewrite filters is the first instinct.

## Current Limitations

PmaControl handles multi-source well at the individual channel level. However, some features are missing for truly unified monitoring.

### No "All Channels Healthy" View

Currently, there is no consolidated page showing the health status of all channels on a replica at a single glance. You need to scroll the slave page to check each channel individually.

What is missing: a summary table at the top of the page with a green/red indicator per channel, like:

```
channel_clients  OK   IO: Yes  SQL: Yes  Lag: 0s
channel_orders   WARN IO: Yes  SQL: Yes  Lag: 45s
channel_logs     ERR  IO: No   SQL: No   Error: 1062
```

### No Aggregated Lag

PmaControl monitors each channel's lag separately but does not compute an aggregated metric. For example:

- Maximum lag among all channels
- Average lag
- Number of channels in error out of total

These aggregated metrics would be useful for alerts: "at least one channel has more than 60 seconds of lag" is more relevant than per-channel alerts when you have 10 channels.

### No Channel Dependency Graph

In multi-source, channels are independent. But in some architectures, there are logical dependencies: channel A must be applied before channel B (for example, reference tables before transactional tables).

PmaControl does not model these dependencies. The DBA must manage application order manually if needed.

### No Per-Channel Alerting

Current alerts are at the server level, not the channel level. If `channel_clients` stops but `channel_orders` is working, the alert simply indicates "replication error on server X" without specifying the channel.

## Practical Use Cases

### Analytics Consolidation

Typical architecture:

```
Master A (clients)  --- channel_clients -->
                                           Analytics Replica
Master B (orders)   --- channel_orders  -->  (MariaDB / MySQL)

Master C (logs)     --- channel_logs    -->
```

The replica consolidates all three databases. PmaControl monitors all three channels. If Master C (logs) is slow, the `channel_logs` lag increases without impacting the other two.

In PmaControl, you will see three blocks on the replica's slave page, with three independent lag charts. The `channel_logs` channel will have its own health strip in amber or red, while the other two remain green.

### Migration by Channel

During a migration, you may temporarily have:

```
Old master  --- channel_legacy  -->
                                     New Replica
New master  --- channel_new     -->
```

The `channel_legacy` channel will be removed once the migration is complete. During the transition, PmaControl monitors both channels and lets you verify the new channel has caught up before cutting the old one.

### Per-Database Filtering

With `REPLICATE_DO_DB` or `REPLICATE_REWRITE_DB`, each channel can be filtered to replicate only certain databases:

```
CHANGE REPLICATION FILTER
  REPLICATE_DO_DB = (clients, clients_archive)
  FOR CHANNEL 'channel_clients';

CHANGE REPLICATION FILTER
  REPLICATE_DO_DB = (orders, order_items)
  FOR CHANNEL 'channel_orders';
```

PmaControl displays active filters for each channel, making it easier to diagnose when an expected table does not appear on the replica.

## Roadmap

Planned improvements for multi-source support in PmaControl:

### Unified Multi-Source Dashboard

A dedicated multi-source dashboard with:

- Matrix view: one replica per row, its channels as columns
- Global health indicator (green if all channels OK, red if at least one KO)
- Aggregated lag (max, average, error count)

### Channel Health Matrix

A compact heatmap-style visualization:

```
              Mon  Tue  Wed  Thu  Fri  Sat  Sun
ch_clients    [G]  [G]  [G]  [G]  [G]  [G]  [G]
ch_orders     [G]  [G]  [A]  [G]  [G]  [G]  [G]
ch_logs       [G]  [A]  [R]  [A]  [G]  [G]  [G]
```

### Per-Channel Alerting

Telegram alerts specific to each channel:

```
Warning — Replication
Server: replica-analytics (10.0.3.1:3306)
Channel: channel_orders
Lag: 120s (threshold: 60s)
Status: IO=Yes, SQL=Yes
```

### Automatic Dependency Detection

Analysis of cross-channel foreign keys to detect potential dependencies and alert if a dependent channel falls behind.

## Multi-Source Best Practices

### 1. Name Channels Clearly

Use descriptive names: `channel_clients`, `channel_orders`, not `ch1`, `ch2`. PmaControl displays names as-is — clear names make diagnosis easier.

### 2. One Channel = One Database (or Logical Group)

Avoid mixing unrelated databases in the same channel. If a channel stops on an error, everything it contains is blocked.

### 3. Monitor Relay Log Space

With multiple channels, relay log disk space can explode. Each channel has its own relay log. Monitor `Relay_Log_Space` per channel in PmaControl.

### 4. Test Individual Channel Stops

Make sure stopping one channel does not impact others. PmaControl lets you STOP/START each channel independently — use this capability to validate isolation.

### 5. Document the Architecture

Multi-source adds complexity. Document which channel carries which database, from which master, with which filters. PmaControl displays this information, but external documentation remains useful for onboarding.

## Conclusion

Multi-source replication is a powerful tool for MariaDB / MySQL data consolidation. PmaControl automatically detects multiple channels and monitors them individually with lag charts, health strips, and per-channel corrective actions.

Current limitations — no unified view, no per-channel alerting, no aggregated lag — are identified and part of the roadmap. In the meantime, per-channel monitoring covers the essential needs: knowing which channel has lag, which channel is in error, and being able to act on them individually.

For DBAs managing multi-source architectures in production, PmaControl remains the most suitable tool — even imperfect — because no competitor offers this per-channel visibility out of the box.