

# Identifying Slow Queries

Slow queries can impact ClickHouse performance, especially under high load or with inefficient queries or schema design. Whether you're using ClickHouse on Elestio via the dashboard, accessing it inside a Docker Compose container, or running CLI queries, ClickHouse offers built-in tools to detect, diagnose, and optimize performance bottlenecks. This guide explains how to capture slow queries using system tables, measure query latency, and improve performance through tuning and query optimization.

## Inspecting Slow Queries from the Terminal

ClickHouse logs query profiling information by default, which you can access via system tables. This allows you to identify long-running or resource-intensive queries directly from SQL.

### Connect to ClickHouse via Terminal

Use the ClickHouse client to connect to your instance:

```
clickhouse-client -h <host> --port <port> --user <username> --password <password>
```

Replace <host>, <port>, <username>, and <password> with your credentials from the Elestio dashboard.

Database Admin		Display your database credentials		Hide DB Credentials
Host	clickhouse-u7774.vm.elestio.app			
Port	29000			
User	root			
Password	*****		Show password	
CLI	clickhouse client --host=clickhouse-u7774.vm.elestio.app --port=29000 --user root --password *****		Show password	

### View Recent Slow Queries

ClickHouse logs query performance stats in the `system.query_log` table. To view the 10 most recent queries that took longer than 1 second:

```
SELECT
    query_start_time,
    query_duration_ms,
```

```
query
FROM system.query_log
WHERE type = 'QueryFinish'
      AND query_duration_ms > 1000
ORDER BY query_start_time DESC
LIMIT 10;
```

You can adjust the `query_duration_ms` threshold to capture slower or more critical queries.

## Analyzing Inside Docker Compose

If your ClickHouse instance is running inside Docker Compose, you can inspect query logs and system performance from inside the container.

### Access the ClickHouse Container

Open a shell session inside the running container:

```
docker-compose exec clickhouse bash
```

Then run the ClickHouse client:

```
clickhouse-client --user root
```

If a password is required, append `--password <yourpassword>` to the command.

### Query the `system.query_log` Inside the Container

Run the same slow query inspection SQL as above to analyze performance issues:

```
SELECT query_start_time, query_duration_ms, query
FROM system.query_log
WHERE type = 'QueryFinish' AND query_duration_ms > 1000
ORDER BY query_start_time DESC
LIMIT 10;
```

## Using the System Metrics & Events Tables

ClickHouse includes system tables that expose performance-related metrics in real time.

### Check Overall Query Performance

You can use the `system.metrics` table to view metrics like query execution time, memory usage, and background operations:

```
SELECT *  
FROM system.metrics  
WHERE value != 0  
ORDER BY value DESC;
```

For cumulative statistics like total queries processed, check the `system.events` table:

```
SELECT *  
FROM system.events  
WHERE value > 0  
ORDER BY value DESC;
```

## Understanding and Resolving Common Bottlenecks

Slow performance in ClickHouse is often caused by suboptimal queries, improper indexing (i.e., no primary key usage), disk I/O, or high memory usage.

### Common Causes of Slow Queries:

- **Large table scans:** Caused by missing filtering conditions or lack of primary key usage.
- **JOINS on unindexed keys:** Inefficient joins can result in full-table scans.
- **High cardinality aggregations:** Especially costly without optimization (e.g., using `uniqExact()`).
- **High insert latency:** Triggered by too frequent small batch writes.
- **Disk bottlenecks:** Heavy merges or large result sets can overload I/O.

### Best Practices to Avoid Slow Queries:

- **Use appropriate filtering:** Always filter with indexed columns (usually primary keys).
- **Avoid SELECT \*:** Specify only the needed columns.
- **Use sampling when possible:** ClickHouse supports `SAMPLE` clause on MergeTree tables.
- **Use LIMIT:** Avoid returning large result sets when debugging.
- **Optimize JOINS:** Prefer `ANY INNER JOIN` or `JOIN ... USING` for performance.

## Optimizing with Configuration Changes

ClickHouse performance can be tuned via its configuration files (config.xml and users.xml) or environment variables. For Docker Compose setups, these can be overridden via docker-compose.override.yml.

## Adjust Query and Memory Settings Dynamically

Some performance-related settings can be changed per session or globally:

```
SET max_memory_usage = 20000000000;  
SET max_threads = 4;  
SET log_queries = 1;
```

To make permanent changes, modify your config.xml or users.xml inside the container volume mount.

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