Detect and terminate long-running queries

Long-running queries can significantly impact database performance by consuming CPU, memory, and I/O resources over extended periods. In production environments like Elestio, it’s important to monitor for these queries and take timely action to terminate them when necessary. PostgreSQL provides built-in monitoring tools and system views to help detect problematic queries and respond accordingly. This guide covers how to identify and cancel long-running queries using PostgreSQL’s terminal tools, Docker Compose environments, and logging features, along with preventive practices.

Identifying Long-Running Queries via Terminal

When connected to your PostgreSQL service through the terminal using psql, you can check which queries are running and how long they have been active. This can help identify queries that are stuck, inefficient, or blocked.

To list all active queries sorted by duration, you can use:

```
SELECT pid, now() - query_start AS duration, state, query
FROM pg_stat_activity
WHERE state = 'active'
ORDER BY duration DESC;
```

This query reveals which operations have been running the longest and their current state. If you want to isolate queries that have exceeded a specific duration (e.g., 1 minute), add a time filter:

```
SELECT pid, now() - query_start AS runtime, query
FROM pg_stat_activity
WHERE state = 'active' AND now() - query_start > interval '1 minute';
```

These queries help you locate potential performance bottlenecks in real time.

Terminating Long-Running Queries Safely

Once a problematic query is identified, PostgreSQL allows you to cancel it using the pid (process ID). If you want to cancel the query without affecting the client session, use:

```
SELECT pg_cancel_backend(<pid>);
```

This tells PostgreSQL to stop the running query, but keep the session connected. If the query is unresponsive or the client is idle for too long, you can fully terminate the session using:

```
SELECT pg_terminate_backend(<pid>);
```

This forcibly closes the session and stops the query. Termination should be used cautiously, especially in shared application environments.

Working Within Docker Compose Environments

If PostgreSQL is deployed using Docker Compose on Elestio, you can detect and manage queries from inside the container. Start by entering the container:

```
docker-compose exec postgres bash
```

Inside the container, connect to the database with:

```
psql -U $POSTGRES_USER -d $POSTGRES_DB
```

From here, you can use the same commands as above to monitor and cancel long-running queries. The logic remains the same; you’re simply operating inside the container’s shell environment.

Using Logs and Monitoring Tools

PostgreSQL supports logging queries that exceed a certain duration threshold, which is useful for long-term monitoring and post-incident review. To enable this, modify your postgresql.conf file and set:

```
log_min_duration_statement = 500
```

This setting logs every query that takes longer than 500 milliseconds. The logs are written to PostgreSQL's log files, which you can access through the Elestio dashboard (if supported) or inside the container under the PostgreSQL data directory.

For cumulative insights, enable the pg_stat_statements extension to track long-running queries over time:

```
CREATE EXTENSION IF NOT EXISTS pg_stat_statements;
```

Then query the collected data:

```
SELECT query, total_time, mean_time, calls
FROM pg_stat_statements
ORDER BY total_time DESC
LIMIT 10;
```

This shows which queries are consistently expensive, not just slow once.

Best Practices to Prevent Long-Running Queries

Preventing long-running queries is more effective than terminating them after the fact. Start by indexing columns used in WHERE, JOIN, and ORDER BY clauses. Use query analysis tools like EXPLAIN ANALYZE to find out how queries are executed and where performance issues may occur.

Also, consider setting timeouts for queries. At the session level, you can use:

```
SET statement_timeout = '2s';
```

This automatically cancels any query that runs longer than 2 seconds. For applications, set timeout configurations in the client or ORM layer to ensure they don't wait indefinitely on slow queries. Monitoring tools and alerts can help you detect abnormal query behavior early. If you're managing your own monitoring stack, connect it to PostgreSQL logs or pg_stat_activity to trigger alerts for long-running operations.

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