FOSSASIA SUMMIT 2025

Automating Database Failover Across Two Data Centers with Open-Source Tools

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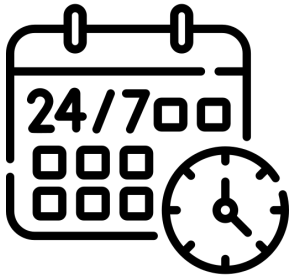
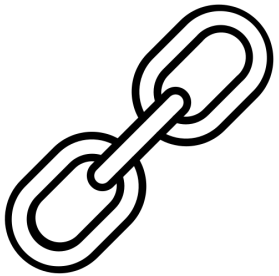
Agenda

- Business objective
- Prometheus and Grafana
- Database failover scenario
- Q&A

Business objective

- Business Continuity Plan (BCP)
- High Availability
- Robustness





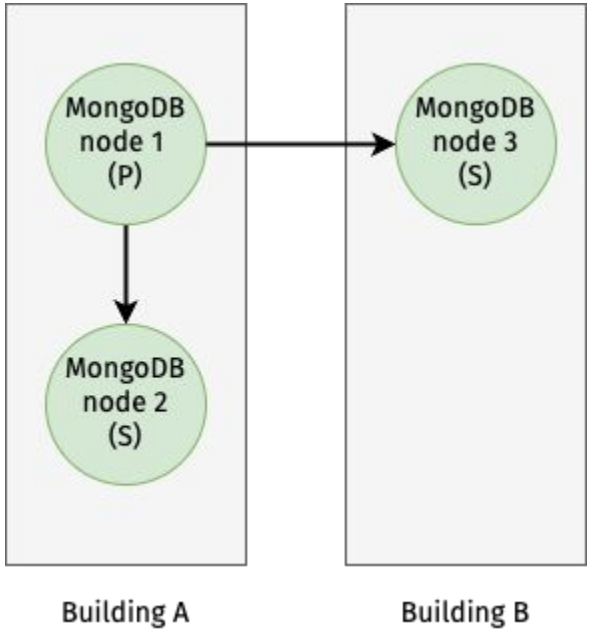
Prometheus

- Time-Series data storage
- Powerful Query Language (PromQL)
- Pull-Based Metrics Collection

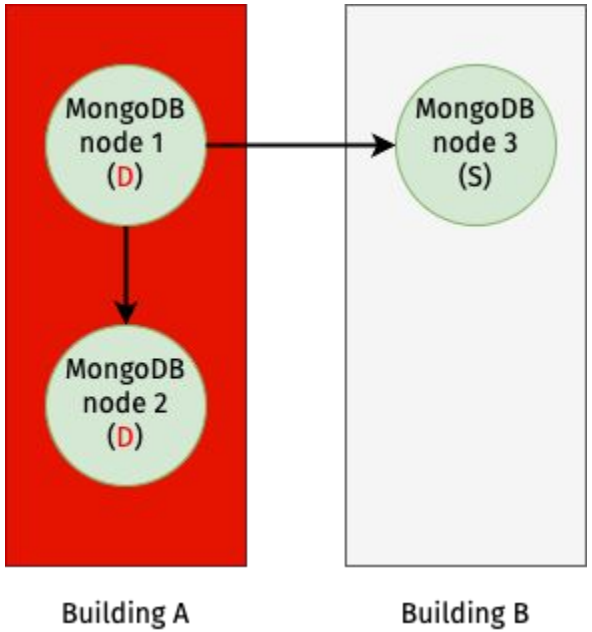
Grafana

- Customizable dashboards
- Multiple data sources
- Advanced alerting system
- Plugin and Extensibility

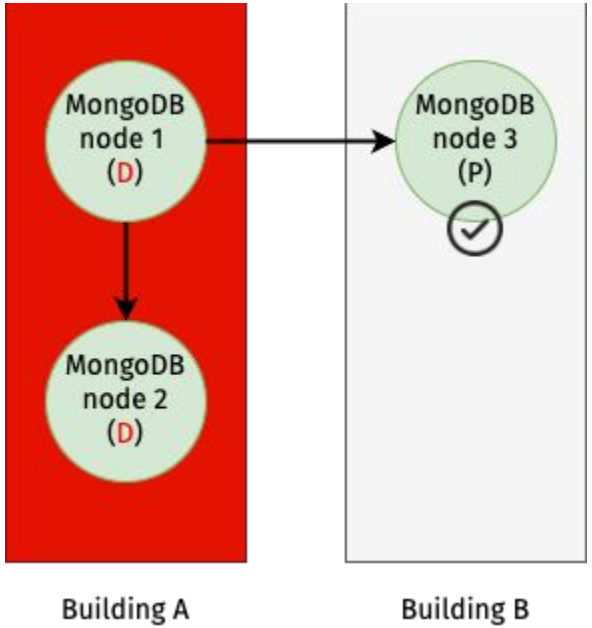
Database failover scenario



Database failover scenario



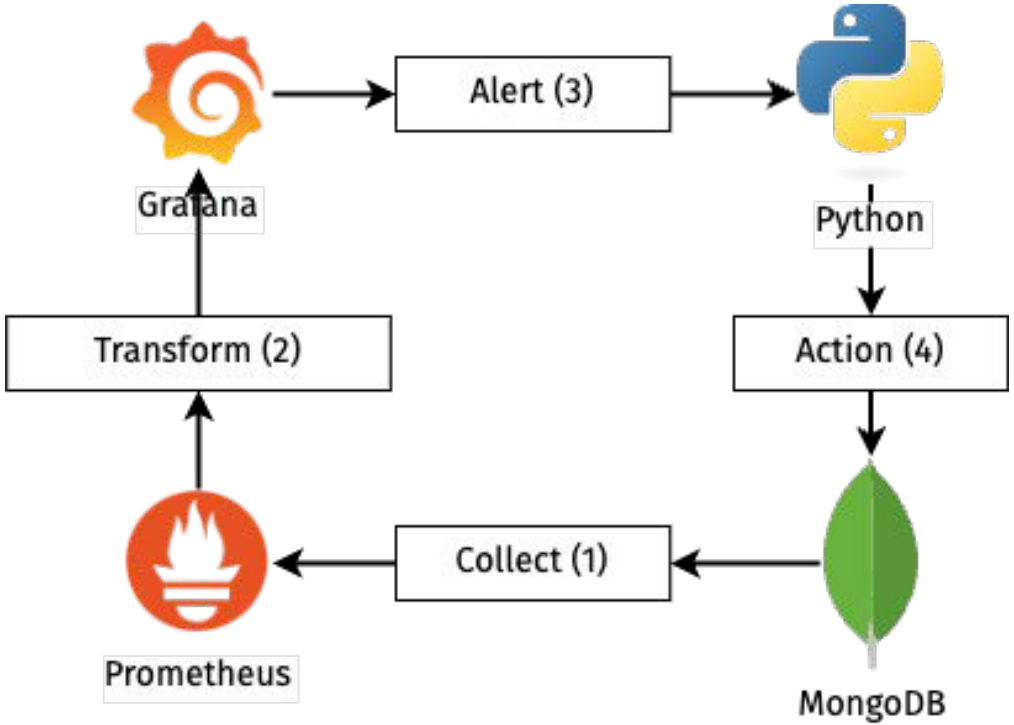
Database failover scenario



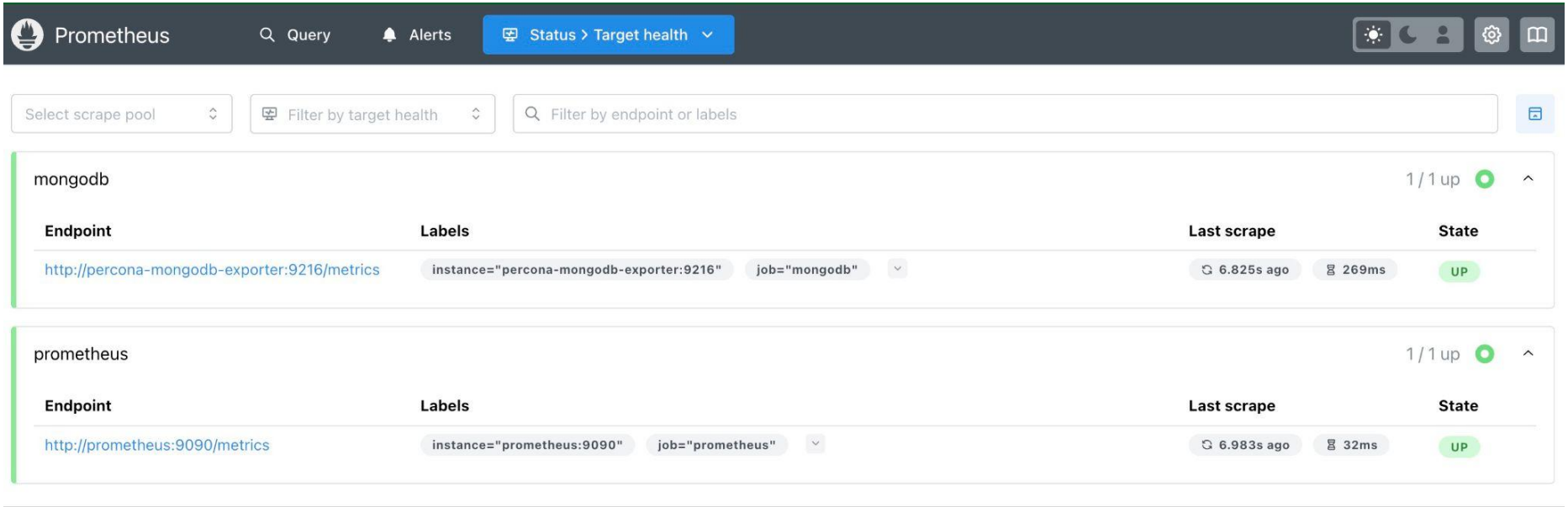
Components

- Grafana
- Prometheus
- MongoDB Percona Exporter
- MongoDB Community Edition

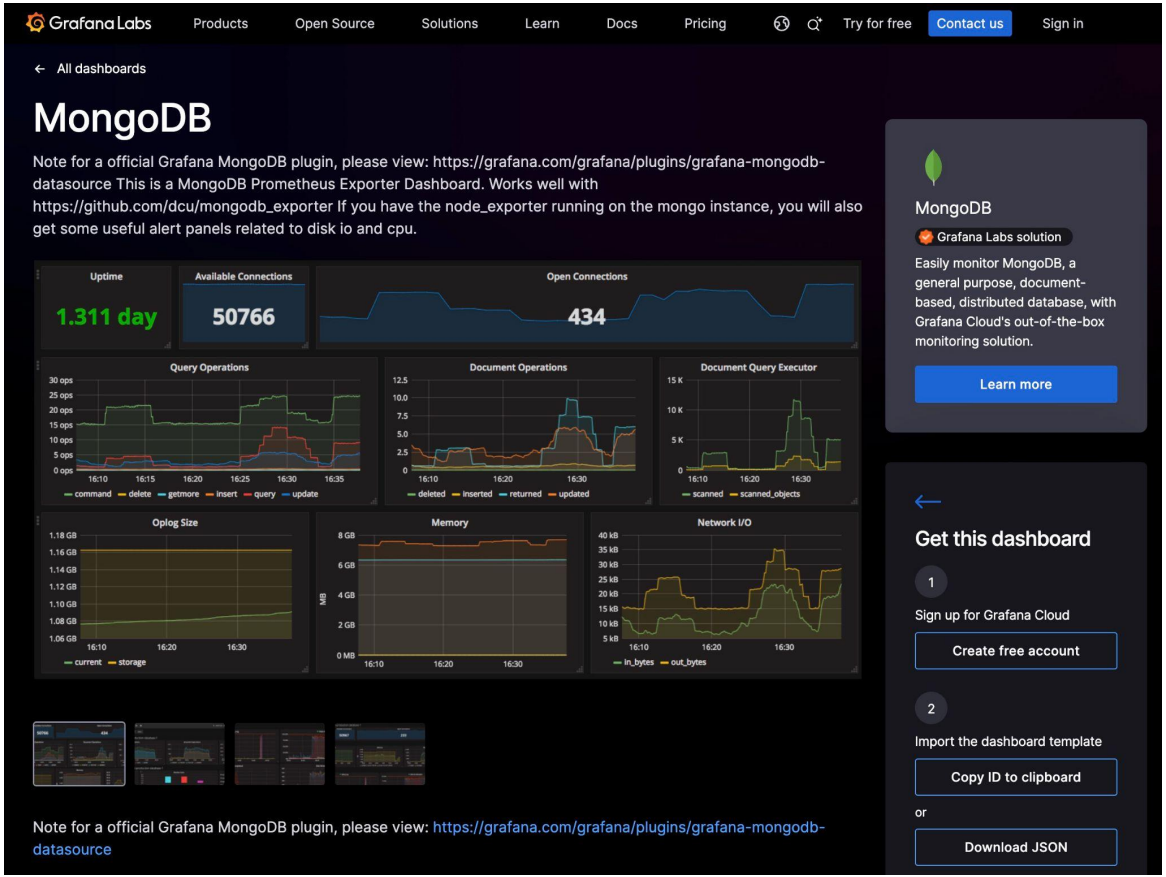
Solution


Alert (3)
Grafana
Python
Transform (2)
Action (4)
Collect (1)
Prometheus
MongoDB

Step (1) - Collect

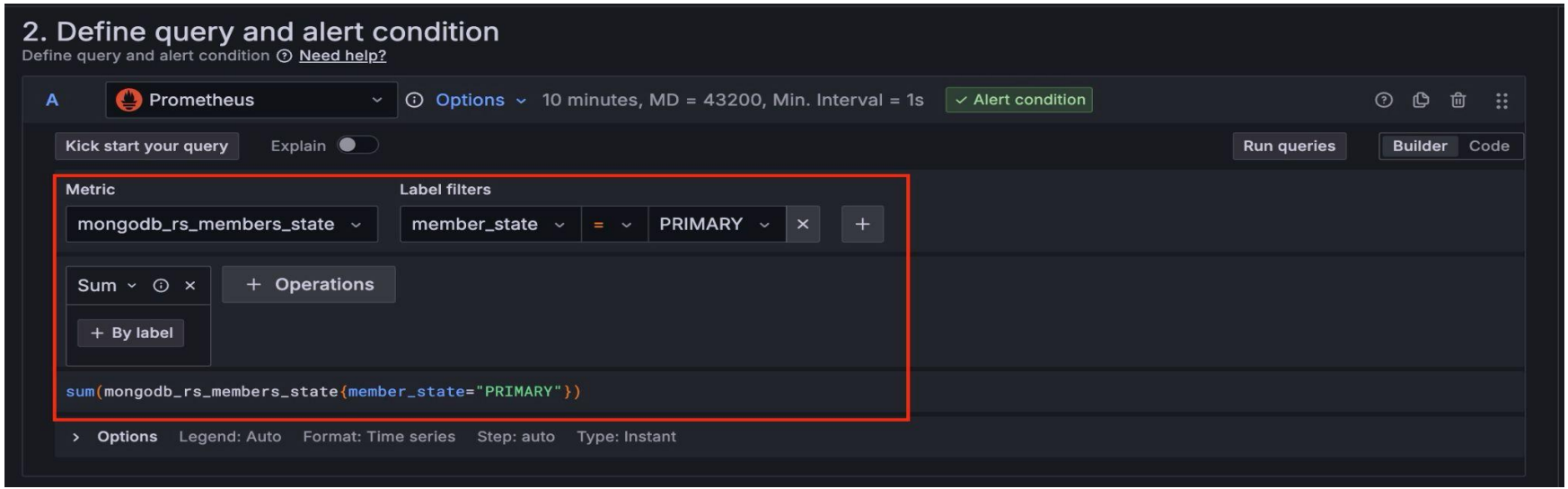


Step (2) - Transform

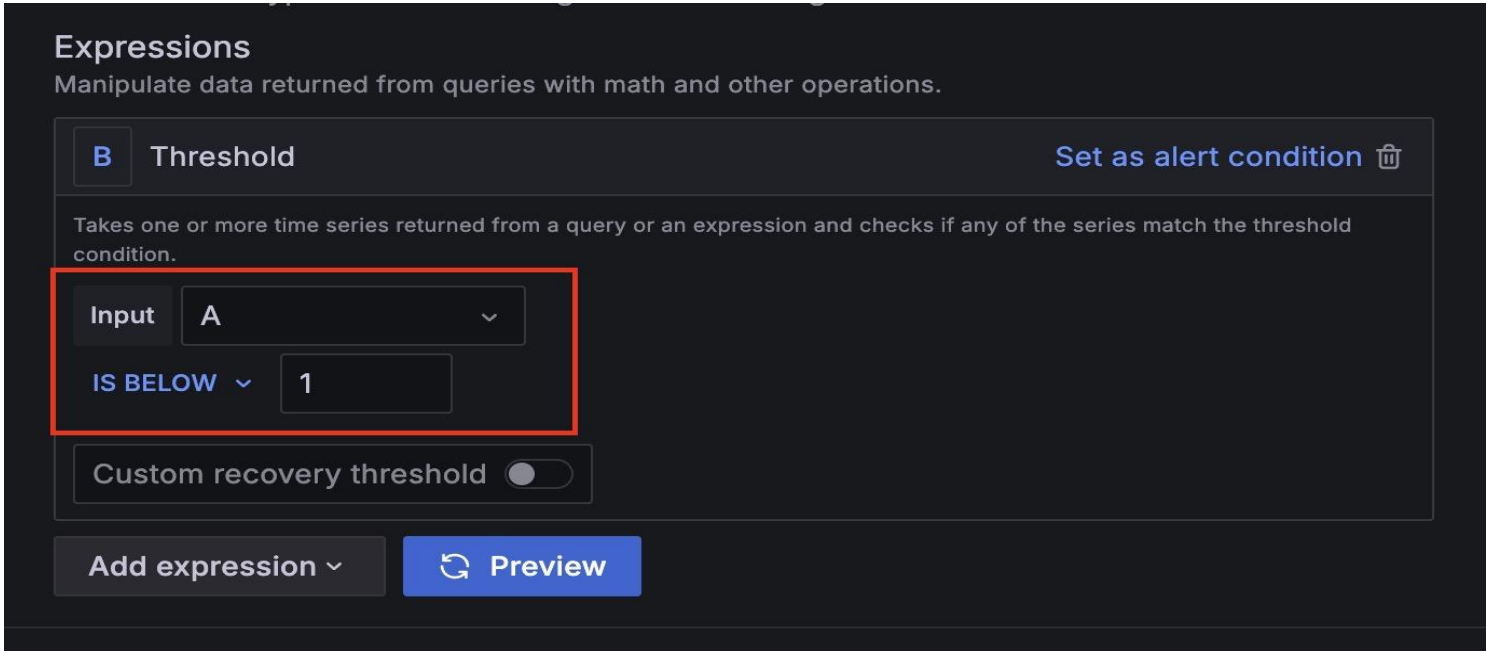


Step (2) - Transform

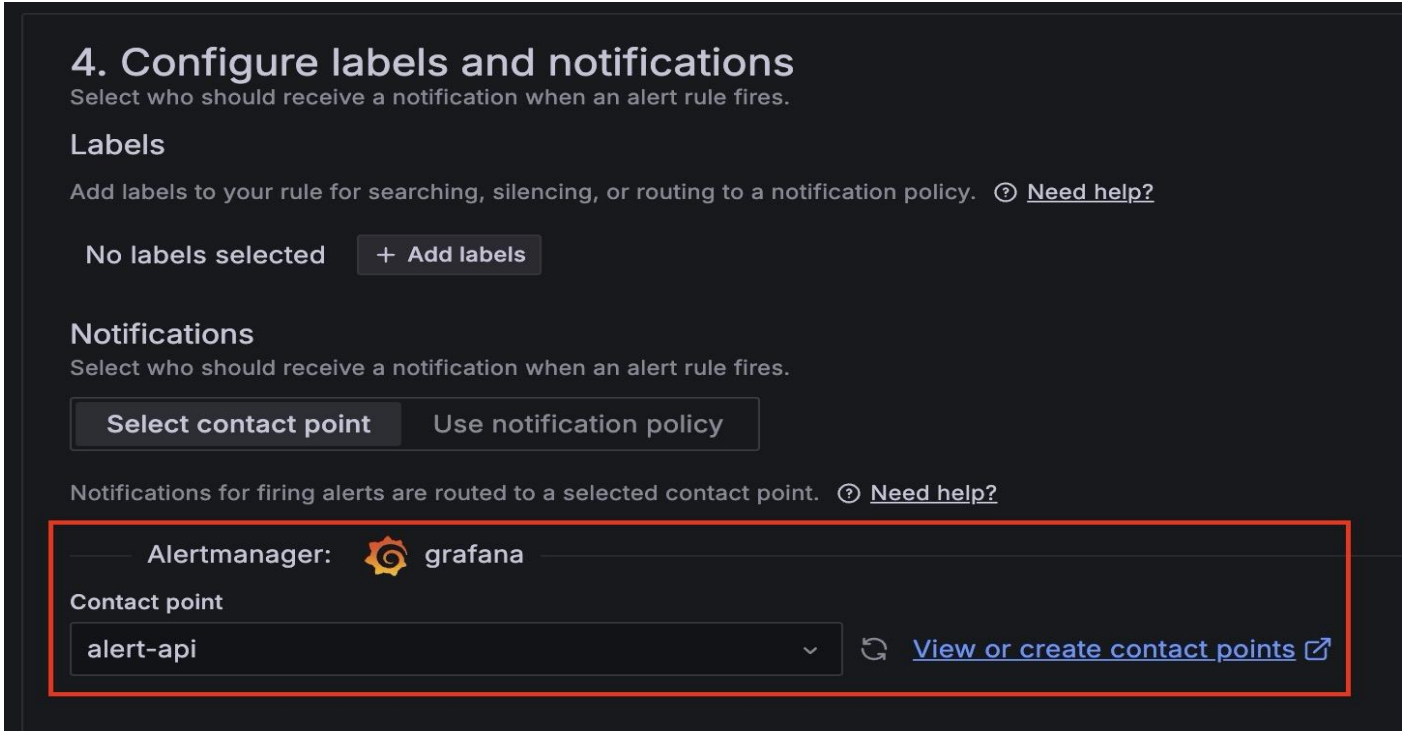
Step (3) - Alert


2. Define query and alert condition
Define query and alert condition
Need help?
A
Prometheus
Options
10 minutes, MD = 43200, Min. Interval = 1s
Alert condition
Kick start your query
Explain
Run queries
Builder
Code
Metric
mongodb_rs_members_state
Label filters
member_state
=
PRIMARY
Sum
Operations
By label
sum(mongodb_rs_members_state{member_state="PRIMARY"})
Options
Legend: Auto
Format: Time series
Step: auto
Type: Instant

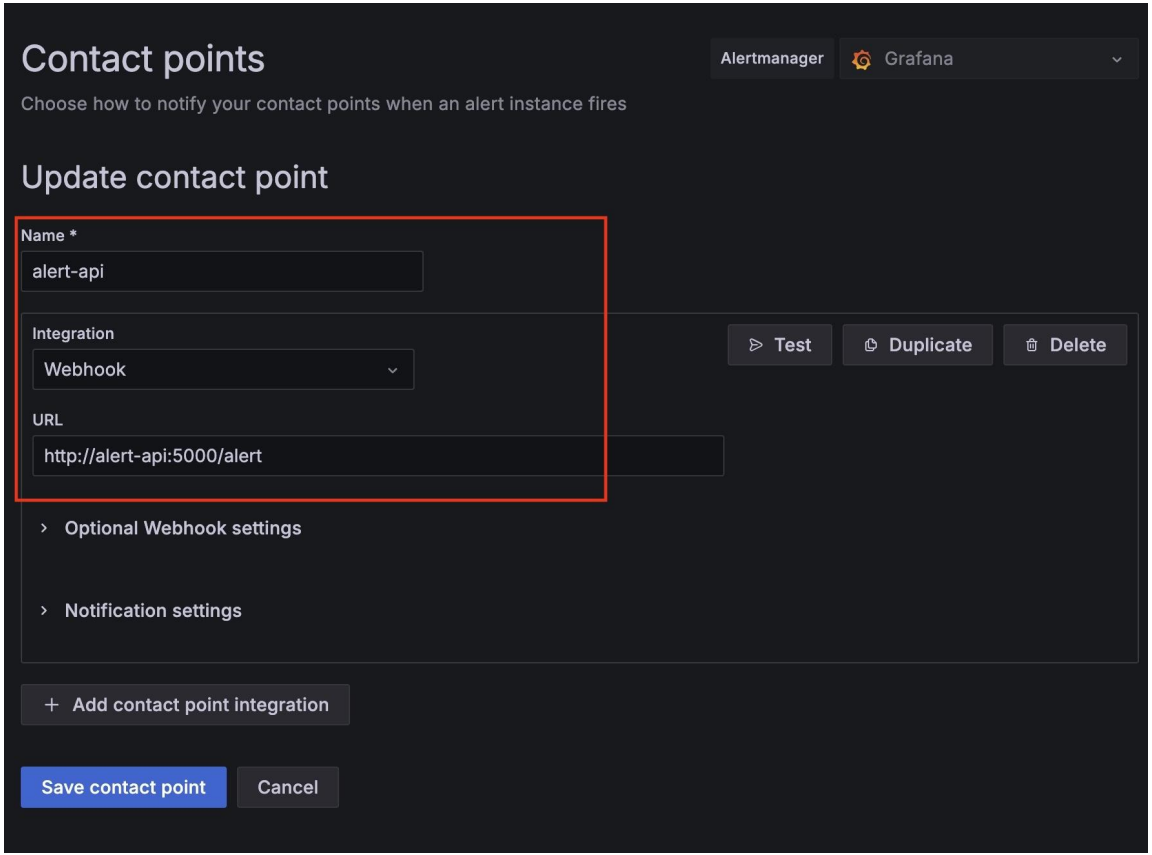
Step (3) - Alert


Expressions
Manipulate data returned from queries with math and other operations.
B
Threshold
Set as alert condition
Takes one or more time series returned from a query or an expression and checks if any of the series match the threshold condition.
Input
A
IS BELOW
1
Custom recovery threshold
Add expression
Preview

Step (3) - Alert


4. Configure labels and notifications
Select who should receive a notification when an alert rule fires.
Labels
Add labels to your rule for searching, silencing, or routing to a notification policy.
Need help?
No labels selected
+ Add labels
Notifications
Select who should receive a notification when an alert rule fires.
Select contact point
Use notification policy
Notifications for firing alerts are routed to a selected contact point.
Need help?
Alertmanager:
grafana
Contact point
alert-api
View or create contact points

Step (3) - Alert


Contact points
Alertmanager
Grafana
Choose how to notify your contact points when an alert instance fires
Update contact point
Name *
alert-api
Integration
Webhook
Test
Duplicate
Delete
URL
http://alert-api:5000/alert
Optional Webhook settings
Notification settings
Add contact point integration
Save contact point
Cancel

Step (4) - Action

```
for node in all_mongo_nodes:
    mongo_uri = f"mongodb://{node}?directConnection=true&serverSelectionTimeoutMS=2000"
    client = MongoClient(mongo_uri)
    try:
        logging.info(f"Trying to connect to {node}")
        client.admin.command("ping")
        logging.info(f"Connected to {node}")
        ok_nodes.append(node)
    except ConnectionFailure as e:
        logging.info(f"Failed to connect to {node}: {e}")
        failed_nodes.append(node)
        continue
```

Step (4) - Action

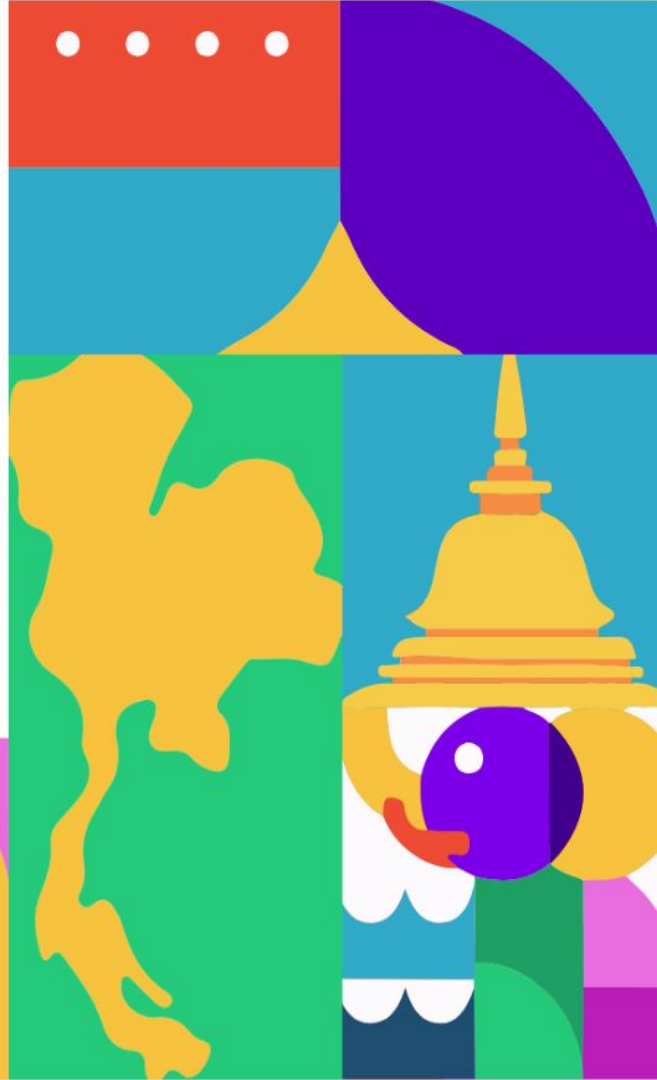
```
if len(ok_nodes) == 1:
    ok_node = ok_nodes[0]
    mongo_uri = f"mongodb://{ok_node}?directConnection=true&serverSelectionTimeoutMS=2000"
    client = MongoClient(mongo_uri)
    try:
        logging.info(f"Trying to connect to {ok_node}")
        client.admin.command("ping")
        logging.info(f"Connected to {ok_node}")
        cfg = client.admin.command("replSetGetConfig")
        members = cfg["config"]["members"]
        for member in members:
            if member["host"] != ok_node:
                member["priority"] = 0
                member["votes"] = 0
        logging.info(f"New config: {cfg}")
        result = client.admin.command("replSetReconfig", cfg["config"], force=True)
        logging.info(f"Reconfig result: {result}")
    except ConnectionFailure as e:
        logging.info(f"Failed to connect to {ok_node}: {e}")
```

PyCon Thailand 2025

Workshop Day
17 October 2025
@Microsoft Thailand

Conference Days
18 October 2025
@Avani Sukhumvit Bangkok

https://th.pycon.org



References

- https://github.com/ninefyi/fossasia-2025
- https://github.com/percona/mongodb_exporter
- https://grafana.com/grafana/dashboards/2583-mongodb/
- https://pymongo.readthedocs.io/en/stable/index.html

Thank you