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Monitoring Expressway Metrics Using Collectd and API

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BRKCOL-2056

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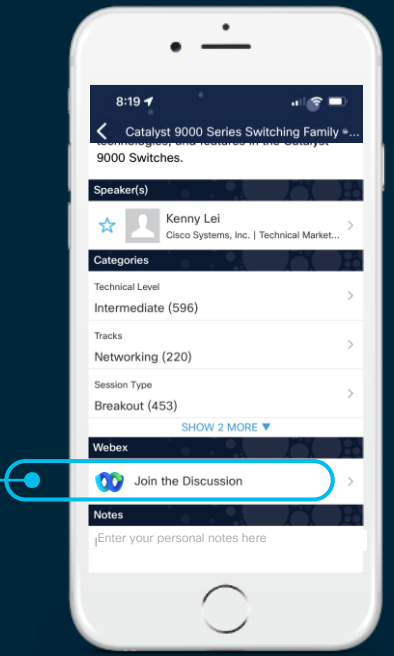

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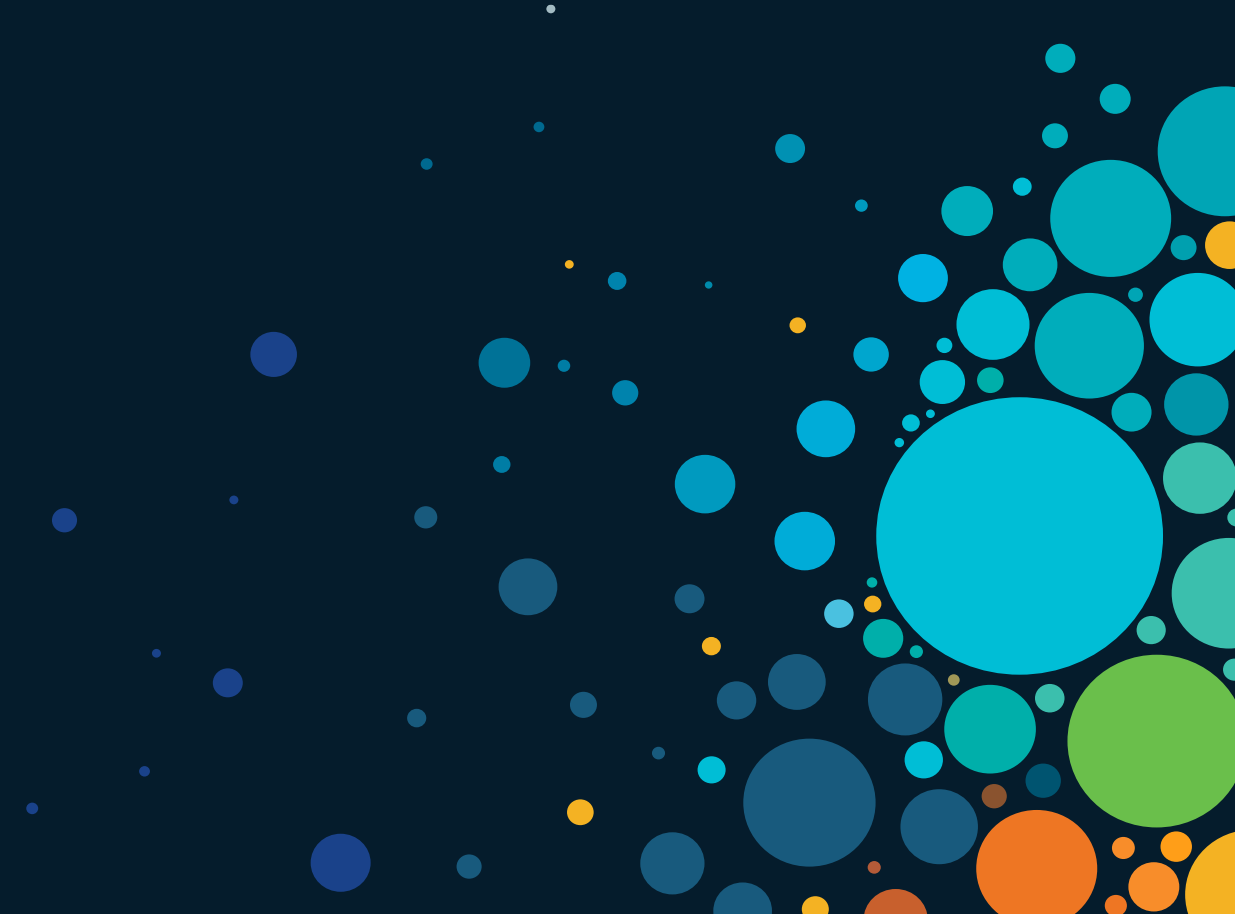
Agenda

- Introduction
- Expressway Collectd
- Grafana Dashboard
- REST API
- Conclusion

Introduction

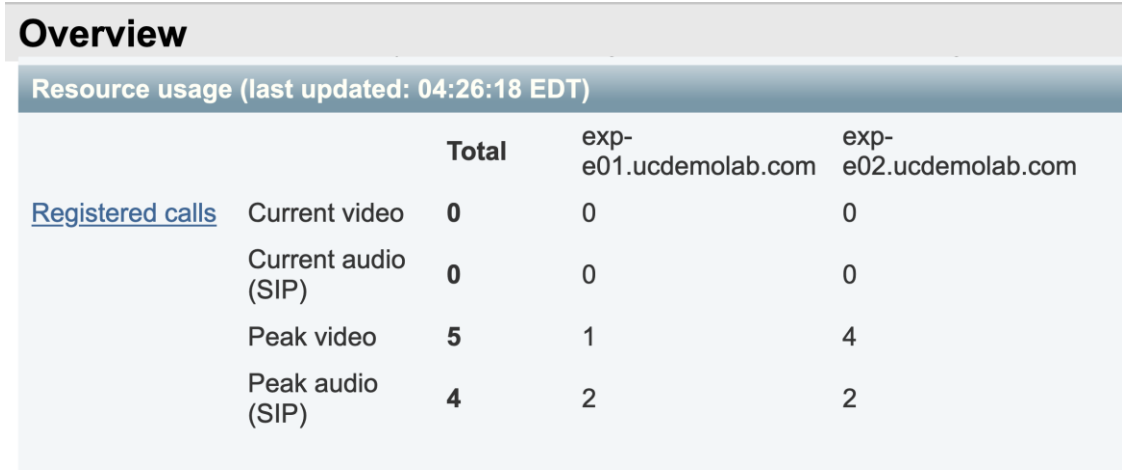


Why we need metrics?

- In March 2020, there was no MRA registration counter in the web UI.
- You had to use RTMT to review the number of devices connected via Expressways.
- It was difficult to decide if more Expressway servers were required when the employees were moving to work from home.
- X12.6.1 introduced a counter of the MRA registrations in the Exp-E servers. This counter shows the current and max registrations at an Expressway-server.

Expressway Overview Page

- Limited view of the statistics, only current and peak values.
- Multiple clusters need to be reviewed separately, taking more time to do a simple status check.



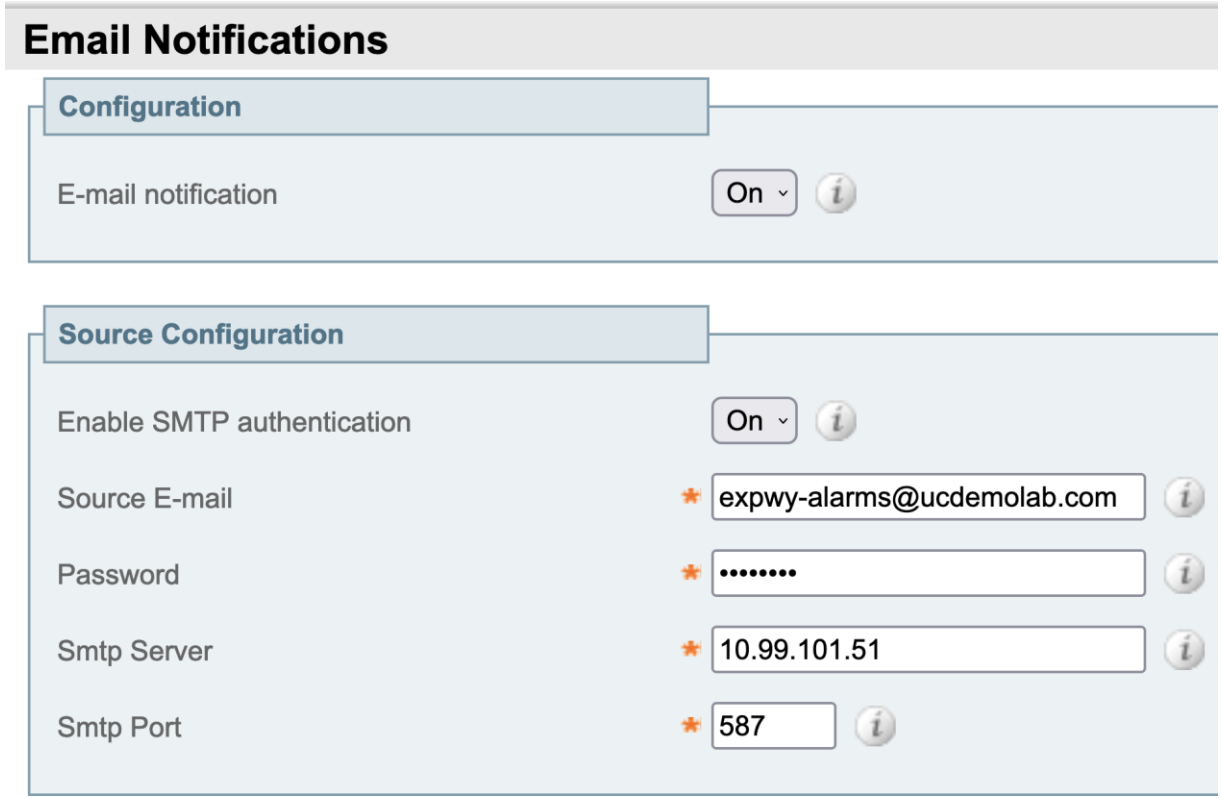
Overview

Resource usage (last updated: 04:26:18 EDT)

		Total	exp-e01.ucdemolab.com	exp-e02.ucdemolab.com
Registered calls	Current video	**0**	0	0
	Current audio (SIP)	**0**	0	0
	Peak video	**5**	1	4
	Peak audio (SIP)	**4**	2	2

MRA Registrations	Current	**2**	2	0
	Peak	**10**	5	5

Alarm-Based Email Notifications



- You can receive emails when a new alarm is raised in your Expressway servers.
- It allows you to customize the notifications, you could disable email notifications for specific alarms.

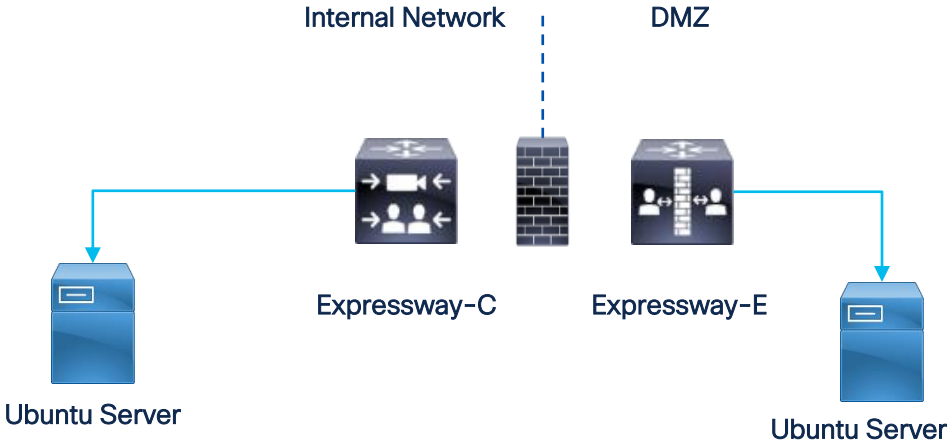
Advantages of Proactive Monitoring

- Detect increased usage before it affects production.
- Identify issues before users create a report.
- Keep track of the system performance for each server in a cluster.
- Simplify the review of metrics using graphics.

Expressway Metrics

Expressway Metrics

- Expressway collects statistics about the performance of the Hardware, OS and application.
- These statistics can be pushed to a remote server running the collectd daemon.



Depending on your security policies, you might need a server installed in the internal and DMZ network.

Collectd Plugins in Expressway

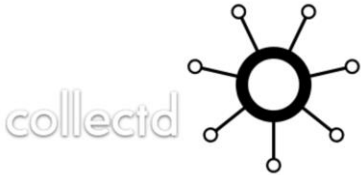
Collectd Plugins	
Aggregation	Protocols
CPU	Process
DF	Statsd
Disk	Swap
Exec-app	Uptime
Load	Users
Memory	Network

- Each plugin will provide information we can use to keep track of the Expressway health.
- For example, from the Exec-app plugin we can get the gauge-active_calls.
- We can review the current and max MRA registrations using the Statsd plugin.

Expressway Metrics

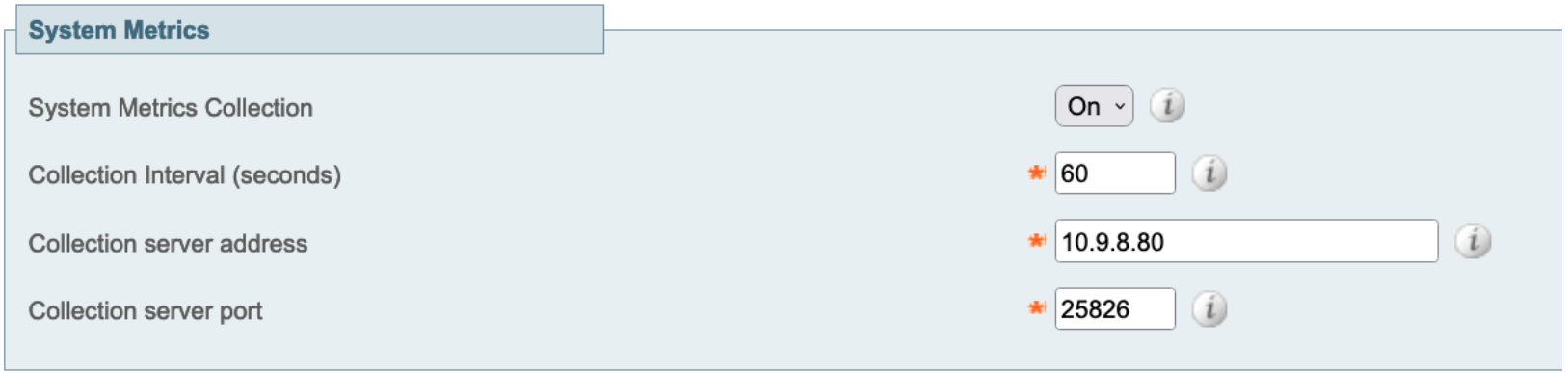
Expressway Metrics Guide

- In your remote server you need to install an application that handles collectd information.
- There are plenty of tools that can handle collectd data, but for this example we will use Graphite running in an Ubuntu Server 20.04.

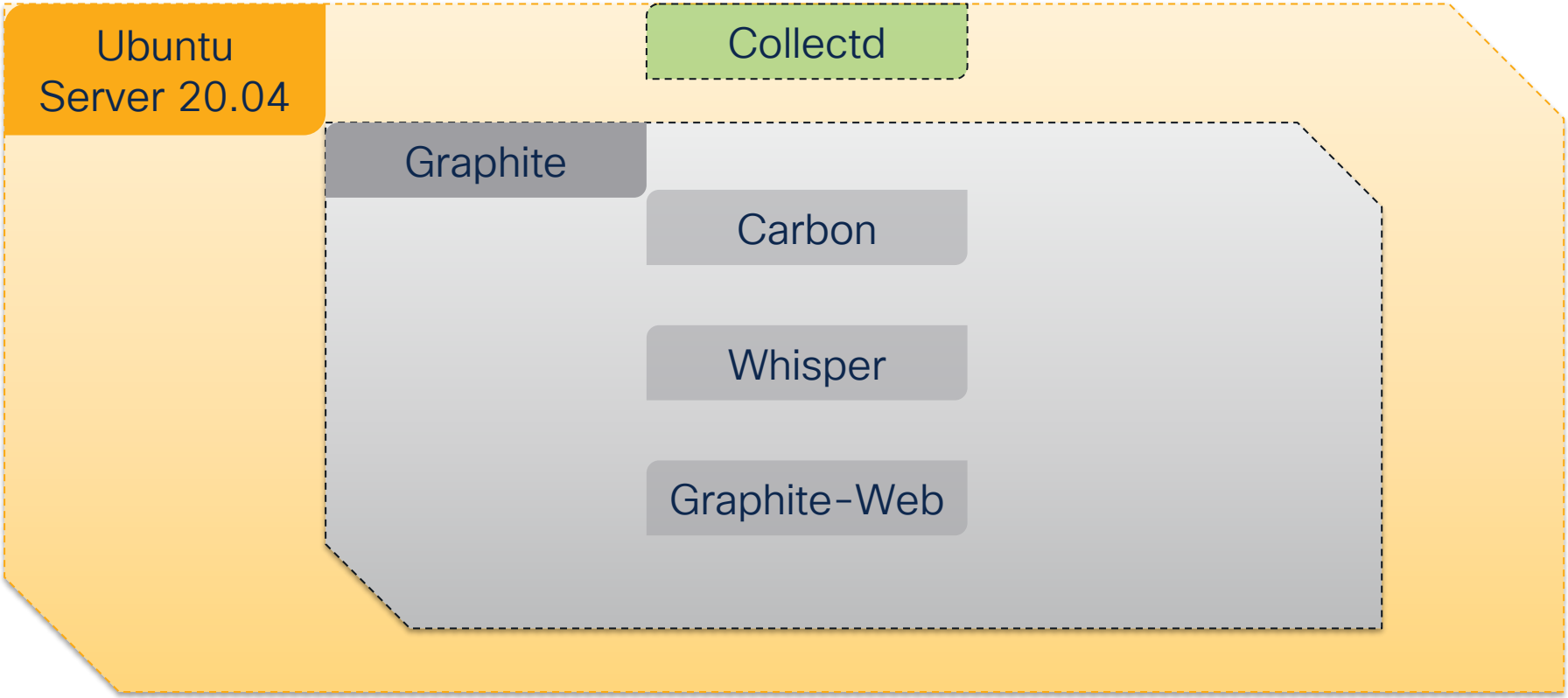


Expressway Metrics

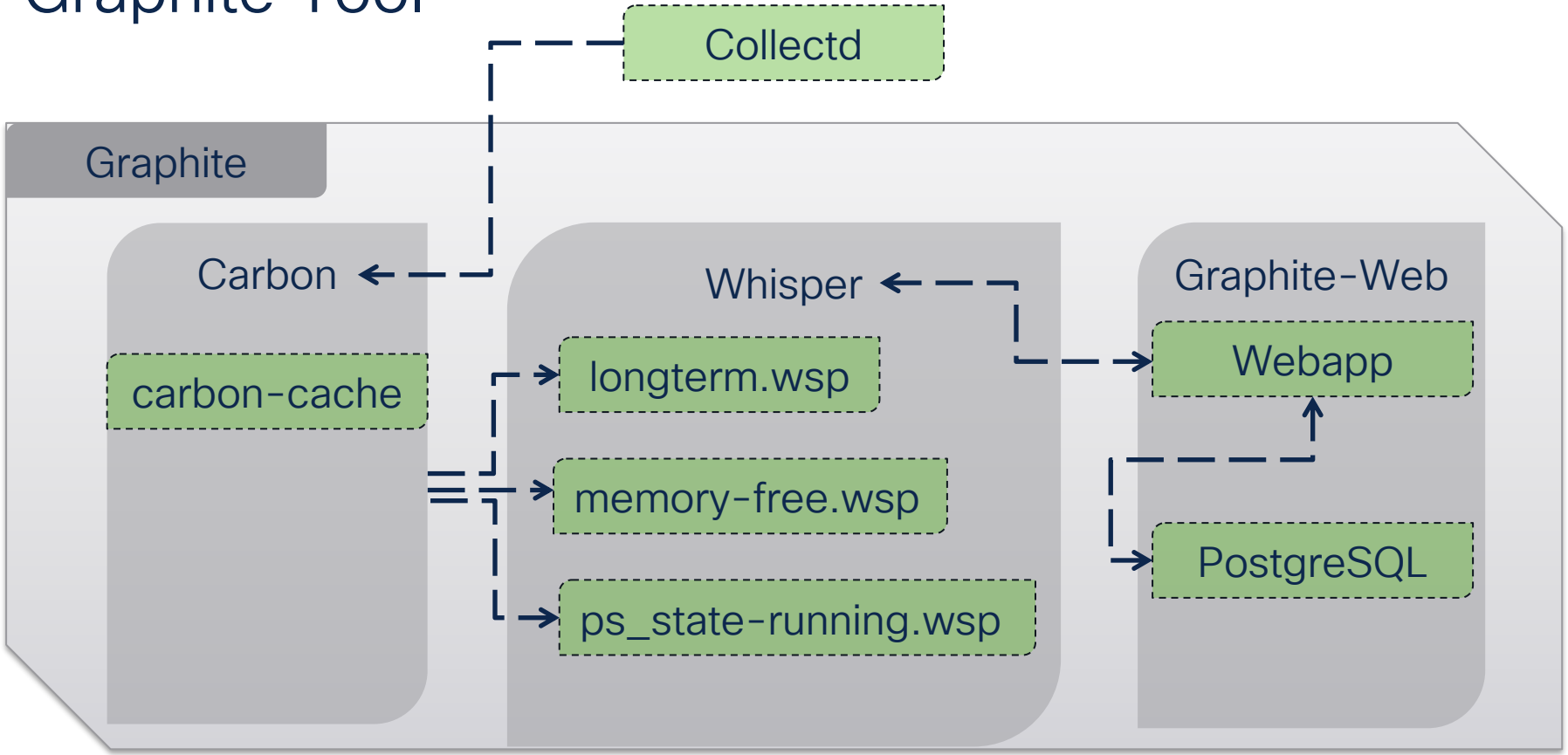
- Configuration in the Expressway server can be done under the Maintenance>Logging page.
- We recommend to keep the interval at 60 seconds to reduce the impact on system performance.



Graphite Tool



Graphite Tool



Collectd

- After installing the Collectd utility, modify the configuration file to listen for data from collectd clients (Expressway).

```
<Plugin "network">
        Listen "198.51.100.15"
</Plugin>
```

graphite

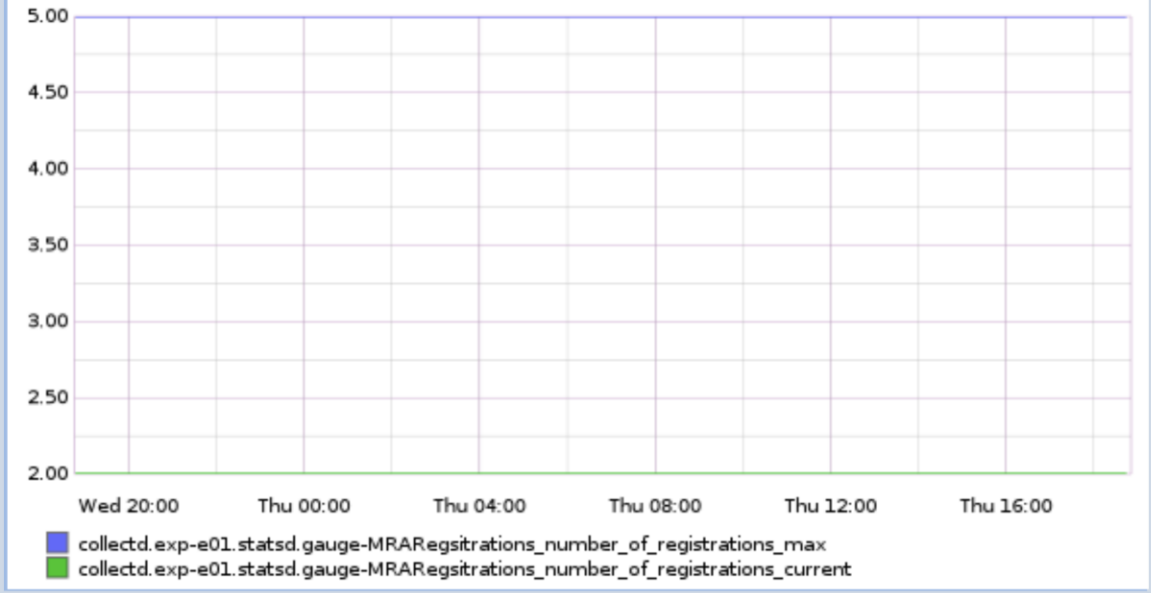
Documentation Dashboard Events Login

Tree Search Auto-Completer

gauge-ICEPassthroughMetrics_prrflxprrflxcalls
gauge-ICEPassthroughMetrics_relayprrflxcalls
gauge-ICEPassthroughMetrics_relayrelaycalls
gauge-ICEPassthroughMetrics_srvrflxprrflxcalls
gauge-ICEPassthroughMetrics_srvrflxrelaycalls
gauge-ICEPassthroughMetrics_srvrflxsrvrflxcalls
gauge-MRARegsitrations_number_of_registrations_current
gauge-MRARegsitrations_number_of_registrations_max
gauge-siptrnsp-0-X_none_stunkeepalive_failureresponses
gauge-siptrnsp-0-X_none_stunkeepalive_requestsdropped
gauge-siptrnsp-0-X_none_stunkeepalive_requestsforwarded
gauge-siptrnsp-0-X_none_stunkeepalive_requestsreceived
gauge-siptrnsp-0-X_none_stunkeepalive_requestsresponded
gauge-siptrnsp-0-X_none_stunkeepalive_responsesdropped
gauge-siptrnsp-0-X_none_stunkeepalive_responsesforwarded
gauge-siptrnsp-0-X_none_stunkeepalive_responsesreceived
gauge-siptrnsp-0-X_none_stunkeepalive_successresponses
swap
uptime
users
p-e02
p-e03

Graphite Composer

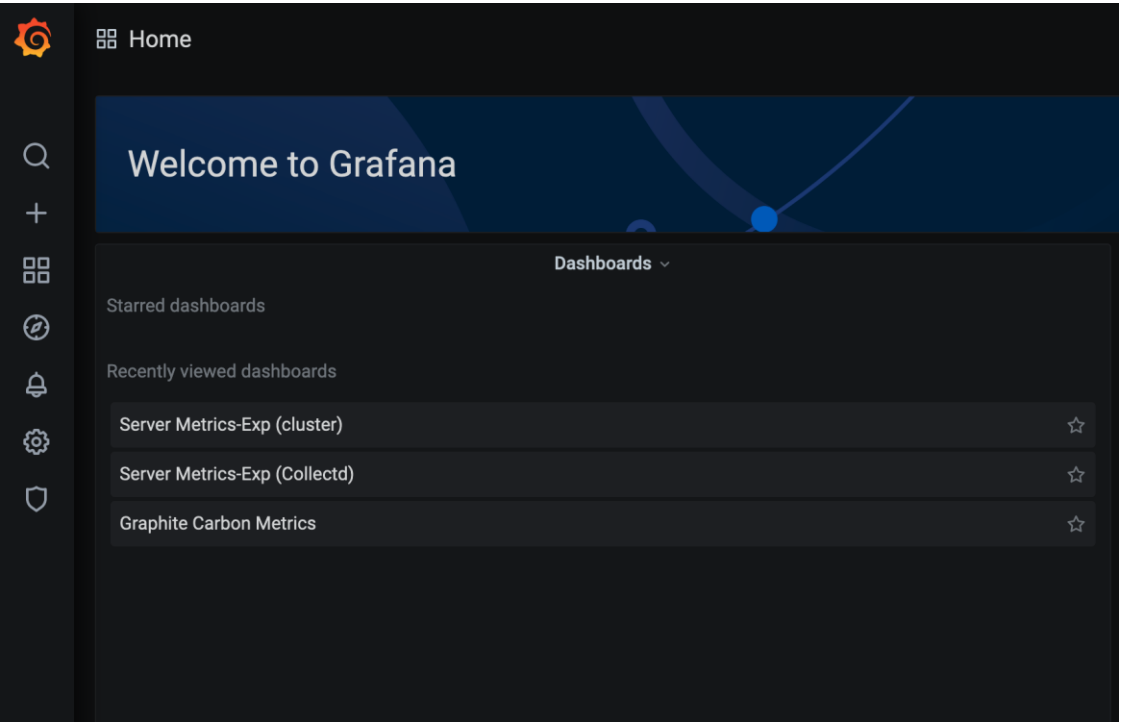
Now showing the past 24 hours



Graph Options Graph Data Auto-Refresh

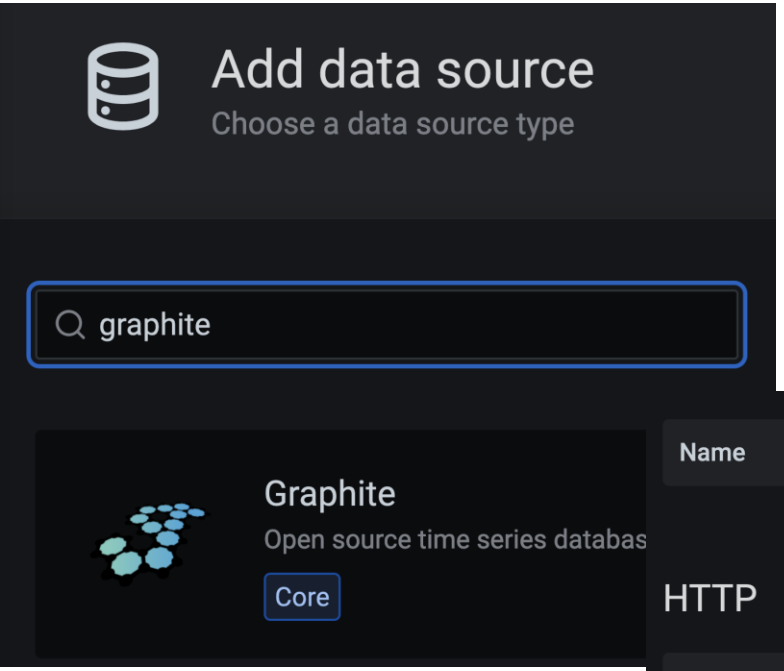
Grafana Dashboard

Grafana Dashboard

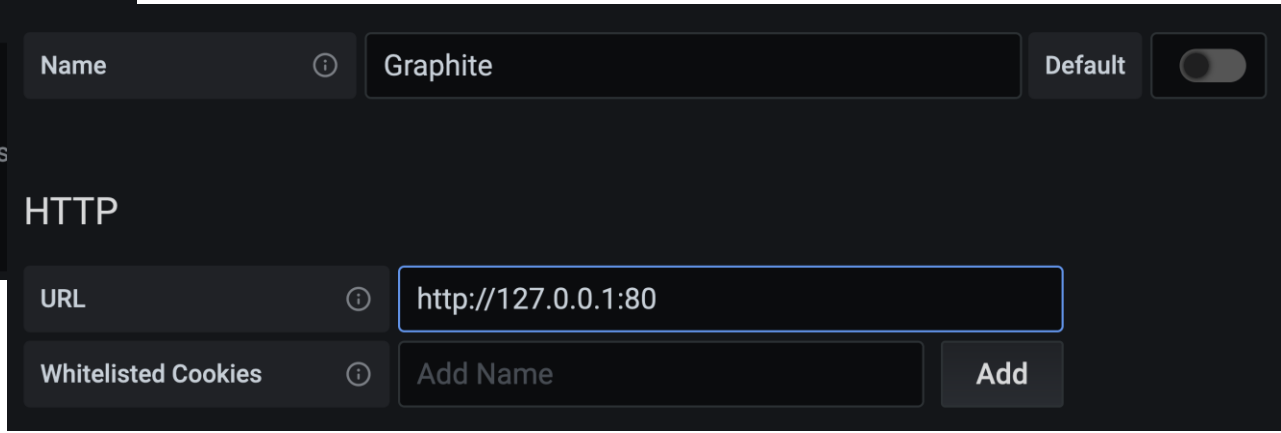


- Grafana is an analytics tool that can be used to create dashboards to monitor metrics.
- It allows you to monitor several Expressway clusters within the same dashboard.
- For this example, we have Grafana running in an Ubuntu server.

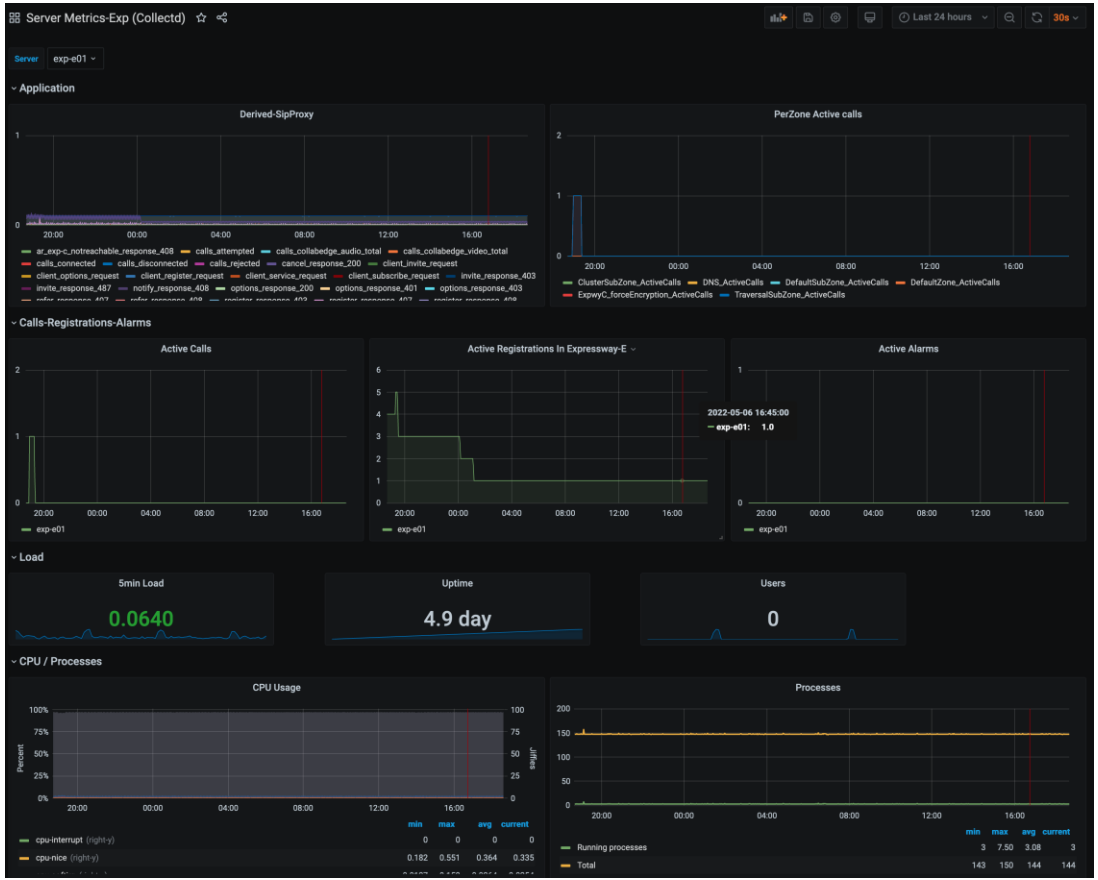
Grafana Dashboard



- From the Settings > Data Sources page, select the option Add New Data Source.
- Select Graphite as the type and specify the IP of the server.



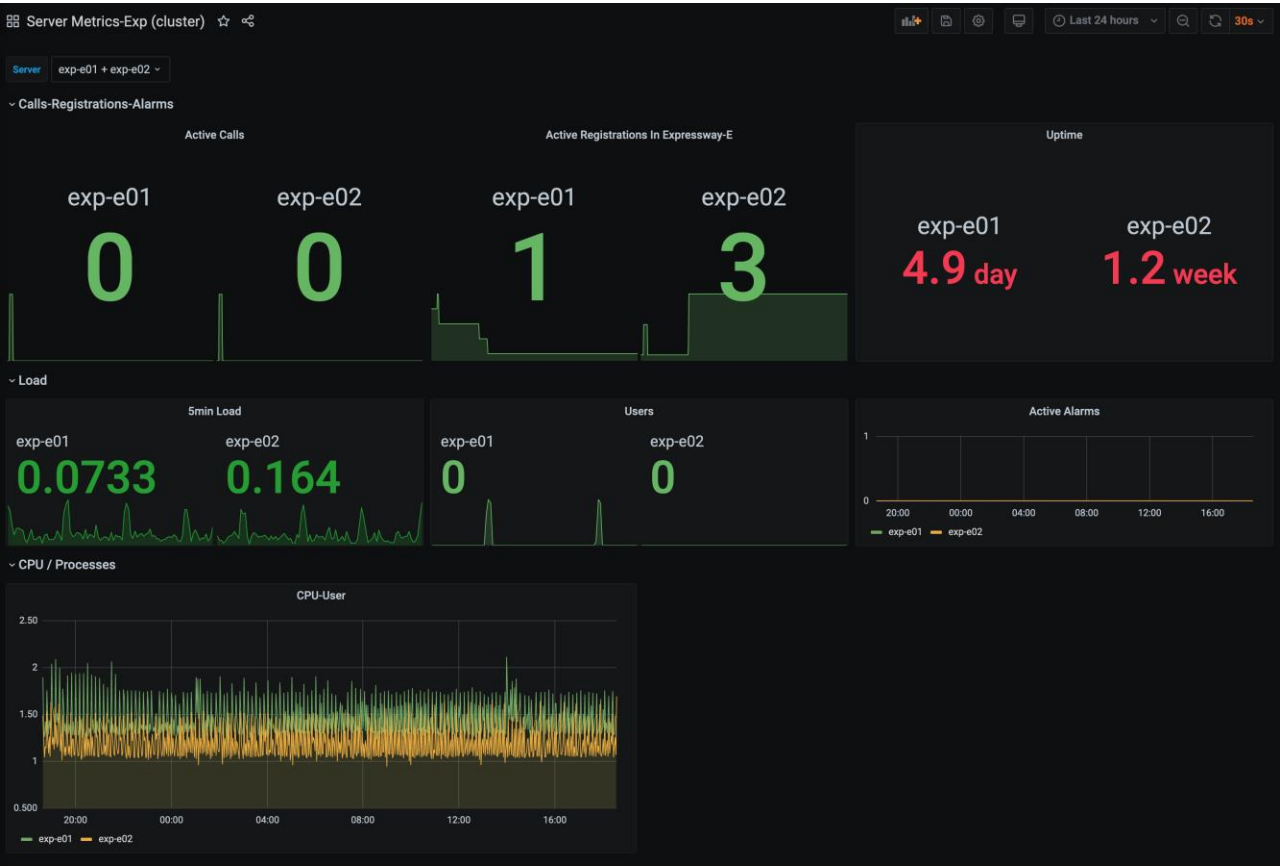
Grafana Dashboard – Server



- The Expressway Metrics guide includes a JSON file to create this dashboard.
- It provides a detailed view per server of most statistics.

Expressway Metrics Guide

Grafana Dashboard – Cluster

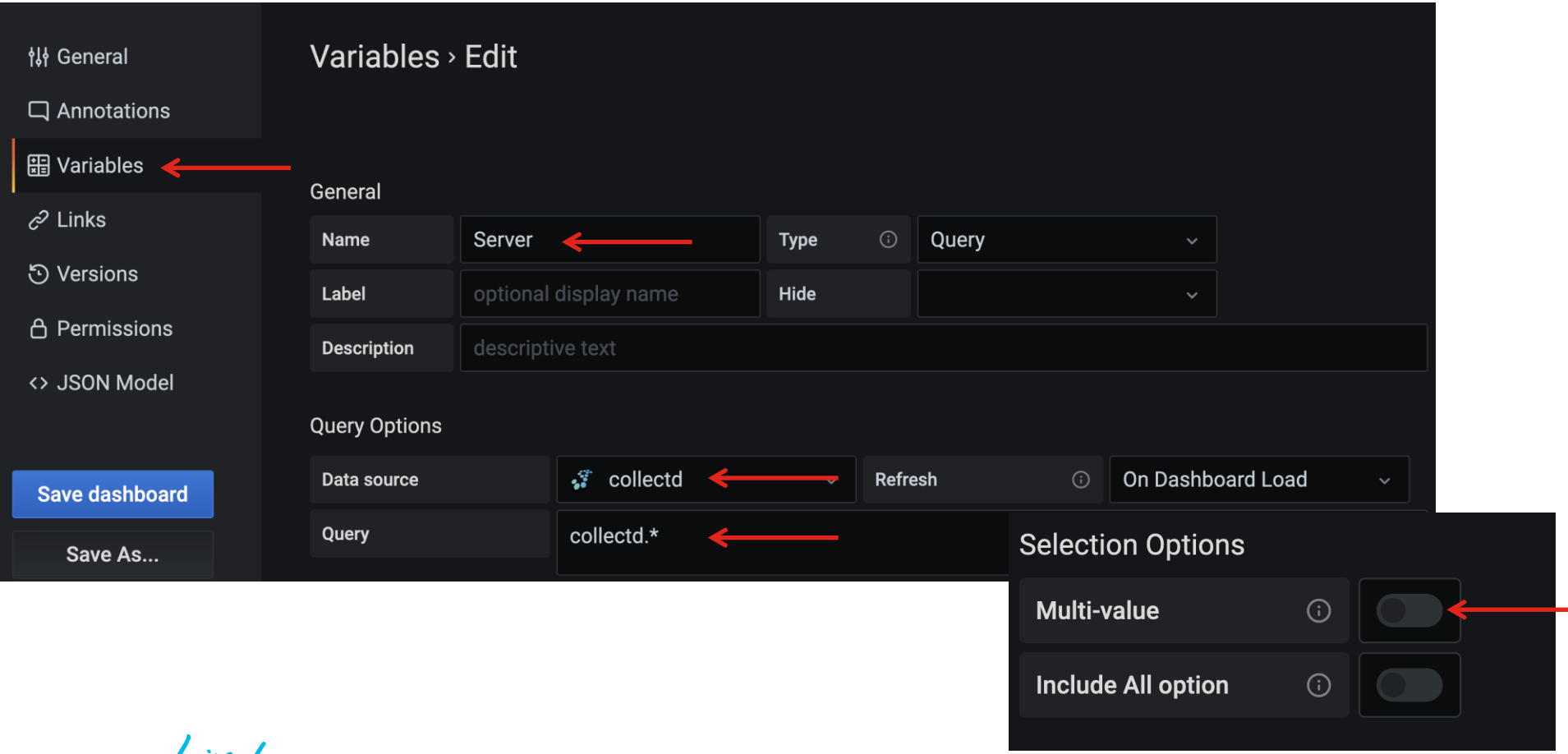


- This dashboard shows data for all the nodes in the cluster in a single page.
- We are only showing some of the most important metrics to simplify the view.

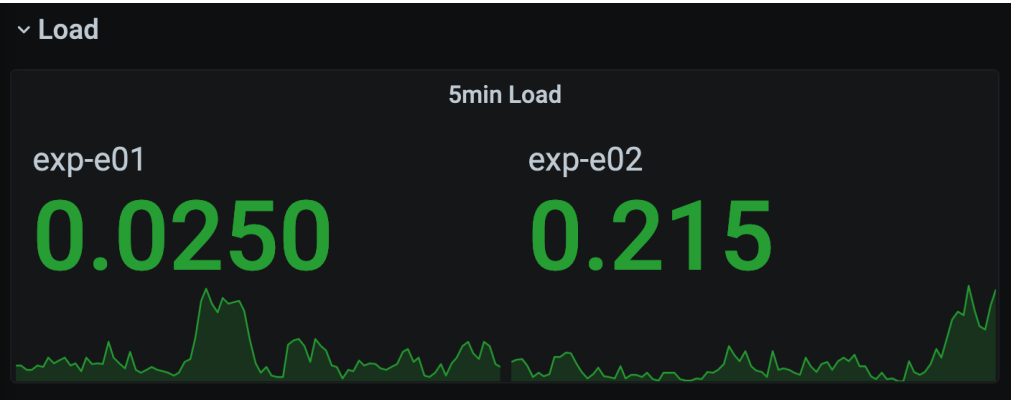
Grafana Dashboard – Cluster vs Server

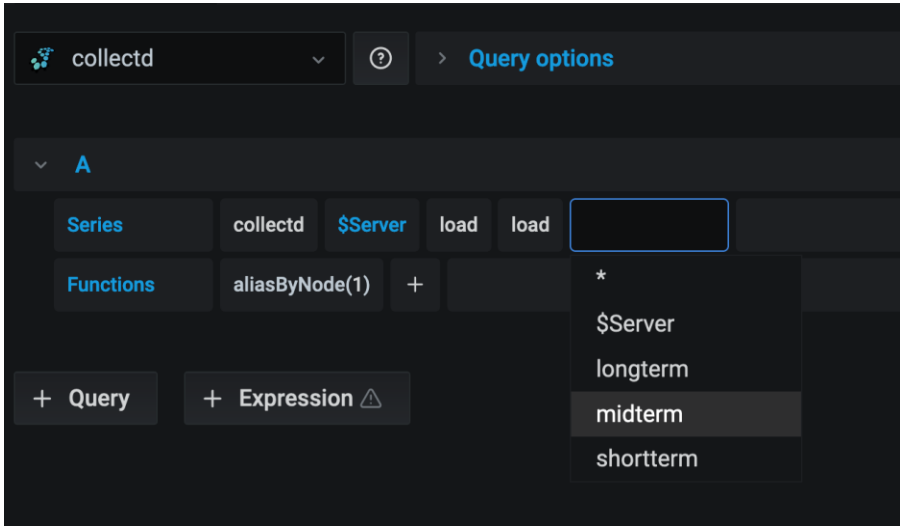
- In the Cluster dashboard you can select multiple Expressway servers.
- Servers selected don't need to belong to the same cluster.
- In the Server dashboard you can only see the detailed stats of one server at a time.
- This is controlled in the variable configuration in the dashboard settings.

Grafana Dashboard – Cluster vs Server



Grafana Dashboard – Load

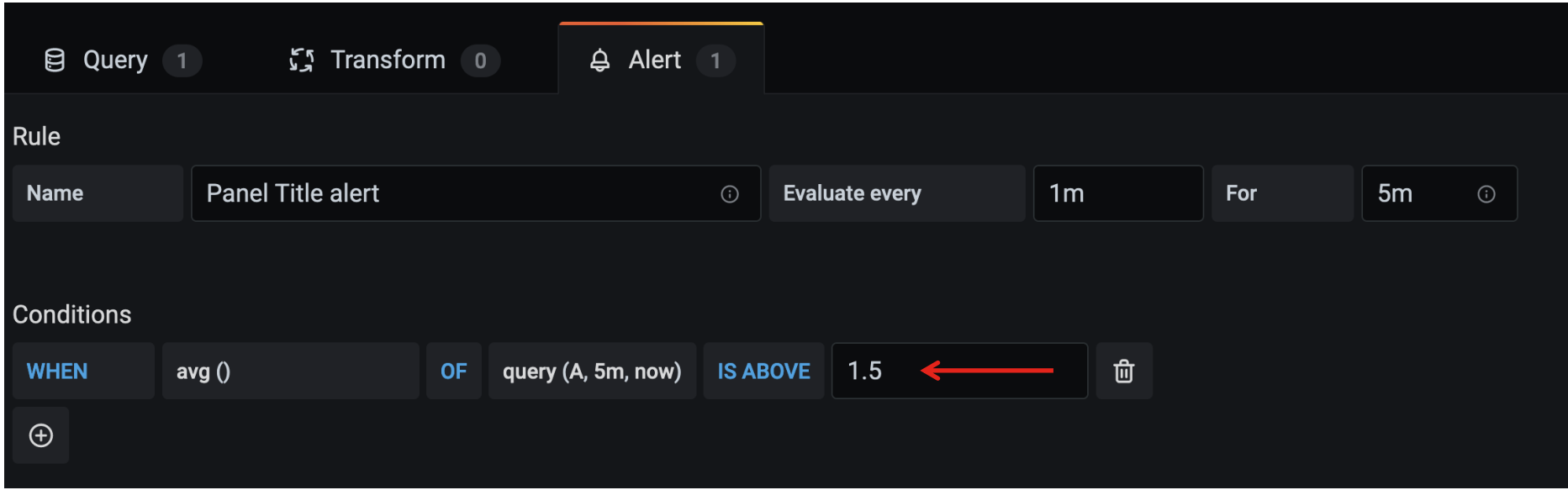




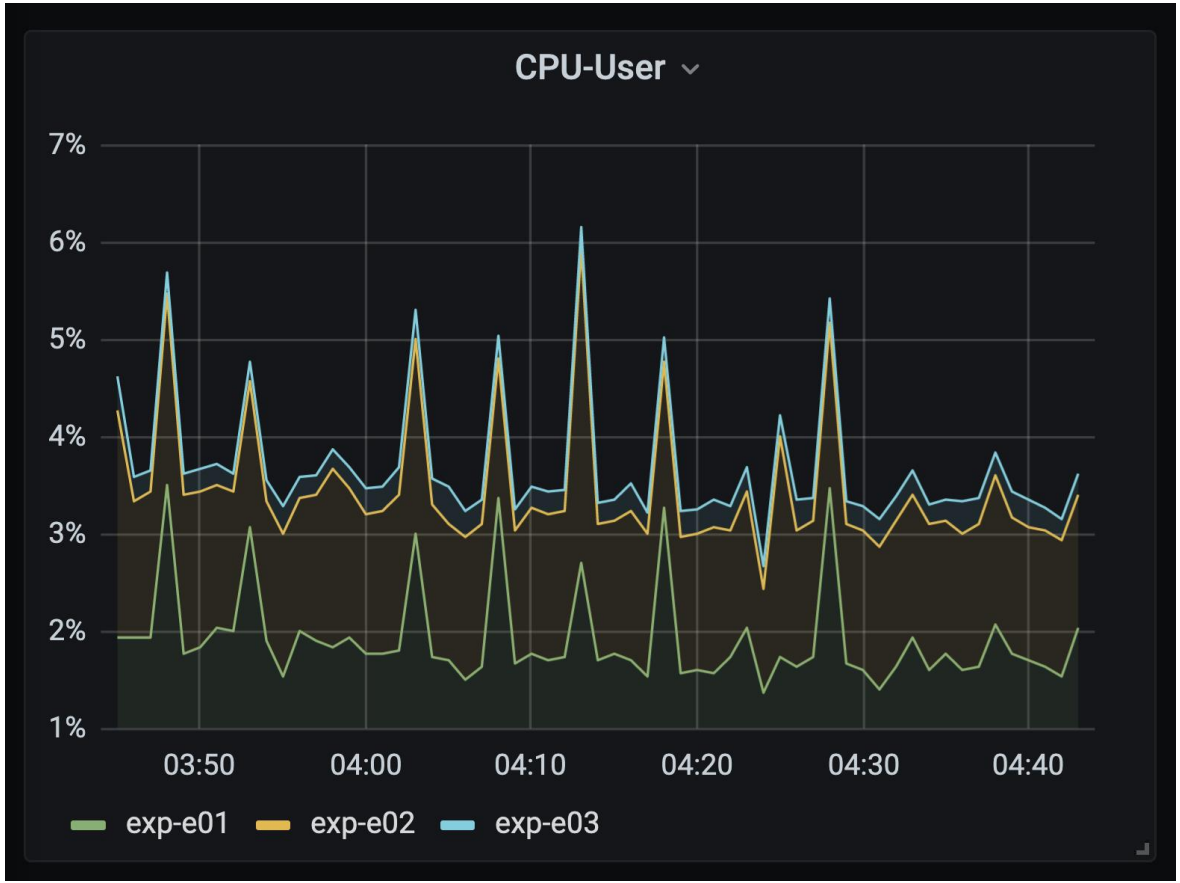
- The load panel will show us an overview of the utilization of the system based on the task queue.
- We can keep track of the system load within 1 min, 5 min and 15 min.

Grafana Dashboard – Load

- Alerts can be configured for some of the metrics to get email notifications when the server performance is at risk.

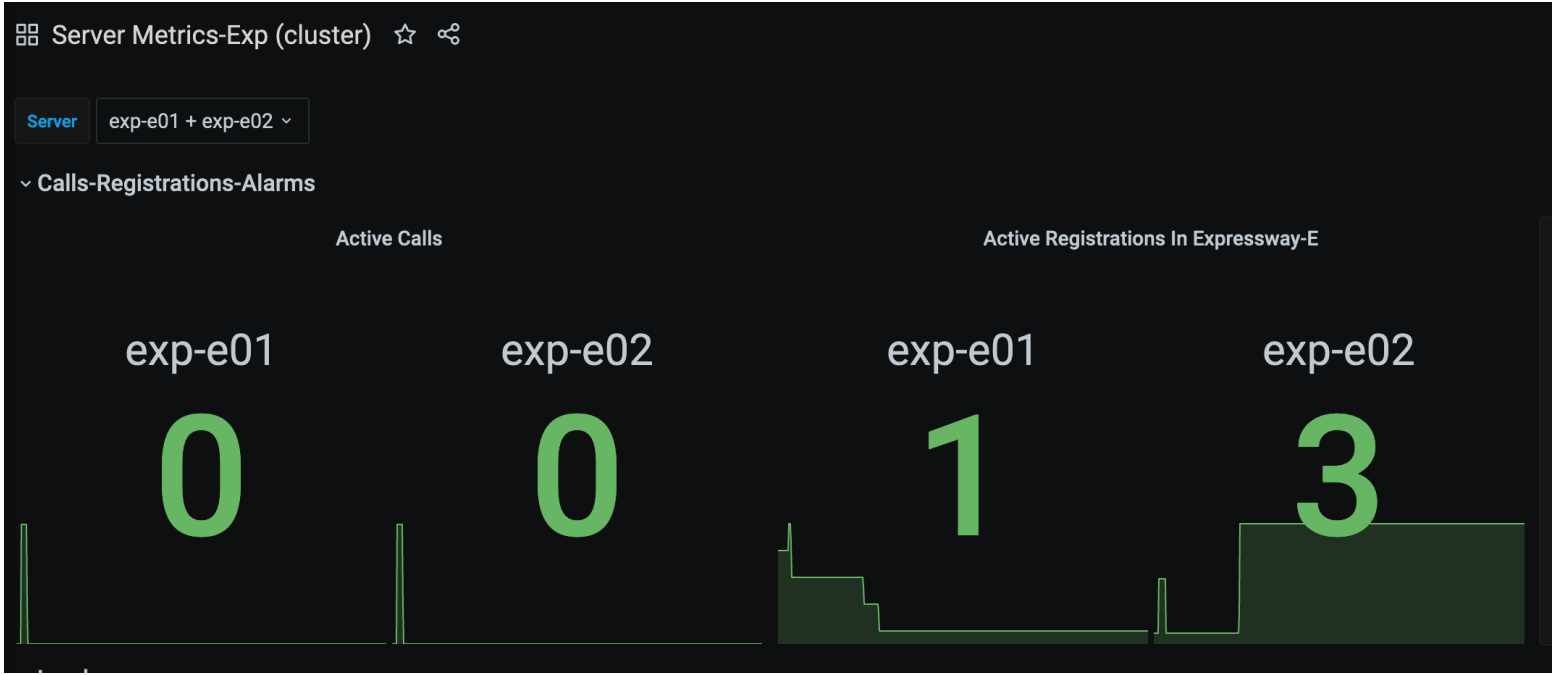


Grafana Dashboard – CPU-User



- CPU user keeps track of how much CPU is being used by the app.
- CPU utilization should not go above 70%. (cpu-user + cpu-system)

Grafana Dashboard – Cluster



- Active Registrations and Active Calls panels allows administrators decide if more or less Expressways are needed in their infrastructure.

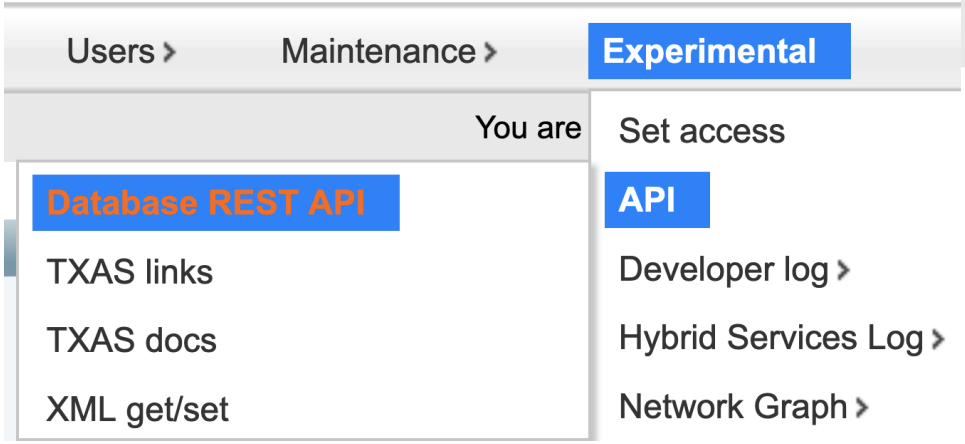
Expressway REST API

REST API

- Expressway's API is self-documented using RAML. This is available at https://<Expressway FQDN or IP>/api/raml.
- Requests and Responses use the JSON schema.
- API is accessible via HTPPS using an admin account with API access enabled.
- Base URL: https://<Expressway FQDN or IP>/api

IMPORTANT! Database API

- Expressways also have a Database API, but this is only for our support and development teams.
- Changes will be done in X14.2 to have this API disabled by default.



Database REST API

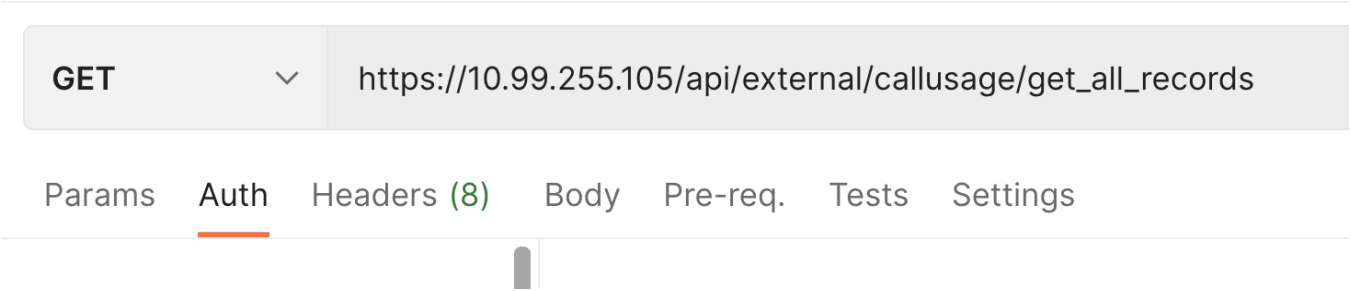
Status API

Table	Replication
status/acmeclustersync	global
status/acmeclustersyncstatus	global
status/acmestate	segmented
status/alarm	segmented
status/authentication/h350	segmented

CDR APIs

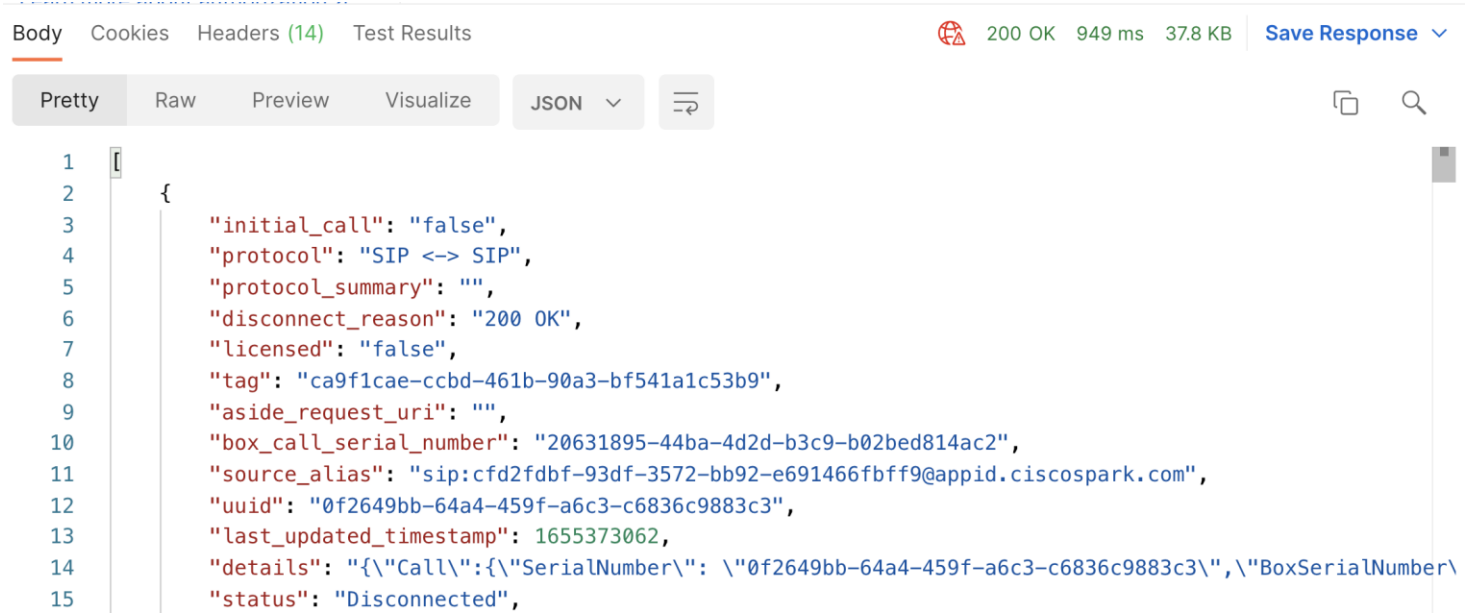
Base URL: https://<Expressway FQDN or IP>/api/external/callusage:

- get_all_records
- get_records_for_interval
- get_records_for_filter
- get_all_csv_records



CDR APIs

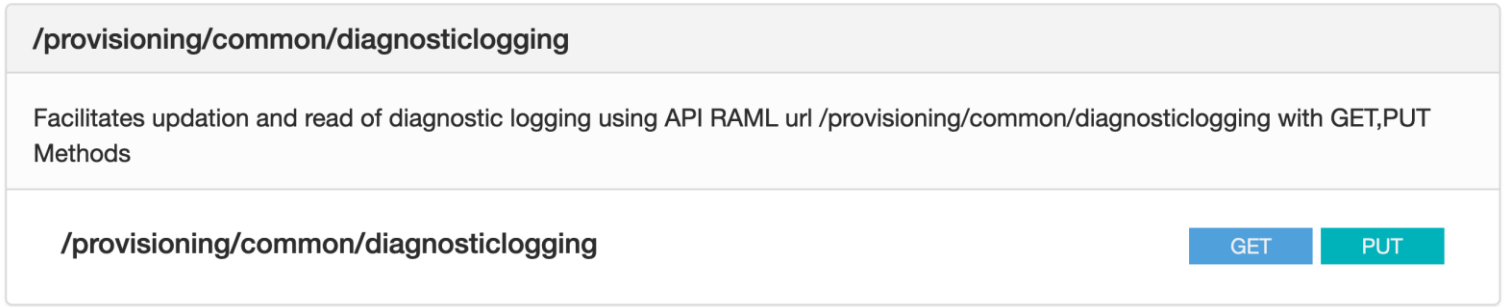
Remember to enable CDR before sending the API. This is done from Maintenance > Logging.



REST API – Example

Diagnostic Logs

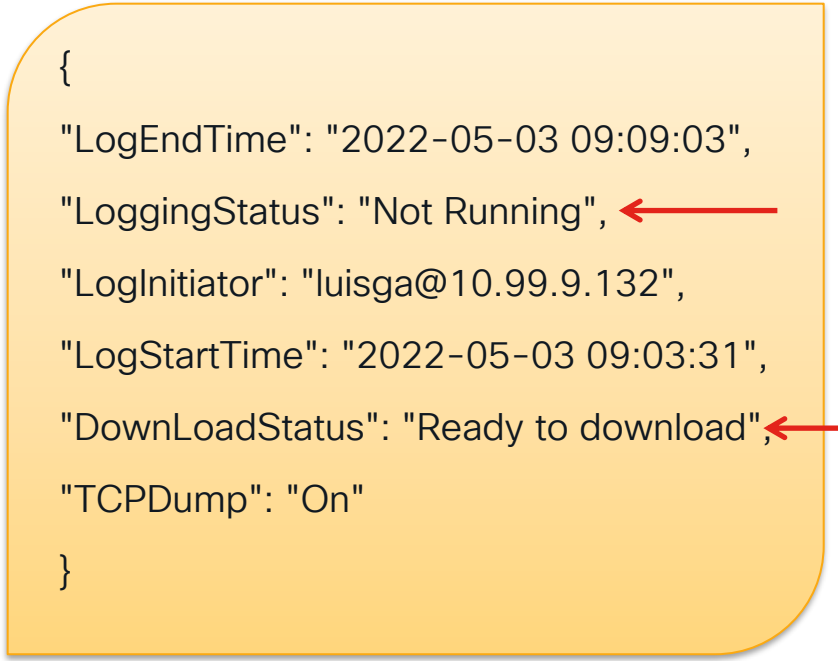
- Sending a GET method we will see the current status of the diagnostic logs.
- Using the PUT method we can Start/Stop/Mark/Collect/Download.



REST API – Example

Diagnostic Logs

- Example of a 200 OK response to a GET request.
- We can see that the logs are not running and that a bundle of logs is ready for download.



REST API – Example

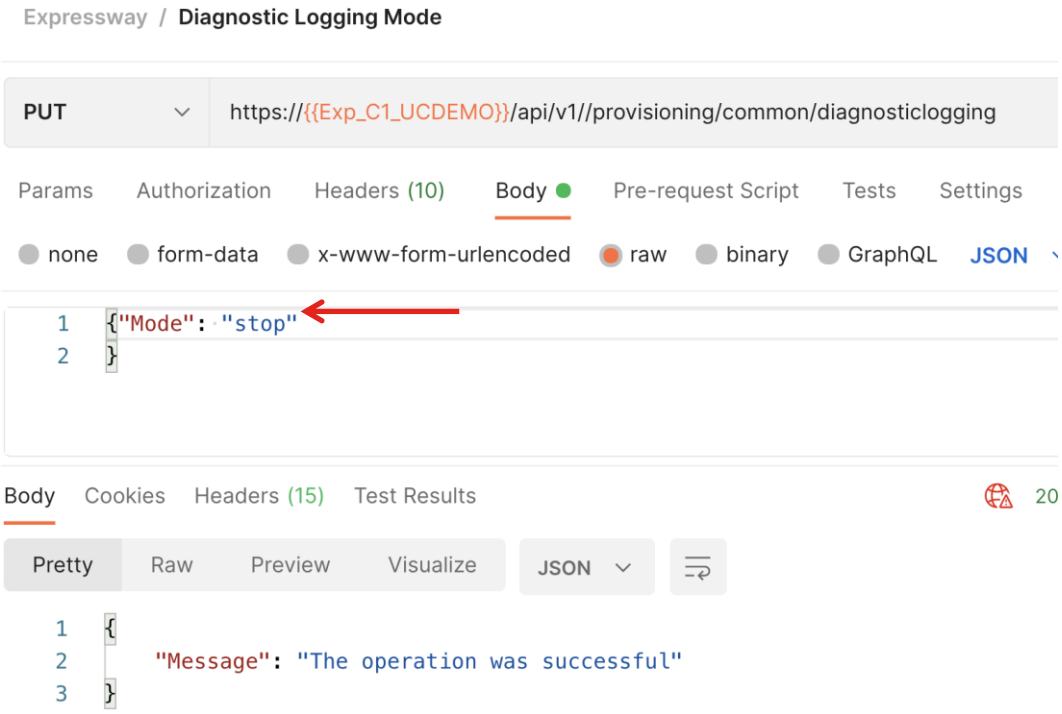
Diagnostic Logs

Expressway / **Diagnostic Logging Mode**

- Using Postman, we can send a PUT that includes the “Mode” and “TCPDump” parameters.
- As usual, starting logs in the primary node initiates the logs in all the nodes for that cluster.
- Collect/Download options need to be sent to each node.

REST API – Example

Diagnostic Logs



- We need to send a PUT with the “Mode” value setup to “stop” before collecting the logs.

REST API – Example

Diagnostic Logs

What's next? Scripting!!!

```
master_exp = [{"fqdn": "exp-e01.ucdemolab.com", "port": "7443"}]

for master in master_exp:

    api_peers = "https://"+ master["fqdn"] + ":" + master["port"]
+ "/api/v1/provisioning/common/cluster/peers"

    response = (requests.get(api_peers,
auth=HTTPBasicAuth(user_exp, passwd_exp))).json()


    for item in response:
        peers.append(item['PeerAddress'] + ":" + master["port"])
```

REST API – Example

Diagnostic Logs

You only need to start/stop logs in the Publisher of each cluster.

```
#Start/Stop logs in the master nodes


for master in master_exp:
    diag_log = "https://"+ master["fqdn"] + ":" + master["port"]
+ "/api/v1/provisioning/common/diagnosticlogging"
    payload = json.dumps({"Mode": "start"})

    response = (requests.put(diag_log, data=payload,
auth=HTTPBasicAuth(user_exp, passwd_exp))).json()
```

REST API – Example

Diagnostic Logs

Now we can Collect/Download from all the nodes in the cluster by simply running a loop.

```
for node in peers:
    diag_log = "https://"+ node +
"/api/v1/provisioning/common/diagnosticlogging"
    payload = json.dumps({"Mode": "collect"})
    response = (requests.put(diag_log, data=payload,
auth=HTTPBasicAuth(user_exp, passwd_exp))).json()
```

REST API – Example

Diagnostic Logs

```
def get_filename_from_cd(cd):

    #Get filename from content-disposition

    if not cd:
        return None
    fname = re.findall('filename="(.+)"', cd)
    if len(fname) == 0:
        return None
    return fname[0]
```

We use this function to find the diagnostic log file name

REST API – Example

Diagnostic Logs

```
#Download logs from the cluster


for node in peers:
    diag_log = "https://"+ node +
"/api/v1/provisioning/common/diagnosticlogging"
    payload = json.dumps({"Mode": "download"})

    response = (requests.put(diag_log, data=payload,
auth=HTTPBasicAuth(user_exp, passwd_exp)))
    filename =
get_filename_from_cd(response.headers.get('content-disposition'))
    open(filename, 'wb').write(response.content)
```

Conclusion

Highlights

- Proactive monitoring is important for administrators to make decisions about their infrastructure.
- Using Collectd you can get a good idea of the state of your Expressways.
- Grafana is a powerful tool to represent time series data.
- Expressways REST API can be used to simplify daily tasks.

Technical Session Surveys

- Attendees who fill out a minimum of four session surveys and the overall event survey will get Cisco Live branded socks!
- Attendees will also earn 100 points in the Cisco Live Game for every survey completed.
- These points help you get on the leaderboard and increase your chances of winning daily and grand prizes.

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