

# SCC 2025: Selection Round

## Monitoring

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[with special thanks to Binjamin Barsch (CHPC)  
for putting together this content]



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[rocky@demo-bb ~]\$ top												
top - 11:02:14 up 1 day, 1:42, 1 user, load average: 0.00, 0.00, 0.00												
Tasks: 150 total, 1 running, 149 sleeping, 0 stopped, 0 zombie												
%Cpu(s): 0.4 us, 0.0 sy, 0.0 ni, 99.6 id, 0.0 wa, 0.0 hi, 0.0 si, 0.0 st												
MiB Mem : 3662.2 total, 764.9 free, 802.5 used, 2388.4 buff/cache												
MiB Swap: 0.0 total, 0.0 free, 0.0 used. 2859.6 avail Mem												
PID	USER	PR	NI	VIRT	RES	SHR	S	%CPU	%MEM	TIME+	COMMAND	
1	root	20	0	110372	20084	11172	S	0.0	0.5	0:04.46	systemd	
2	root	20	0	0	0	0	S	0.0	0.0	0:00.03	kthreadd	
3	root	0	-20	0	0	0	I	0.0	0.0	0:00.00	rcu_gp	
4	root	0	-20	0	0	0	I	0.0	0.0	0:00.00	rcu_par_gp	
5	root	0	-20	0	0	0	I	0.0	0.0	0:00.00	slub_flushwq	
6	root	0	-20	0	0	0	I	0.0	0.0	0:00.00	netns	
8	root	0	-20	0	0	0	I	0.0	0.0	0:00.00	kworker/0:0H-events_highpri	
10	root	0	-20	0	0	0	I	0.0	0.0	0:00.00	mm_percpu_wq	
12	root	20	0	0	0	0	I	0.0	0.0	0:00.00	rcu_tasks_kthre	
13	root	20	0	0	0	0	I	0.0	0.0	0:00.00	rcu_tasks_rude_	
14	root	20	0	0	0	0	I	0.0	0.0	0:00.00	rcu_tasks_trace	
15	root	20	0	0	0	0	S	0.0	0.0	0:00.09	ksoftirqd/0	
16	root	20	0	0	0	0	I	0.0	0.0	0:01.03	rcu_preempt	
17	root	rt	0	0	0	0	S	0.0	0.0	0:00.14	migration/0	
19	root	20	0	0	0	0	S	0.0	0.0	0:00.00	cpuhp/0	
20	root	20	0	0	0	0	S	0.0	0.0	0:00.00	cpuhp/1	
21	root	rt	0	0	0	0	S	0.0	0.0	0:00.24	migration/1	
22	root	20	0	0	0	0	S	0.0	0.0	0:00.10	ksoftirqd/1	
24	root	0	-20	0	0	0	I	0.0	0.0	0:00.00	kworker/1:0H-events_highpri	
26	root	20	0	0	0	0	S	0.0	0.0	0:00.00	kdevtmpfs	
27	root	0	-20	0	0	0	I	0.0	0.0	0:00.00	inet_frag_wq	
28	root	20	0	0	0	0	S	0.0	0.0	0:00.30	kauditd	
29	root	20	0	0	0	0	S	0.0	0.0	0:00.06	khungtaskd	

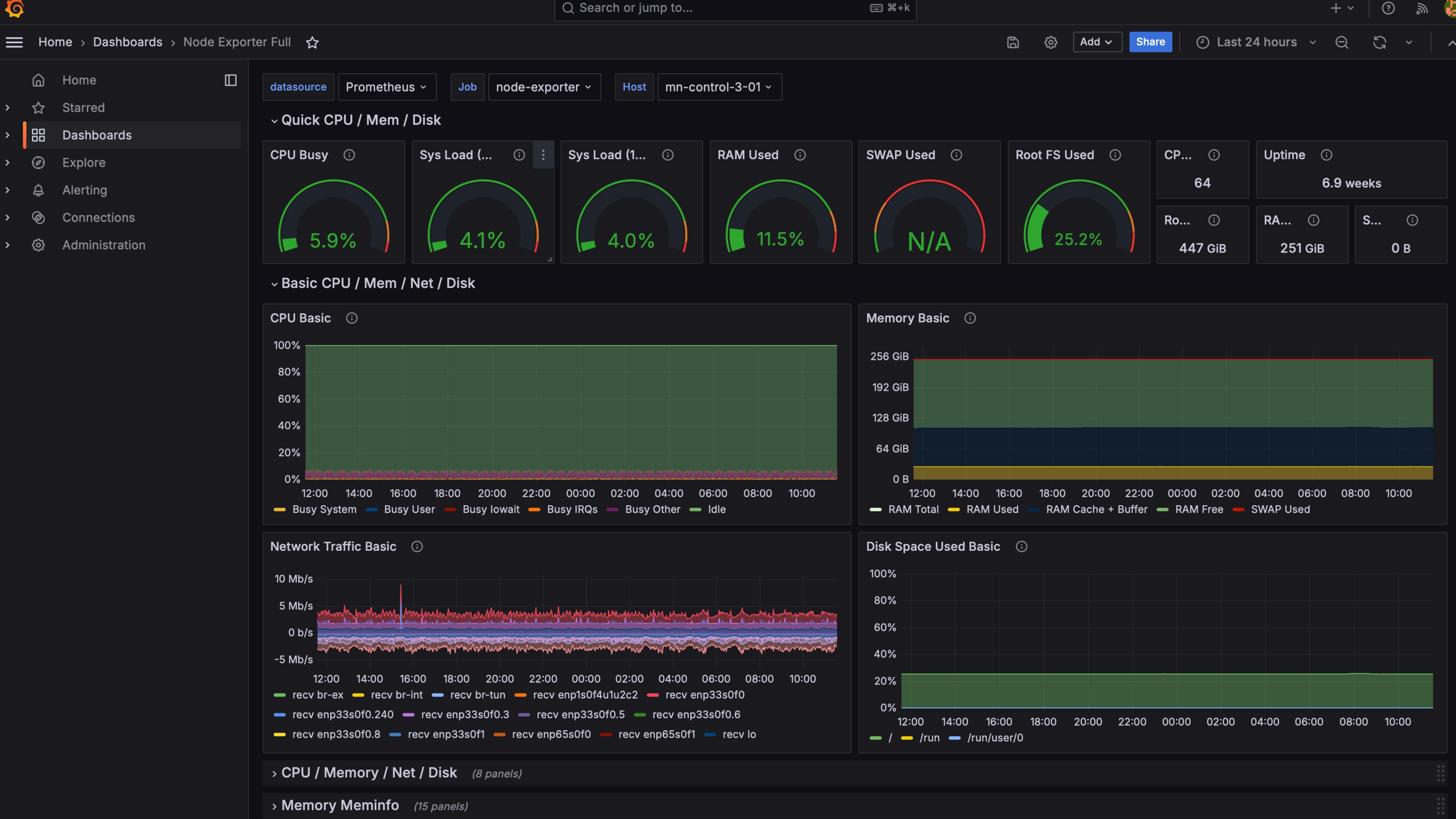
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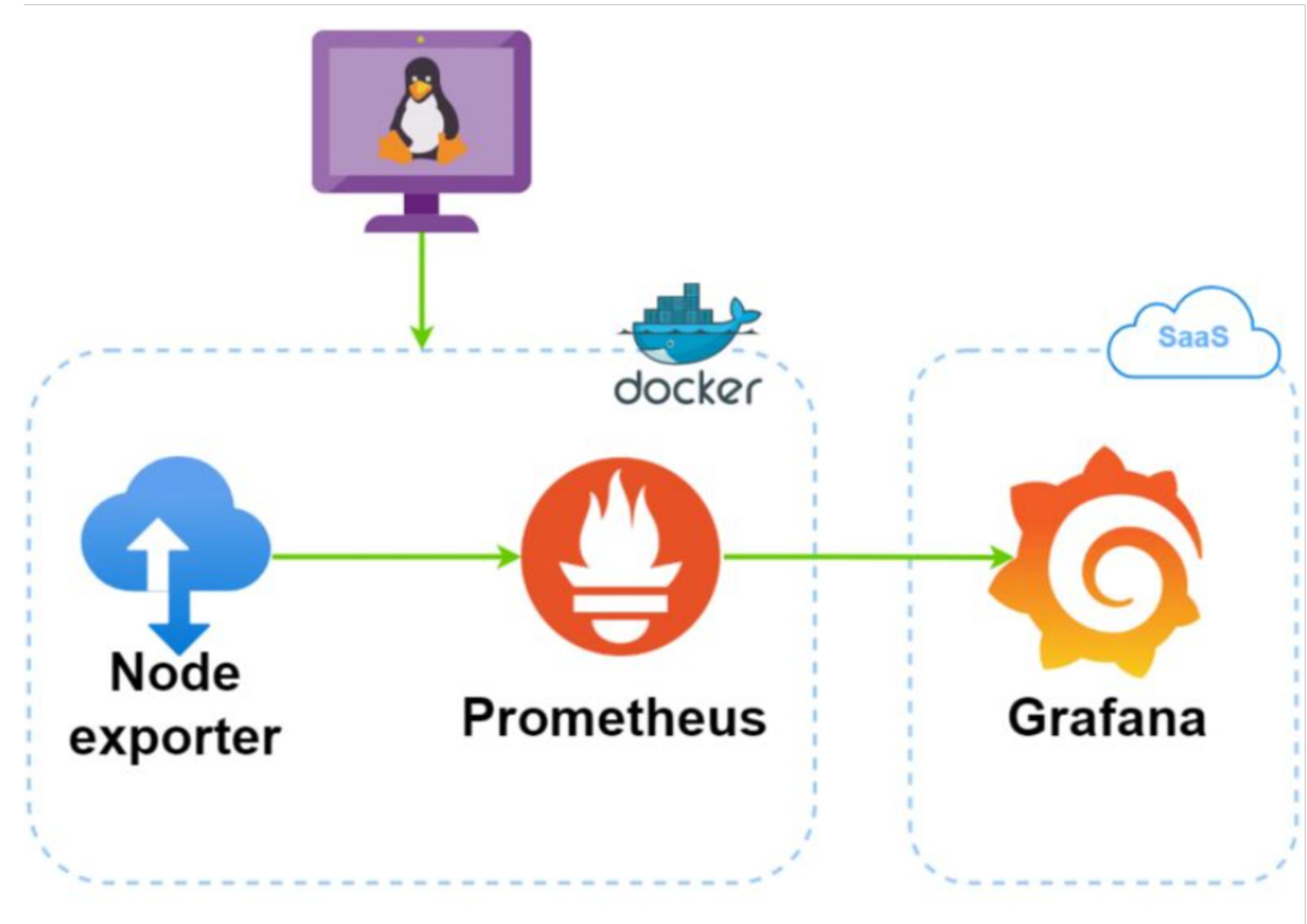
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# Monitoring stack



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# Pre-requisites

1. Rocky 9.03 VM and ssh keys working
2. Install Docker Engine and Docker Compose: based on following: <https://docs.docker.com/engine/install/rhel/#install-using-the-repository>

Install steps:

- Install the yum-utils package (which provides the yum-config-manager utility) and set up the repository.

```
sudo yum install -y yum-utils
```



```
sudo yum-config-manager --add-repo https://download.docker.com/linux/rhel/docker-ce.repo
```



- Install Docker Engine, containerd, and Docker Compose:

```
sudo yum install docker-ce docker-ce-cli containerd.io docker-buildx-plugin docker-compose-plugin
```



If prompted to accept the GPG key, verify that the fingerprint matches, accept it.

This command installs Docker, but it doesn't start Docker. It also creates a docker group, however, it doesn't add any users to the group by default.

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- Start Docker:

```
sudo systemctl start docker
```



- Verify that the Docker Engine installation is successful by running the hello-world image:

```
sudo docker run hello-world
```



This command downloads a test image and runs it in a container. When the container runs, it prints a confirmation message and exits.

You have now successfully installed and started Docker Engine.

- Confirm you have docker compose:

```
docker compose version
```



Output:

```
$ docker compose version
Docker Compose version v2.28.1
```



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# Installation via docker-compose

- Pre-requisites: each host involved needs to have docker-ce and docker-compose installed as mentioned in the previous section
- Create a suitable directory, e.g. /opt/monitoring\_stack, in which you'll keep a number of important configuration files.

Input the following:

```
sudo mkdir /opt/monitoring_stack/  
cd /opt/monitoring_stack/
```



- In /opt/monitoring\_stack/, create a docker-compose.yml file containing the following lines:

```
sudo nano /opt/monitoring_stack/docker-compose.yml
```



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```
version: '3'
services:
  node-exporter:
    image: prom/node-exporter
    ports:
      - "9100:9100"
    restart: always
    networks:
      - monitoring-network

  prometheus:
    image: prom/prometheus
    ports:
      - "9090:9090"
    restart: always
    volumes:
      - /opt/monitoring_stack/prometheus.yml:/etc/prometheus/prometheus.yml
    networks:
      - monitoring-network

  grafana:
    image: grafana/grafana
    ports:
      - "3000:3000"
    restart: always
    environment:
      GF_SECURITY_ADMIN_PASSWORD: admin
    volumes:
      - /opt/monitoring_stack/prometheus-datasource.yaml:/etc/grafana/provisioning/datasources/prometheus-datasource.yaml
    networks:
      - monitoring-network

networks:
  monitoring-network:
    driver: bridge
```

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- We then need to create two additional files, firstly:

```
sudo nano /opt/monitoring_stack/prometheus.yml
```



```
global:  
  scrape_interval: 15s  
  
scrape_configs:  
  - job_name: 'node-exporter'  
    static_configs:  
      - targets: ['node-exporter:9100']
```



- secondly:

```
sudo nano /opt/monitoring_stack/prometheus-datasource.yaml
```



```
apiVersion: 1  
datasources:  
  - name: Prometheus  
    type: prometheus  
    access: proxy  
    url: http://prometheus:9090
```



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# Start the services

Use:

```
sudo docker compose up -d
```



You should then see:

```
$ sudo docker compose up -d
[+] Running 4/4
✓ Network monitoring_stack_monitoring-network Created 0.3s
✓ Container monitoring_stack-grafana-1 Started 0.2s
✓ Container monitoring_stack-prometheus-1 Started 0.3s
✓ Container monitoring_stack-node-exporter-1 Started 0.2s
```



Then do

```
sudo docker ps
```



```
/opt/monitoring_stack$ sudo docker ps
CONTAINER ID        IMAGE               COMMAND                  CREATED             STATUS              PORTS
2b707570dc41        grafana/grafana     "/run.sh"                6 days ago         Up 12 hours        0.0.0.0:3000->3000/tcp, :::3000->3000/tcp
ea730ef94381        prom/prometheus    "/bin/prometheus --c..."   6 days ago         Up 10 hours        0.0.0.0:9090->9090/tcp, :::9090->9090/tcp
704dfa94ecf3        prom/node-exporter  "/bin/node_exporter"    6 days ago         Up 12 hours        0.0.0.0:9100->9100/tcp, :::9100->9100/tcp
```



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Now let us verify the services!

## Prometheus

Input:

```
curl -s localhost:9090/metrics | head
```



You should see:

```
$ curl -s localhost:9090/metrics | head
# HELP go_gc_cycles_automatic_gc_cycles_total Count of completed GC cycles generated by the Go runtime.
# TYPE go_gc_cycles_automatic_gc_cycles_total counter
go_gc_cycles_automatic_gc_cycles_total 5
# HELP go_gc_cycles_forced_gc_cycles_total Count of completed GC cycles forced by the application.
# TYPE go_gc_cycles_forced_gc_cycles_total counter
go_gc_cycles_forced_gc_cycles_total 0
# HELP go_gc_cycles_total_gc_cycles_total Count of all completed GC cycles.
# TYPE go_gc_cycles_total_gc_cycles_total counter
go_gc_cycles_total_gc_cycles_total 5
# HELP go_gc_duration_seconds A summary of the pause duration of garbage collection cycles.
# TYPE go_gc_duration_seconds summary
go_gc_duration_seconds{quantile="0"} 7.81e-05
go_gc_duration_seconds{quantile="0.25"} 0.000135
...
...
```



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# Node Exporter

Input:

```
curl -s localhost:9100/metrics | head
```



You should see:

```
$ curl -s localhost:9100/metrics | head
# HELP go_gc_duration_seconds A summary of the pause duration of
garbage collection cycles.
# TYPE go_gc_duration_seconds summary
go_gc_duration_seconds{quantile="0"} 2.1937e-05
go_gc_duration_seconds{quantile="0.25"} 3.2322e-05
go_gc_duration_seconds{quantile="0.5"} 3.4946e-05
go_gc_duration_seconds{quantile="0.75"} 5.7424e-05
go_gc_duration_seconds{quantile="1"} 0.000171199
go_gc_duration_seconds_sum 0.007451006
go_gc_duration_seconds_count 157
# HELP go_goroutines Number of goroutines that currently exist
```



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# Grafana

Input the following:

```
curl -s localhost:3000 | head
```



You should see:

```
$ curl -s localhost:3000 | hea
<a href="/login">Found</a>.
$ curl -s -u admin:admin localhost:3000 | head
<!DOCTYPE html>
<html lang="en-US">
<head>
<meta charset="utf-8" />
<meta http-equiv="X-UA-Compatible" content="IE=edge,chrome=1" />
<meta name="viewport" content="width=device-width" />
<meta name="theme-color" content="#000" />
<title>Grafana</title>
```



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Now you can also go to a local browser.

Open a new terminal and run the tunnel command (replace xxx.xxx.xxx.xxx with your unique IP):

```
$ ssh -L 3000:localhost:3000 rocky@xxx.xxx.xxx.xxx
```



You should see something like this (note you will have a different IP address):

```
$ ssh -L 3000:localhost:3000 rocky@154.114.57.102
Last login: Wed Jul  3 12:05:29 2024 from 41.10.78.210
[rocky@demo-bb ~]$
```



Then open up a browser

```
http://localhost:3000
```



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localhost:3000/login

★

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# Welcome to Grafana

Email or username

Password  
 ⚒

[Log in](#)

[Forgot your password?](#)

username: admin password: admin



# Welcome to Grafana

Email or username

Password

[Log in](#)

[Forgot your password?](#)

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## Go to Dashboards

The screenshot shows the Grafana interface with a dark theme. At the top, there is a header bar with the Grafana logo and a search bar. Below the header, there are navigation icons for back, forward, and search. The main menu is visible, featuring a gear icon, Home, Starred, Dashboards (which is underlined), Playlists, Snapshots, and Library panels. The 'Dashboards' section is currently active.

Grafana

Home

Starred

Dashboards

Playlists

Snapshots

Library panels

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Click on New -> Import

The screenshot shows a user interface for managing dashboards. On the left, there is a sidebar with navigation links: Home, Starred, Dashboards (which is selected and highlighted in orange), Playlists, Snapshots, Library panels, and Public dashboards. The main area is titled "Dashboards" and contains the sub-instruction "Create and manage dashboards to visualize your data". It features a search bar labeled "Search for dashboards and folders", a filter dropdown labeled "Filter by tag", and a checkbox for "Starred". Below these are two sorting options: "Name" and "Tags". On the far right, there is a vertical menu with four items: "New ^" (highlighted in blue), "New dashboard", "New folder", and "Import".

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Input: 1860 and click Load

# Import dashboard

Import dashboard from file or Grafana.com



Upload dashboard JSON file

Drag and drop here or click to browse  
Accepted file types: .json, .txt

Find and import dashboards for common applications at [grafana.com/dashboards](https://grafana.com/dashboards)

Load

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Click on source: "Prometheus"

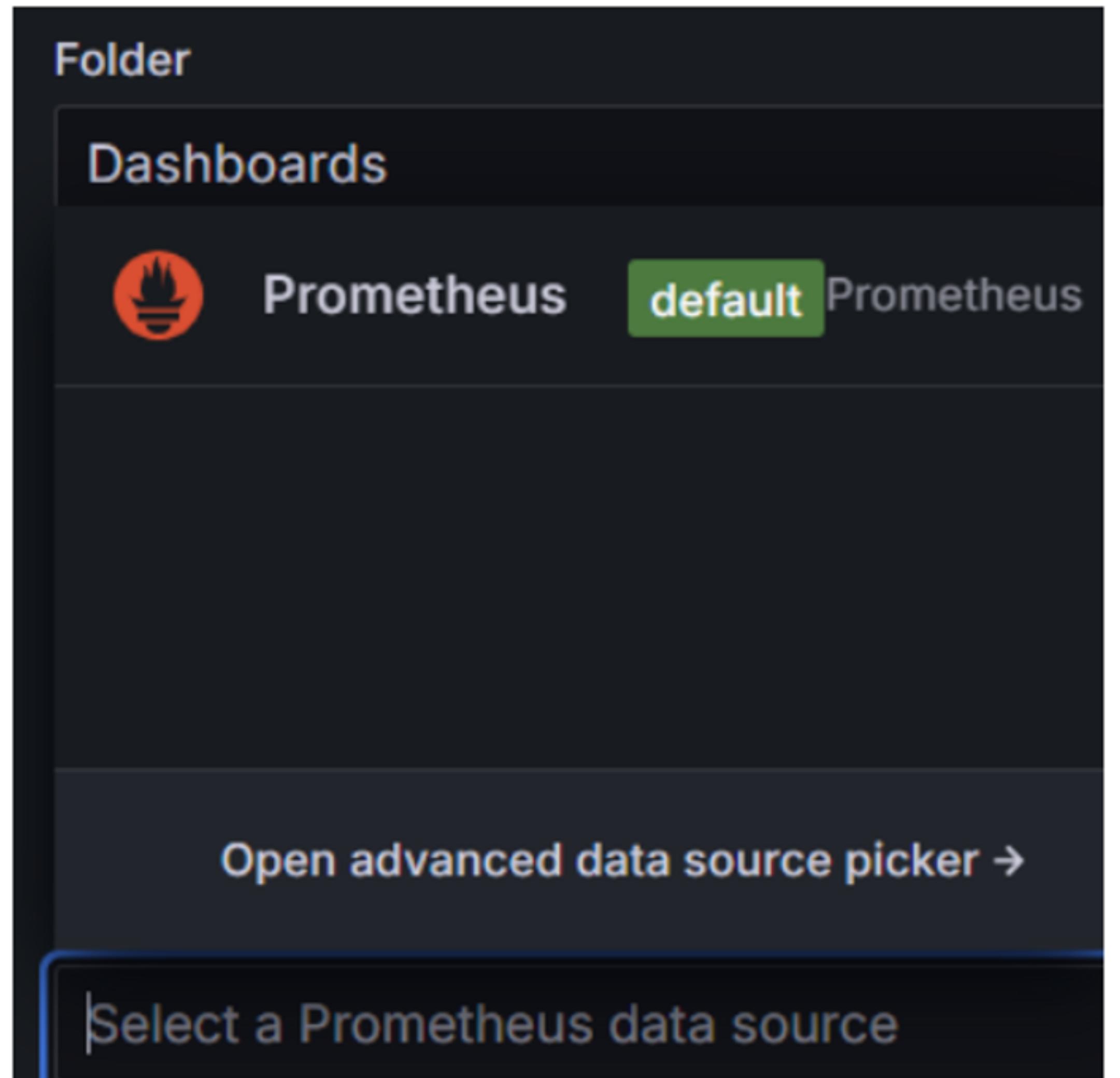
Folder

Dashboards

 Prometheus default Prometheus

[Open advanced data source picker →](#)

Select a Prometheus data source



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Click on Import:

Importing dashboard from [Grafana.com](#)

Published by rfmoz

Updated on 2024-05-22 18:07:35

### Options

Name

Folder

**Unique identifier (UID)**  
The unique identifier (UID) of a dashboard can be used for uniquely identify a dashboard between multiple Grafana installs. The UID allows having consistent URLs for accessing dashboards so changing the title of a dashboard will not break any bookmarked links to that dashboard.

Change uid

Prometheus

Import Cancel

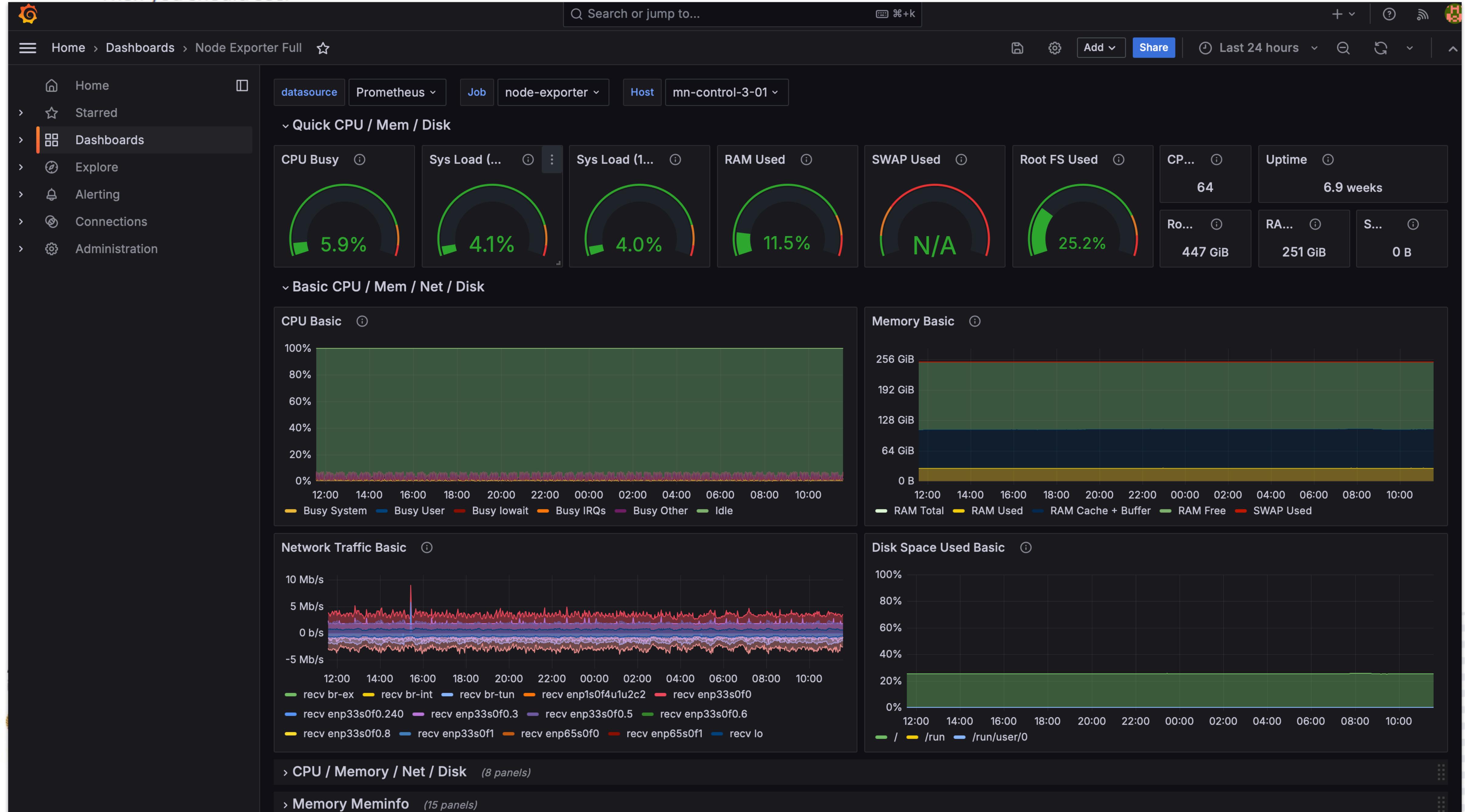
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Then you should see:



[datasource](#)[Prometheus ▾](#)[Job](#)[node-exporter ▾](#)[Host](#)[Enter variable value](#)

### Quick CPU / Mem / Disk



#### CPU Busy ⓘ



#### Sys Load (1m) ⓘ

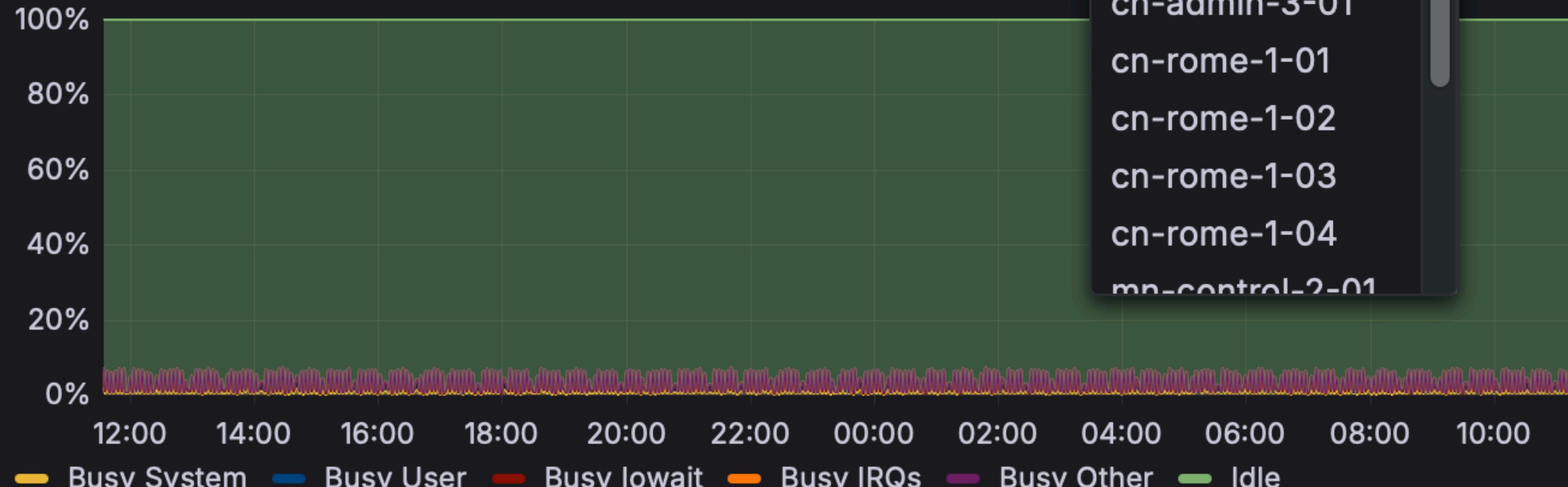


#### Sys Load (15m) ⓘ



### Basic CPU / Mem / Net / Disk

#### CPU Basic ⓘ



ceph-hdd-2-01

ceph-hdd-2-02

ceph-hdd-3-01

ceph-hdd-4-01

ceph-hdd-4-02

ceph-nvme-2-01

ceph-nvme-3-01

ceph-nvme-3-02

ceph-nvme-4-01

ceph-nvme-4-02

cn-admin-2-01

cn-admin-3-01

cn-rome-1-01

cn-rome-1-02

cn-rome-1-03

cn-rome-1-04

mn-control-2-01

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# E.g. Ceph Cluster Dashboard





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Any questions before one  
last announcement?



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# Quick plug: The HPC Ecosystems Project

So you've learned how to spell HPC and you've compiled a doohick on the whatsit using a self-healing quantum encabulator.

Now what?

Do you want to engage with a global HPC virtual community of almost 400 people from 5 continents with its roots in Africa?

Looking for HPC hardware for your interest group? Want to learn from international experts? Rub shoulders with international HPC celebrities or maybe even find some cool internship projects or the love of your life\*?

Join the largest and fastest growing (read: possibly only) HPC virtual community in Africa before it's no longer cool!

What we do:

- Engage with each other and nerd out on all things RSE and HPC
- Train, joke, mentor, and collaborate
- Weekly cake meet-ups (hosted virtually, bring your own cake)

The HPC Ecosystems Project has been recognised with a ton of international and national awards so don't miss out on the shared connection to something awesome! Join up to our Slack and see why our community is a massive force of nature - a tempest of global change - and not simply passing wind.

Join our Slack: <https://tinyurl.com/ECOslack>

\* Your mileage may vary but we guarantee love and happiness! Maybe.

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