DAY 6:

Prometheus

Prometheus is an open-source system monitoring and alerting toolkit originally built at SoundCloud. It is now a standalone open source project .

Prometheus joined the Cloud Native Computing Foundation in 2016 as the second hosted project, after Kubernetes.

Prometheus Architecture

Prometheus Server– Collects and stores metrics.

Pushgateway– Receives metrics from short-lived jobs.

Exporters– Agents that expose metrics (e.g., Node Exporter for system stats).

Alertmanager– Handles alerts based on defined rules

Grafana (Optional)– For visualization

Prometheus Installation

```
sudo useradd \
   --system \
   --no-create-home \
   --shell /bin/false Prometheus
```

```
tar -xvf prometheus-2.47.1.linux-amd64.tar.gz
sudo mkdir -p /data /etc/prometheus
cd prometheus-2.47.1.linux-amd64/
sudo mv prometheus promtool /usr/local/bin/
sudo mv consoles/ console_libraries/ /etc/prometheus/
sudo mv prometheus.yml /etc/prometheus/prometheus.yml
sudo chown -R prometheus:prometheus /etc/prometheus/ /data/
```

```
cd
rm -rf prometheus-2.47.1.linux-amd64.tar.gz
prometheus --version
sudo vim /etc/systemd/system/prometheus.service
```

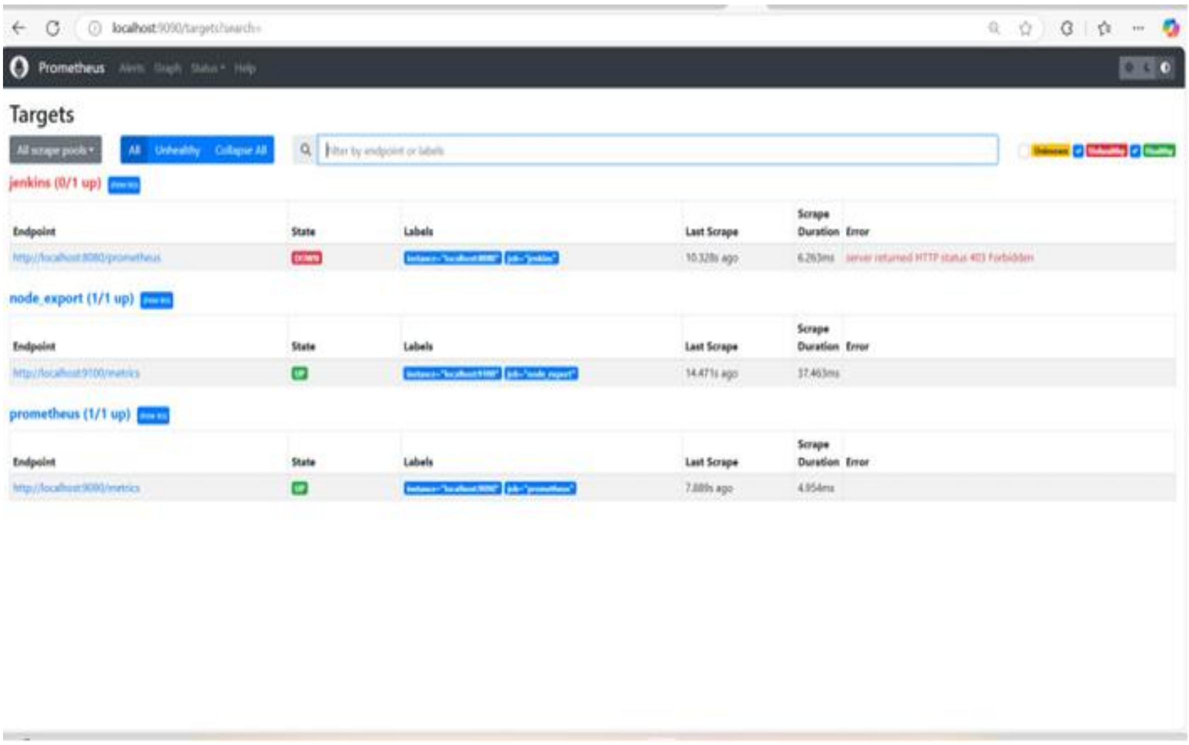
```
[Unit]
Description=Prometheus
Wants=network-online.target
After=network-online.target
StartLimitIntervalSec=500
StartLimitBurst=5
[Service]
User=prometheus
Group=prometheus
Type=simple
Restart=on-failure
RestartSec=5s
ExecStart=/usr/local/bin/prometheus \
  --config.file=/etc/prometheus/prometheus.yml \
  --storage.tsdb.path=/data \
  --web.console.templates=/etc/prometheus/consoles \
  --web.console.libraries=/etc/prometheus/console_libraries \
  --web.listen-address=0.0.0.0:9090 \
  --web.enable-lifecycle
[Install]
WantedBy=multi-user.target
[Unit]
Description=Prometheus
Wants=network-online.target
After=network-online.target
```

```
StartLimitIntervalSec=500
StartLimitBurst=5
[Service]
User=prometheus
Group=prometheus
Type=simple
Restart=on-failure
RestartSec=5s
ExecStart=/usr/local/bin/prometheus \
  --config.file=/etc/prometheus/prometheus.yml \
  --storage.tsdb.path=/data \
  --web.console.templates=/etc/prometheus/consoles \
  --web.console.libraries=/etc/prometheus/console_libraries \
  --web.listen-address=0.0.0.0:9090 \
  --web.enable-lifecycle
[Install]
WantedBy=multi-user.target
sudo useradd \
    --system \
    --no-create-home \
    --shell /bin/false node_exporter
wget https://github.com/prometheus/node_exporter/releases/download/v1.6.1/node_exporter-1.6.1.linux-amd64.tar.gz
tar -xvf node_exporter-1.6.1.linux-amd64.tar.gz
sudo mv \
  node_exporter-1.6.1.linux-amd64/node_exporter \
  /usr/local/bin/

Description=Node Exporter
Wants=network-online.target
```

```
After=network-online.target
StartLimitIntervalSec=500
StartLimitBurst=5
[Service]
User=node_exporter
Group=node_exporter
Type=simple
Restart=on-failure
RestartSec=5s
ExecStart=/usr/local/bin/node_exporter \
    --collector.logind

WantedBy=multi-user.target
sudo systemctl enable node_exporter
sudo systemctl start node_exporter
sudo systemctl status node_exporter
journalctl -u node_exporter -f --no-pager
 sudo vim /etc/prometheus/prometheus.yml
  job_name: node_export
    static_configs:
      - targets: ["localhost:9100"]
sudo apt-get install -y apt-transport-https software-properties-common
wget -q -O - https://packages.grafana.com/gpg.key | sudo apt-key add -
echo "deb https://packages.grafana.com/oss/deb stable main" | sudo tee -a /etc/apt/sources.list.d/grafana.list
sudo apt-get update
sudo apt-get -y install grafana
sudo systemctl enable grafana-server
sudo systemctl start grafana-server
sudo systemctl status grafana-server
```



Targets

jenkins (0/1 up)

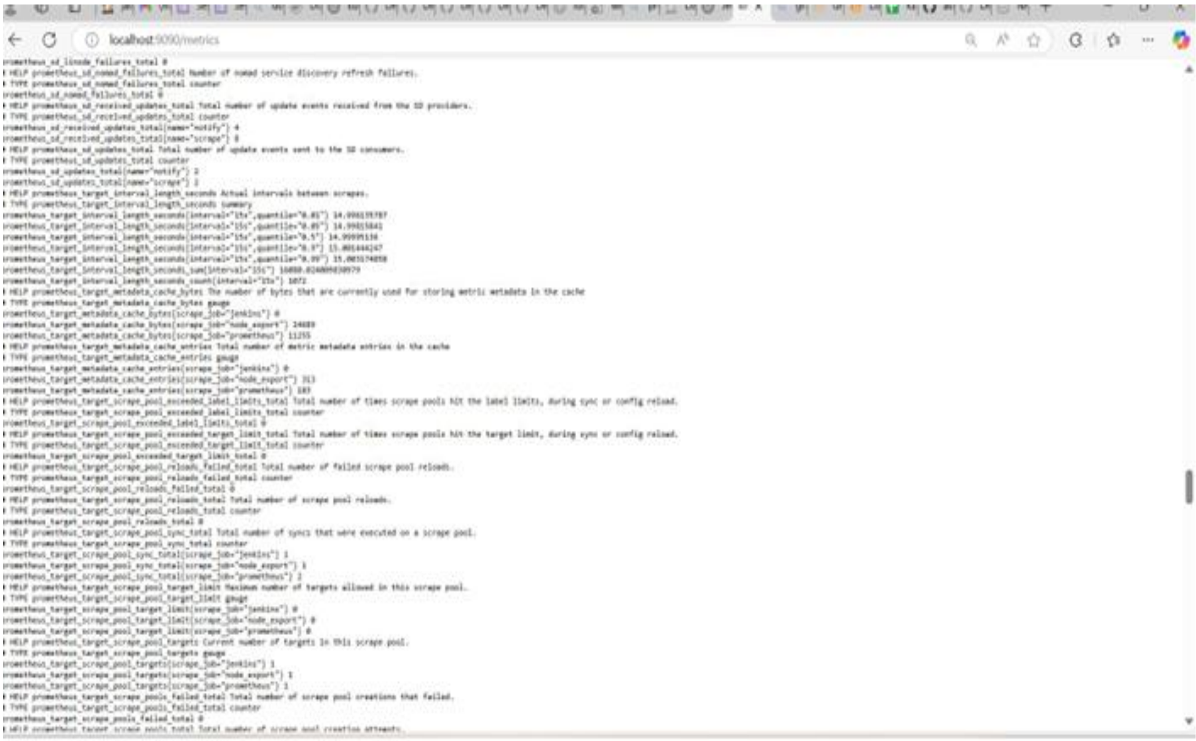
Endpoint	State	Labels	Last Scrape	Scrape Duration	Error
http://localhost:8080/prometheus	DOWN	instance="localhost:8080" job="jenkins"	10.328s ago	6.263ms	server returned HTTP status 403 Forbidden

node_export (1/1 up)

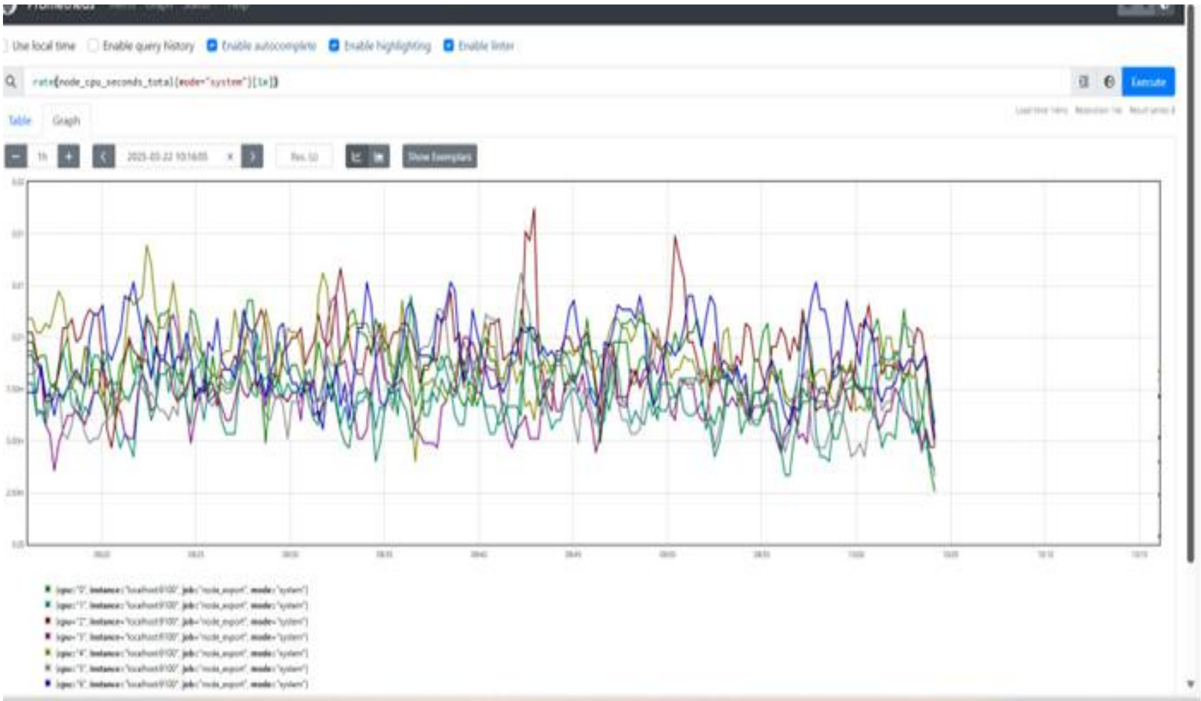
Endpoint	State	Labels	Last Scrape	Scrape Duration	Error
http://localhost:9100/metrics	UP	instance="localhost:9100" job="node_export"	14.471s ago	37.463ms	

prometheus (1/1 up)

Endpoint	State	Labels	Last Scrape	Scrape Duration	Error
http://localhost:9090/metrics	UP	instance="localhost:9090" job="prometheus"	7.889s ago	4.954ms	



```
prometheus_sd_linode_failures_total 0
# HELP prometheus_sd_nomad_failures_total Number of nomad service discovery refresh failures.
# TYPE prometheus_sd_nomad_failures_total counter
prometheus_sd_nomad_failures_total 0
# HELP prometheus_sd_received_updates_total Total number of update events received from the SD providers.
# TYPE prometheus_sd_received_updates_total counter
prometheus_sd_received_updates_total{name="notify"} 4
prometheus_sd_received_updates_total{name="scrape"} 8
# HELP prometheus_sd_updates_total Total number of update events sent to the SD consumers.
# TYPE prometheus_sd_updates_total counter
prometheus_sd_updates_total{name="notify"} 2
prometheus_sd_updates_total{name="scrape"} 2
# HELP prometheus_target_interval_length_seconds Actual intervals between scrapes.
# TYPE prometheus_target_interval_length_seconds summary
prometheus_target_interval_length_seconds{interval="15s",quantile="0.01"} 14.99815787
prometheus_target_interval_length_seconds{interval="15s",quantile="0.05"} 14.99815841
prometheus_target_interval_length_seconds{interval="15s",quantile="0.5"} 14.99995136
prometheus_target_interval_length_seconds{interval="15s",quantile="0.9"} 15.00144247
prometheus_target_interval_length_seconds{interval="15s",quantile="0.99"} 15.00374058
prometheus_target_interval_length_seconds_sum{interval="15s"} 16080.024009830979
prometheus_target_interval_length_seconds_count{interval="15s"} 1072
# HELP prometheus_target_metadata_cache_bytes The number of bytes that are currently used for storing metric metadata in the cache
# TYPE prometheus_target_metadata_cache_bytes gauge
prometheus_target_metadata_cache_bytes{scrape_job="jenkins"} 0
prometheus_target_metadata_cache_bytes{scrape_job="node_export"} 24689
prometheus_target_metadata_cache_bytes{scrape_job="prometheus"} 11255
# HELP prometheus_target_metadata_cache_entries Total number of metric metadata entries in the cache
# TYPE prometheus_target_metadata_cache_entries gauge
prometheus_target_metadata_cache_entries{scrape_job="jenkins"} 0
prometheus_target_metadata_cache_entries{scrape_job="node_export"} 313
prometheus_target_metadata_cache_entries{scrape_job="prometheus"} 183
# HELP prometheus_target_scrape_pool_exceeded_label_limits_total Total number of times scrape pools hit the label limits, during sync or config reload.
# TYPE prometheus_target_scrape_pool_exceeded_label_limits_total counter
prometheus_target_scrape_pool_exceeded_label_limits_total 0
# HELP prometheus_target_scrape_pool_exceeded_target_limit_total Total number of times scrape pools hit the target limit, during sync or config reload.
# TYPE prometheus_target_scrape_pool_exceeded_target_limit_total counter
prometheus_target_scrape_pool_exceeded_target_limit_total 0
# HELP prometheus_target_scrape_pool_reloads_failed_total Total number of failed scrape pool reloads.
# TYPE prometheus_target_scrape_pool_reloads_failed_total counter
prometheus_target_scrape_pool_reloads_failed_total 0
# HELP prometheus_target_scrape_pool_reloads_total Total number of scrape pool reloads.
# TYPE prometheus_target_scrape_pool_reloads_total counter
prometheus_target_scrape_pool_reloads_total 0
# HELP prometheus_target_scrape_pool_sync_total Total number of syncs that were executed on a scrape pool.
# TYPE prometheus_target_scrape_pool_sync_total counter
prometheus_target_scrape_pool_sync_total{scrape_job="jenkins"} 1
prometheus_target_scrape_pool_sync_total{scrape_job="node_export"} 1
prometheus_target_scrape_pool_sync_total{scrape_job="prometheus"} 1
# HELP prometheus_target_scrape_pool_target_limit Maximum number of targets allowed in this scrape pool.
# TYPE prometheus_target_scrape_pool_target_limit gauge
prometheus_target_scrape_pool_target_limit{scrape_job="jenkins"} 0
prometheus_target_scrape_pool_target_limit{scrape_job="node_export"} 0
prometheus_target_scrape_pool_target_limit{scrape_job="prometheus"} 0
# HELP prometheus_target_scrape_pool_targets Current number of targets in this scrape pool.
# TYPE prometheus_target_scrape_pool_targets gauge
prometheus_target_scrape_pool_targets{scrape_job="jenkins"} 1
prometheus_target_scrape_pool_targets{scrape_job="node_export"} 1
prometheus_target_scrape_pool_targets{scrape_job="prometheus"} 1
# HELP prometheus_target_scrape_pools_failed_total Total number of scrape pool creations that failed.
# TYPE prometheus_target_scrape_pools_failed_total counter
prometheus_target_scrape_pools_failed_total 0
# HELP prometheus_target_scrape_pools_total Total number of scrape pool creation attempts.
```

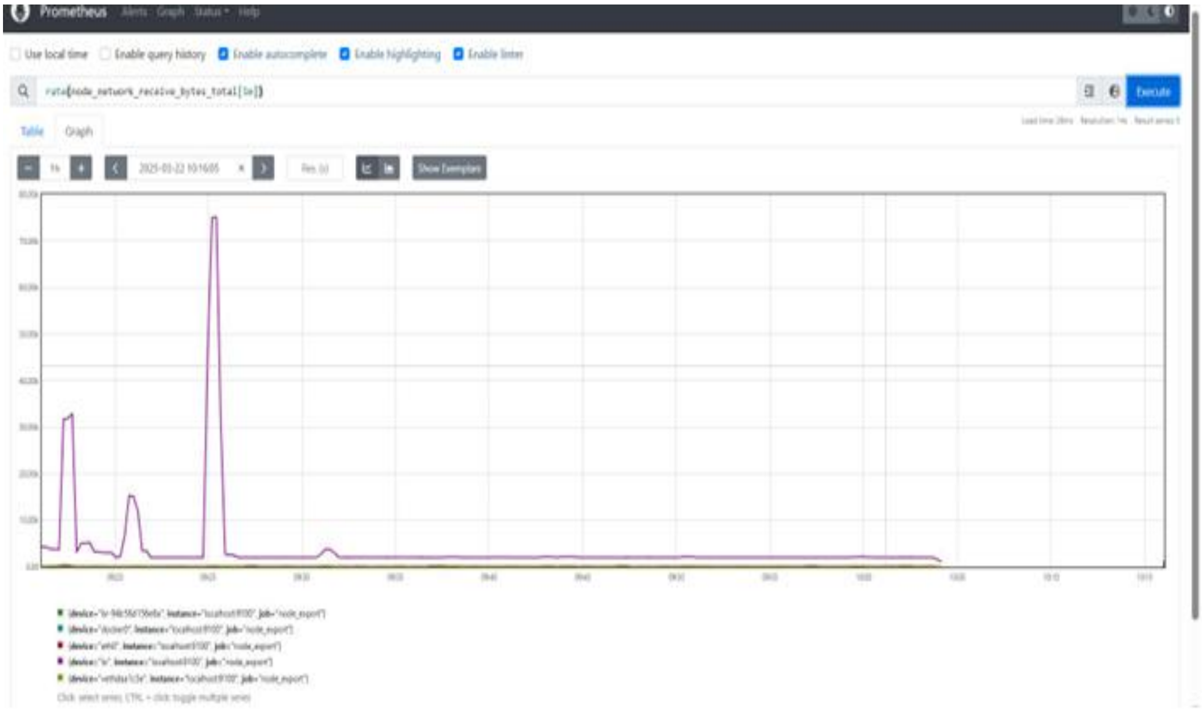


☐ Use local time ☐ Enable query history ☑ Enable autocomplete ☑ Enable highlighting ☑ Enable linter

```
rate(node_cpu_seconds_total{mode="system"}[1m])
```

- {cpu="0", instance="localhost:9100", job="node_exporter", mode="system"}
- {cpu="1", instance="localhost:9100", job="node_exporter", mode="system"}
- {cpu="2", instance="localhost:9100", job="node_exporter", mode="system"}
- {cpu="3", instance="localhost:9100", job="node_exporter", mode="system"}
- {cpu="4", instance="localhost:9100", job="node_exporter", mode="system"}
- {cpu="5", instance="localhost:9100", job="node_exporter", mode="system"}
- {cpu="6", instance="localhost:9100", job="node_exporter", mode="system"}

rate(node_network_receive_bytes_total[1m]



☐ Use local time ☐ Enable query history ☑ Enable autocomplete ☑ Enable highlighting ☑ Enable linter

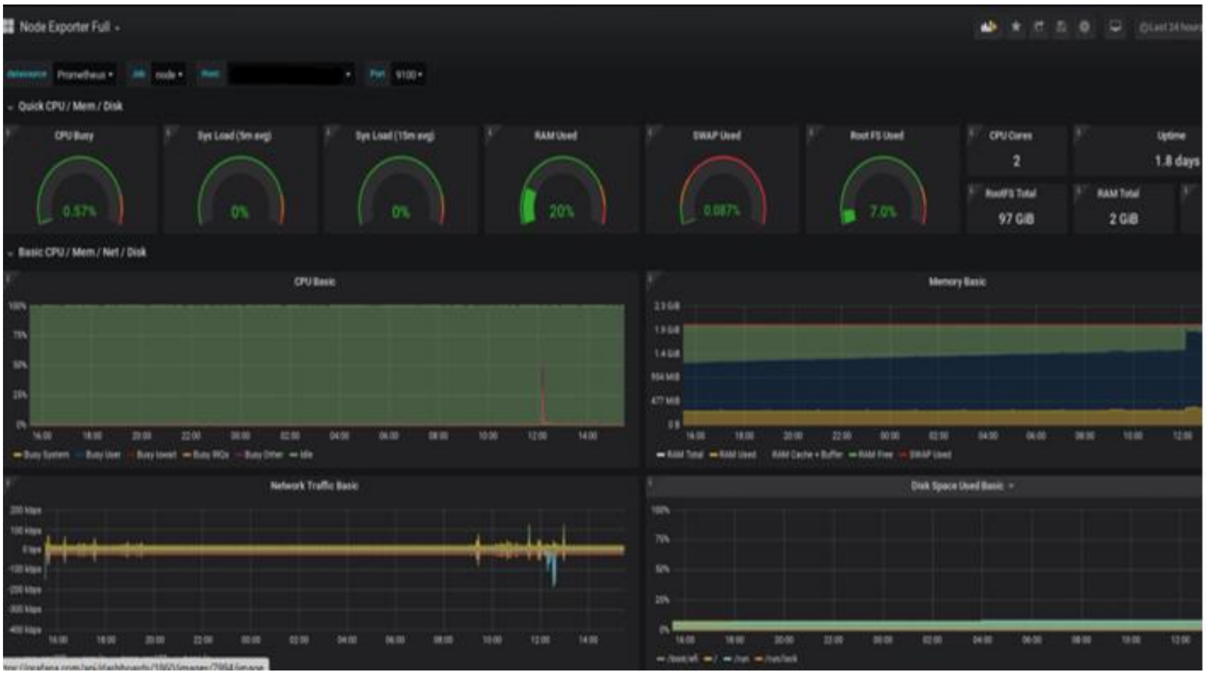
```
rate(node_network_receive_bytes_total[1m])
```

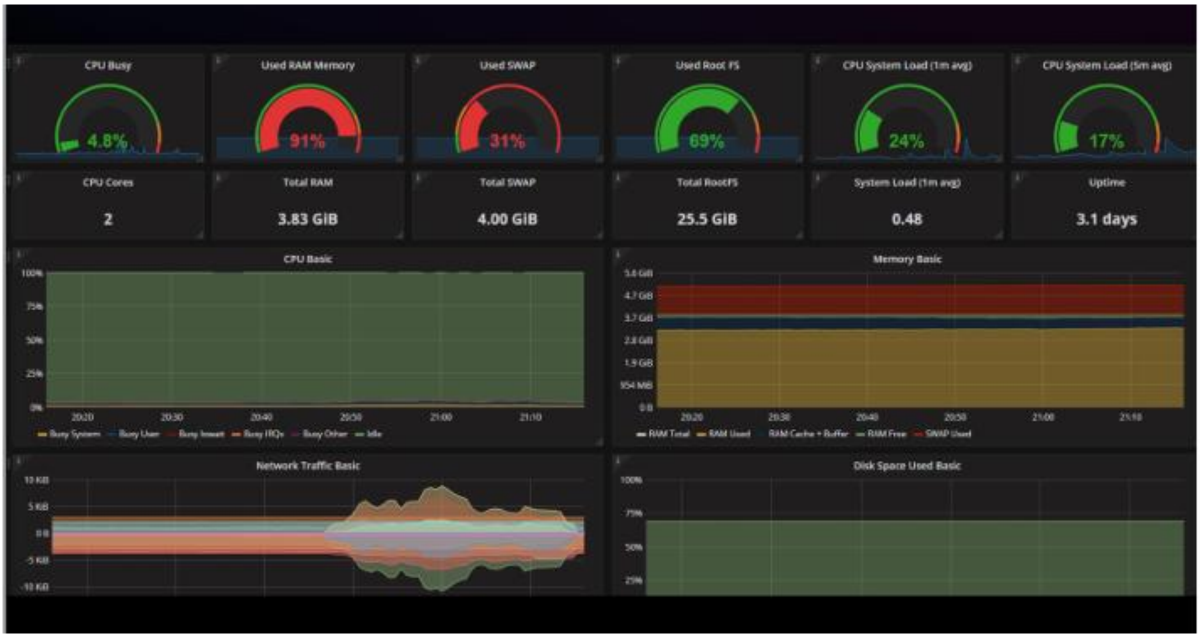
- {device="br-[illegible]", instance="localhost:9100", job="node_exporter"}
- {device="docker0", instance="localhost:9100", job="node_exporter"}
- {device="eth0", instance="localhost:9100", job="node_exporter"}
- {device="lo", instance="localhost:9100", job="node_exporter"}
- {device="veth[illegible]", instance="localhost:9100", job="node_exporter"}

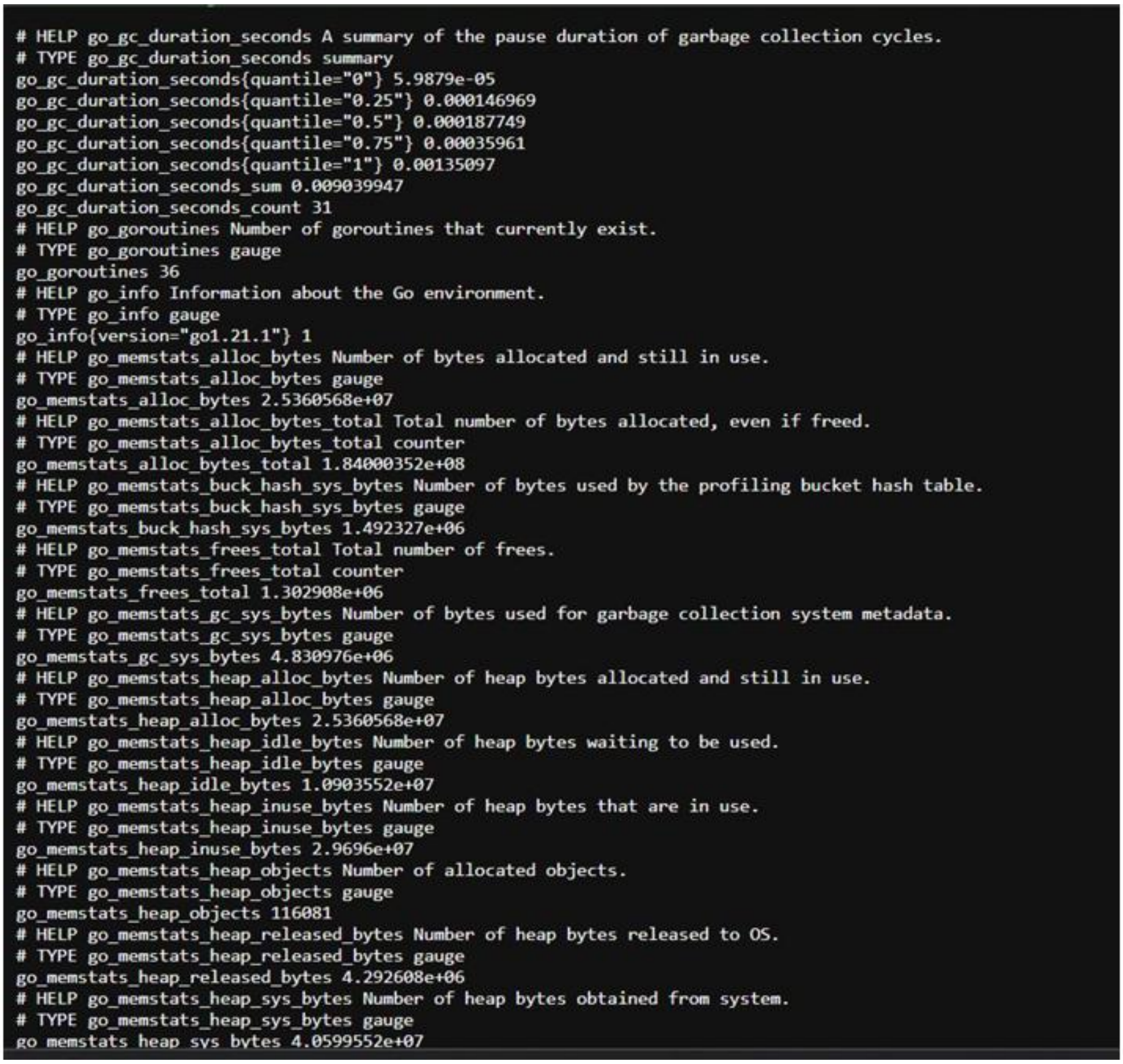
Click: select series, CTRL + click: toggle multiple series

GRAFANA:

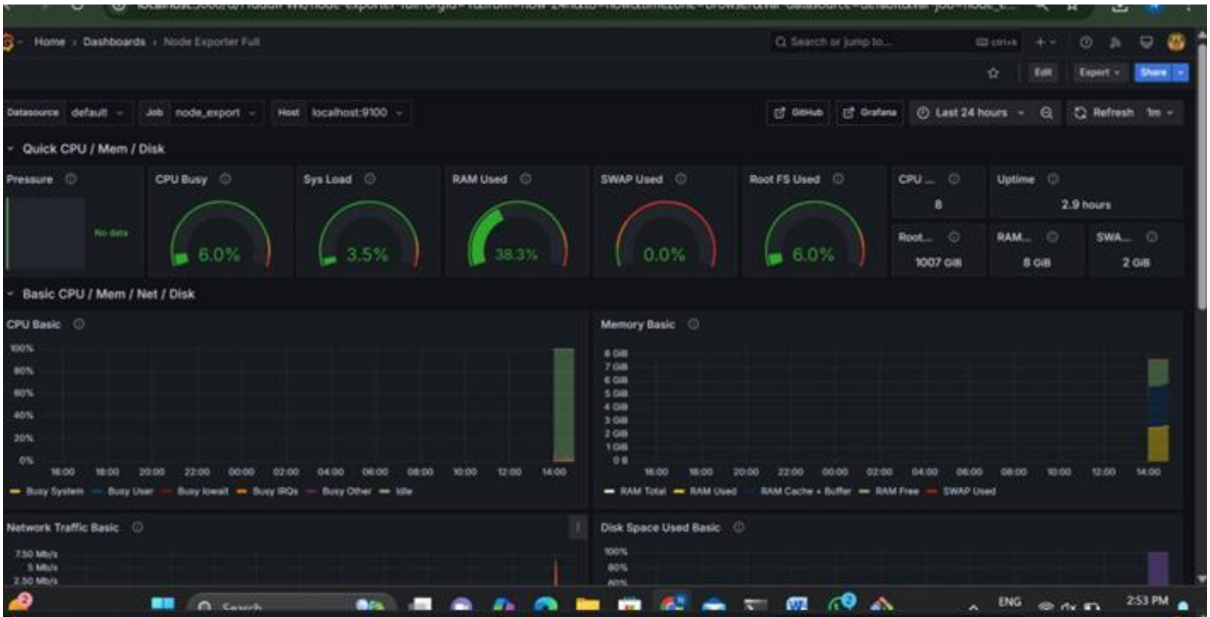
Grafana is an open-source analytics and visualization platform used for monitoring and observability. It allows users to create interactive dashboards from multiple data sources like Prometheus, InfluxDB, Elasticsearch, MySQL, and more

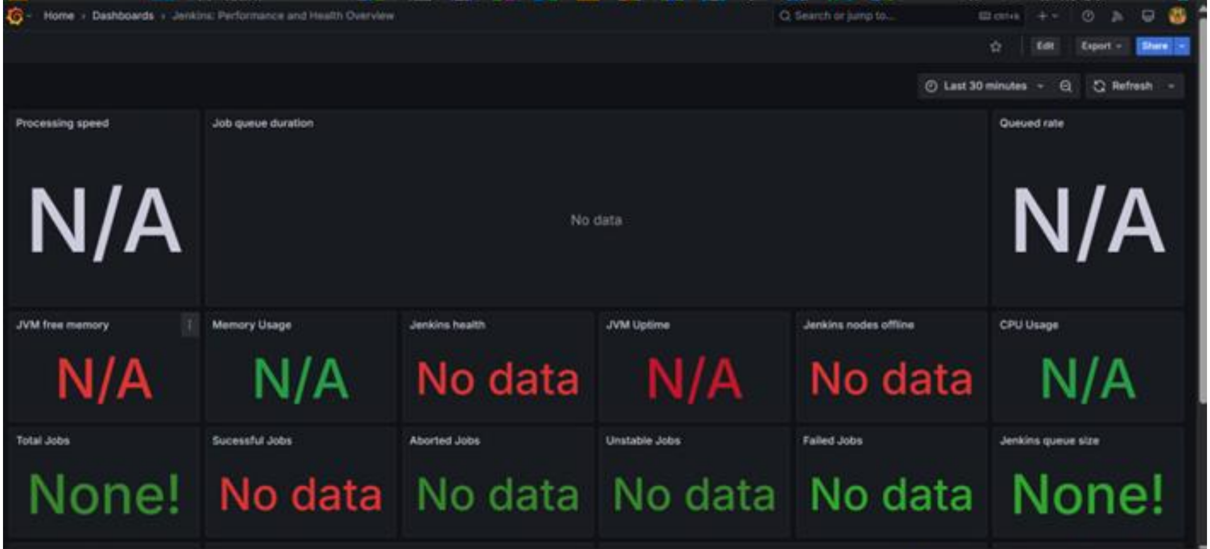


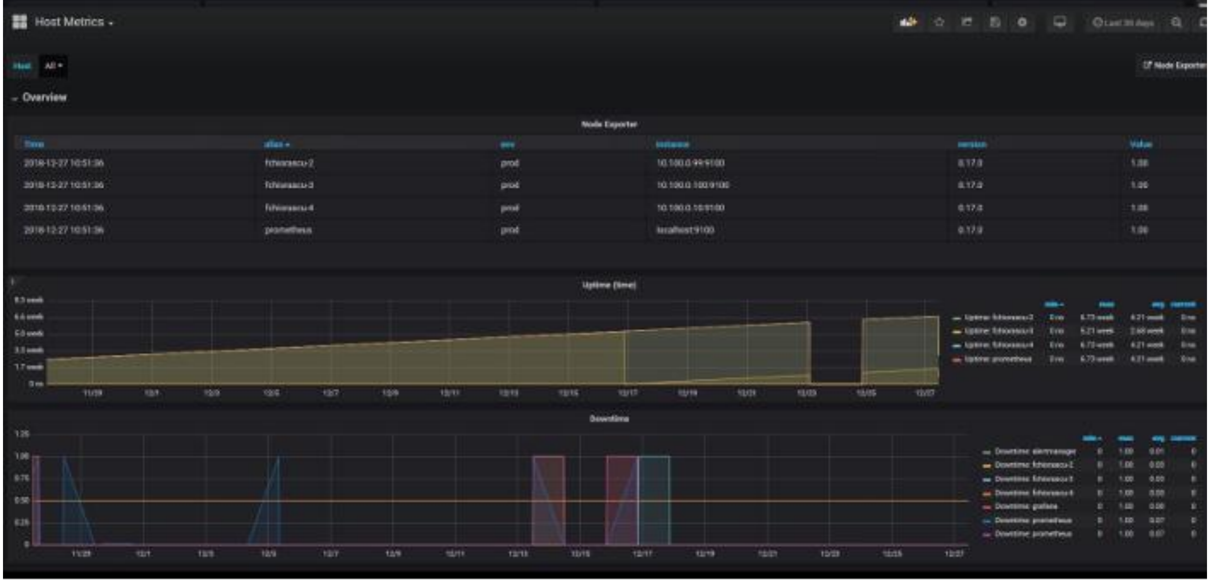




```
# HELP go_gc_duration_seconds A summary of the pause duration of garbage collection cycles.
# TYPE go_gc_duration_seconds summary
go_gc_duration_seconds{quantile="0"} 5.9879e-05
go_gc_duration_seconds{quantile="0.25"} 0.000146969
go_gc_duration_seconds{quantile="0.5"} 0.000187749
go_gc_duration_seconds{quantile="0.75"} 0.00035961
go_gc_duration_seconds{quantile="1"} 0.00135097
go_gc_duration_seconds_sum 0.009039947
go_gc_duration_seconds_count 31
# HELP go_goroutines Number of goroutines that currently exist.
# TYPE go_goroutines gauge
go_goroutines 36
# HELP go_info Information about the Go environment.
# TYPE go_info gauge
go_info{version="go1.21.1"} 1
# HELP go_memstats_alloc_bytes Number of bytes allocated and still in use.
# TYPE go_memstats_alloc_bytes gauge
go_memstats_alloc_bytes 2.5360568e+07
# HELP go_memstats_alloc_bytes_total Total number of bytes allocated, even if freed.
# TYPE go_memstats_alloc_bytes_total counter
go_memstats_alloc_bytes_total 1.84000352e+08
# HELP go_memstats_buck_hash_sys_bytes Number of bytes used by the profiling bucket hash table.
# TYPE go_memstats_buck_hash_sys_bytes gauge
go_memstats_buck_hash_sys_bytes 1.492327e+06
# HELP go_memstats_frees_total Total number of frees.
# TYPE go_memstats_frees_total counter
go_memstats_frees_total 1.302908e+06
# HELP go_memstats_gc_sys_bytes Number of bytes used for garbage collection system metadata.
# TYPE go_memstats_gc_sys_bytes gauge
go_memstats_gc_sys_bytes 4.830976e+06
# HELP go_memstats_heap_alloc_bytes Number of heap bytes allocated and still in use.
# TYPE go_memstats_heap_alloc_bytes gauge
go_memstats_heap_alloc_bytes 2.5360568e+07
# HELP go_memstats_heap_idle_bytes Number of heap bytes waiting to be used.
# TYPE go_memstats_heap_idle_bytes gauge
go_memstats_heap_idle_bytes 1.0903552e+07
# HELP go_memstats_heap_inuse_bytes Number of heap bytes that are in use.
# TYPE go_memstats_heap_inuse_bytes gauge
go_memstats_heap_inuse_bytes 2.9696e+07
# HELP go_memstats_heap_objects Number of allocated objects.
# TYPE go_memstats_heap_objects gauge
go_memstats_heap_objects 116081
# HELP go_memstats_heap_released_bytes Number of heap bytes released to OS.
# TYPE go_memstats_heap_released_bytes gauge
go_memstats_heap_released_bytes 4.292608e+06
# HELP go_memstats_heap_sys_bytes Number of heap bytes obtained from system.
# TYPE go_memstats_heap_sys_bytes gauge
go_memstats_heap_sys_bytes 4.0599552e+07
```







Node Exporter

Time	alias	env	instance	version	Value
2018-12-27 10:51:36	fchiorascu-2	prod	10.100.0.99:9100	0.17.0	1.00
2018-12-27 10:51:36	fchiorascu-3	prod	10.100.0.100:9100	0.17.0	1.00
2018-12-27 10:51:36	fchiorascu-4	prod	10.100.0.10:9100	0.17.0	1.00
2018-12-27 10:51:36	prometheus	prod	localhost:9100	0.17.0	1.00