

Lesson 02 Demo 01

Setting up and Monitoring with Node Exporter

Objective: To set up and monitor Node Exporter, which exposes system metrics from a Linux host, making it a valuable tool for monitoring hosts within a Prometheus ecosystem

Tools required: Linux operating system

Prerequisites: None

Steps to be followed:

1. Download and set up Node Exporter on localhost
2. Set up a Prometheus server on localhost to scrape Node Exporter metrics
3. Access Node Exporter metrics using Prometheus UI

Step 1: Download and set up Node Exporter on localhost

- 1.1 Navigate to the terminal on the Ubuntu system and execute the following command to download Node Exporter:

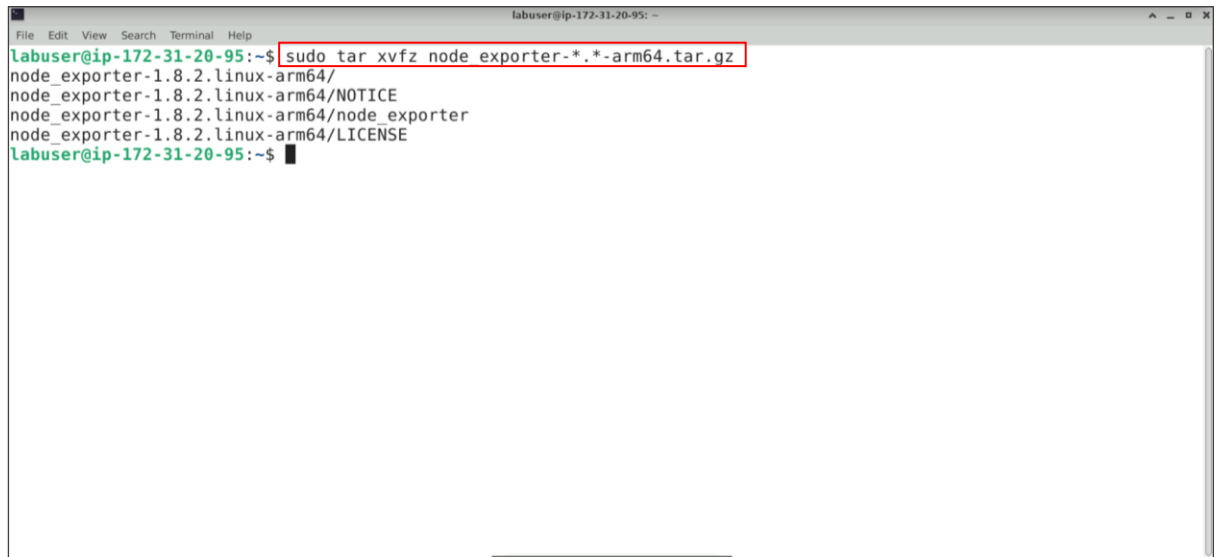
sudo wget

https://github.com/prometheus/node_exporter/releases/download/v1.8.2/node_exporter-1.8.2.linux-arm64.tar.gz

```
labuser@ip-172-31-20-95: ~  
labuser@ip-172-31-20-95:~$ sudo wget https://github.com/prometheus/node_exporter/releases/download/v1.8.2/node_exporter-1.8.2.linux-arm64.tar.gz  
--2024-09-05 09:35:20-- https://github.com/prometheus/node_exporter/releases/download/v1.8.2/node_exporter-1.8.2.linux-arm64.tar.gz  
Resolving github.com (github.com)... 20.207.73.82  
Connecting to github.com (github.com)|20.207.73.82|:443... connected.  
HTTP request sent, awaiting response... 302 Found  
Location: https://objects.githubusercontent.com/github-production-release-asset-2e65be/9524057/a32f99c4-6509-43a7-bc2a-b17790c867267X-Amz-Algorithm=AWS4-HMAC-SHA256&X-Amz-Credential=releaseassetproduction%2F20240905%2Fus-east-1%2Fs3%2Faws4_request&X-Amz-Date=20240905T093520Z&X-Amz-Expires=300&X-Amz-Signature=309aa73cac1dff1186118bd6e21cdcaecf587dbec48bc2266e3d1ba07a0e2a44&X-Amz-SignedHeaders=host&actor_id=0&key_id=0&repo_id=9524057&response-content-disposition=attachment%3B%20filename%3Dnode_exporter-1.8.2.linux-arm64.tar.gz&response-content-type=application%2Foctet-stream [following]  
--2024-09-05 09:35:20-- https://objects.githubusercontent.com/github-production-release-asset-2e65be/9524057/a32f99c4-6509-43a7-bc2a-b17790c867267X-Amz-Algorithm=AWS4-HMAC-SHA256&X-Amz-Credential=releaseassetproduction%2F20240905%2Fus-east-1%2Fs3%2Faws4_request&X-Amz-Date=20240905T093520Z&X-Amz-Expires=300&X-Amz-Signature=309aa73cac1dff1186118bd6e21cdcaecf587dbec48bc2266e3d1ba07a0e2a44&X-Amz-SignedHeaders=host&actor_id=0&key_id=0&repo_id=9524057&response-content-disposition=attachment%3B%20filename%3Dnode_exporter-1.8.2.linux-arm64.tar.gz&response-content-type=application%2Foctet-stream  
Resolving objects.githubusercontent.com (objects.githubusercontent.com)... 185.199.110.133, 185.199.111.133, 185.199.108.133, ...  
Connecting to objects.githubusercontent.com (objects.githubusercontent.com)|185.199.110.133|:443... connected.  
HTTP request sent, awaiting response... 200 OK  
Length: 9956552 (9.5M) [application/octet-stream]  
Saving to: 'node_exporter-1.8.2.linux-arm64.tar.gz'  
  
node_exporter-1.8.2.linux 100%[=====] 9.50M --.-KB/s in 0.04s  
  
2024-09-05 09:35:21 (230 MB/s) - 'node_exporter-1.8.2.linux-arm64.tar.gz' saved [9956552/9956552]  
  
labuser@ip-172-31-20-95:~$
```

1.2 Run the following command to extract the downloaded Node Exporter package:

```
sudo tar xvfz node_exporter-*.linux-arm64.tar.gz
```



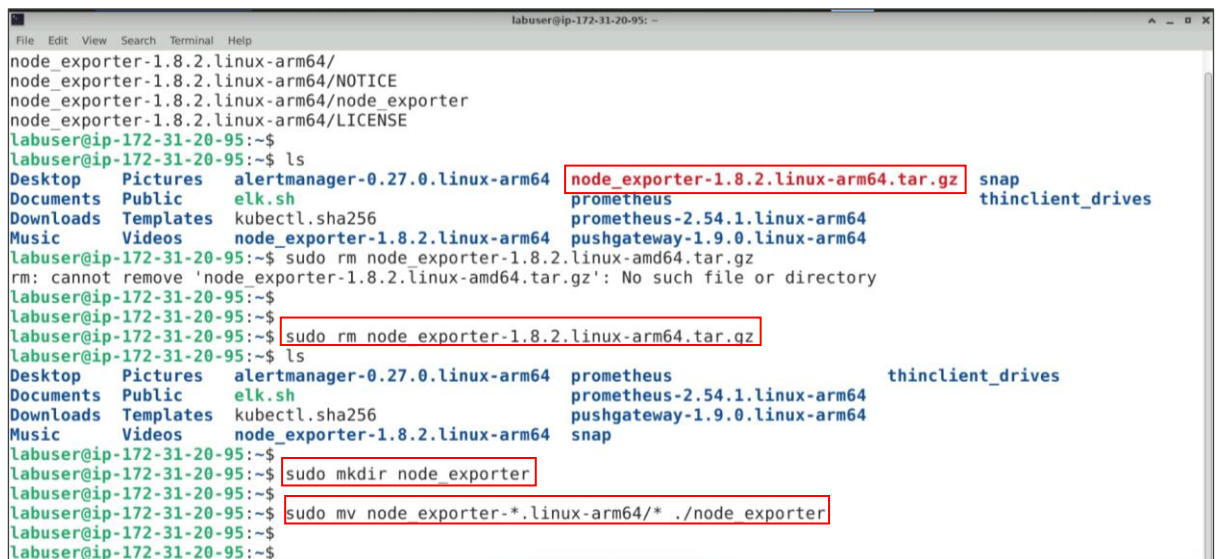
```
labuser@ip-172-31-20-95: ~  
File Edit View Search Terminal Help  
labuser@ip-172-31-20-95:~$ sudo tar xvfz node_exporter-*.linux-arm64.tar.gz  
node_exporter-1.8.2.linux-arm64/  
node_exporter-1.8.2.linux-arm64/NOTICE  
node_exporter-1.8.2.linux-arm64/node_exporter  
node_exporter-1.8.2.linux-arm64/LICENSE  
labuser@ip-172-31-20-95:~$
```

1.3 Delete the downloaded .tar.gz file to free up space, then create a new directory named **Node_Exporter** and move the extracted Node Exporter files into the newly created directory using the following commands:

```
sudo rm node_exporter-1.8.2.linux-arm64.tar.gz
```

```
sudo mkdir node_exporter
```

```
sudo mv node_exporter-*.linux-arm64/* ./node_exporter
```

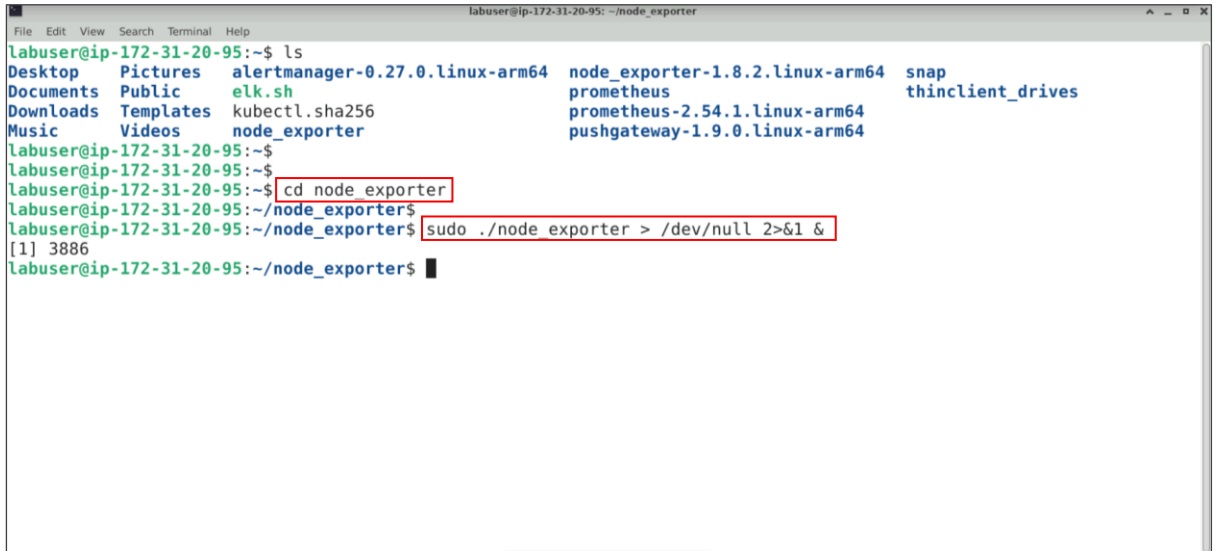


```
node_exporter-1.8.2.linux-arm64/  
node_exporter-1.8.2.linux-arm64/NOTICE  
node_exporter-1.8.2.linux-arm64/node_exporter  
node_exporter-1.8.2.linux-arm64/LICENSE  
labuser@ip-172-31-20-95:~$  
labuser@ip-172-31-20-95:~$ ls  
Desktop  Pictures  alertmanager-0.27.0.linux-arm64  node_exporter-1.8.2.linux-arm64.tar.gz  snap  
Documents Public    elk.sh                               prometheus                               thinclient_drives  
Downloads Templates kubectl.sha256                    prometheus-2.54.1.linux-arm64  
Music    Videos  node_exporter-1.8.2.linux-arm64  pushgateway-1.9.0.linux-arm64  
labuser@ip-172-31-20-95:~$ sudo rm node_exporter-1.8.2.linux-arm64.tar.gz  
rm: cannot remove 'node_exporter-1.8.2.linux-arm64.tar.gz': No such file or directory  
labuser@ip-172-31-20-95:~$  
labuser@ip-172-31-20-95:~$ sudo rm node_exporter-1.8.2.linux-arm64.tar.gz  
labuser@ip-172-31-20-95:~$  
labuser@ip-172-31-20-95:~$ sudo rm node_exporter-1.8.2.linux-arm64.tar.gz  
labuser@ip-172-31-20-95:~$ ls  
Desktop  Pictures  alertmanager-0.27.0.linux-arm64  prometheus                               thinclient_drives  
Documents Public    elk.sh                               prometheus-2.54.1.linux-arm64  
Downloads Templates kubectl.sha256                    pushgateway-1.9.0.linux-arm64  
Music    Videos  node_exporter-1.8.2.linux-arm64  snap  
labuser@ip-172-31-20-95:~$  
labuser@ip-172-31-20-95:~$ sudo mkdir node_exporter  
labuser@ip-172-31-20-95:~$  
labuser@ip-172-31-20-95:~$ sudo mv node_exporter-*.linux-arm64/* ./node_exporter  
labuser@ip-172-31-20-95:~$  
labuser@ip-172-31-20-95:~$
```

- 1.4 Execute the following commands to change the directory and start the node_exporter in the background, redirecting output to **/dev/null**:

```
cd node_exporter
```

```
sudo ./node_exporter > /dev/null 2>&1 &
```



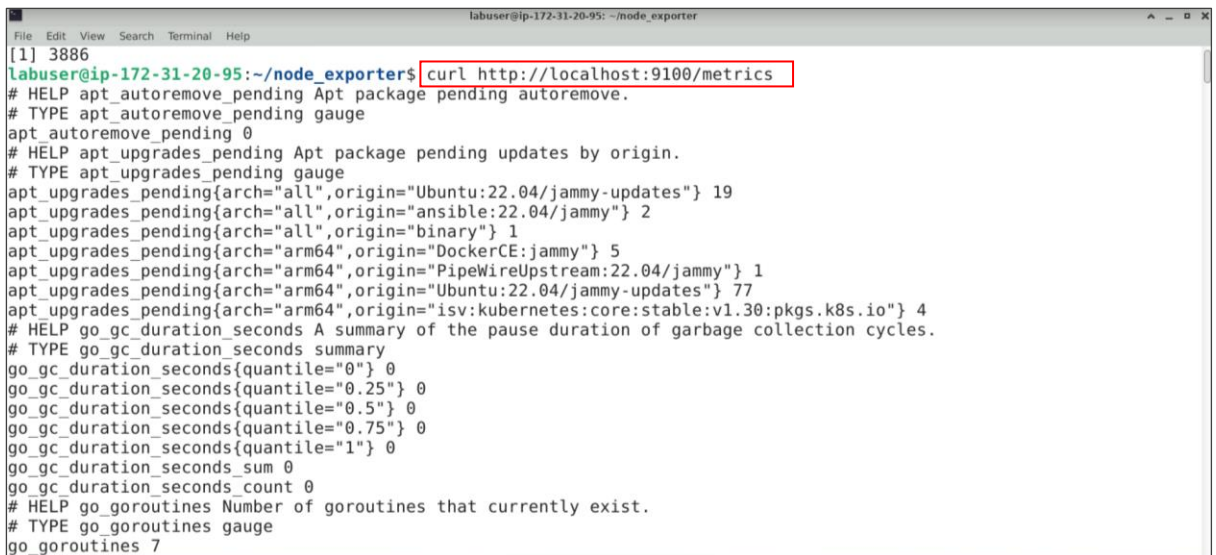
A terminal window titled 'labuser@ip-172-31-20-95: ~/node_exporter'. The user runs 'ls' showing a directory listing with files like 'alertmanager-0.27.0', 'node_exporter-1.8.2', 'prometheus', and 'pushgateway'. Then, the user runs 'cd node_exporter' and 'sudo ./node_exporter > /dev/null 2>&1 &'. The terminal shows the process starting with PID 3886.

```
labuser@ip-172-31-20-95:~$ ls
Desktop  Pictures  alertmanager-0.27.0.linux-arm64  node_exporter-1.8.2.linux-arm64  snap
Documents Public    elk.sh                               prometheus                         thinclient_drives
Downloads Templates kubectl.sha256                     prometheus-2.54.1.linux-arm64
Music    Videos  node_exporter                       pushgateway-1.9.0.linux-arm64

labuser@ip-172-31-20-95:~$
labuser@ip-172-31-20-95:~$
labuser@ip-172-31-20-95:~$ cd node_exporter
labuser@ip-172-31-20-95:~/node_exporter$
labuser@ip-172-31-20-95:~/node_exporter$ sudo ./node_exporter > /dev/null 2>&1 &
[1] 3886
labuser@ip-172-31-20-95:~/node_exporter$
```

- 1.5 Verify that Node Exporter is running by fetching its metrics with the following command:

```
curl http://localhost:9100/metrics
```



A terminal window showing the output of the command 'curl http://localhost:9100/metrics'. The output displays various system metrics in a structured format, including apt autoremove pending, apt upgrades pending, go_gc_duration_seconds, and go_goroutines.

```
labuser@ip-172-31-20-95:~/node_exporter$ curl http://localhost:9100/metrics
# HELP apt_autoremove_pending Apt package pending autoremove.
# TYPE apt_autoremove_pending gauge
apt_autoremove_pending 0
# HELP apt_upgrades_pending Apt package pending updates by origin.
# TYPE apt_upgrades_pending gauge
apt_upgrades_pending{arch="all",origin="Ubuntu:22.04/jammy-updates"} 19
apt_upgrades_pending{arch="all",origin="ansible:22.04/jammy"} 2
apt_upgrades_pending{arch="all",origin="binary"} 1
apt_upgrades_pending{arch="arm64",origin="DockerCE:jammy"} 5
apt_upgrades_pending{arch="arm64",origin="PipeWireUpstream:22.04/jammy"} 1
apt_upgrades_pending{arch="arm64",origin="Ubuntu:22.04/jammy-updates"} 77
apt_upgrades_pending{arch="arm64",origin="isv:kubernetes:core:stable:v1.30:pkgs.k8s.io"} 4
# 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"} 0
go_gc_duration_seconds{quantile="0.25"} 0
go_gc_duration_seconds{quantile="0.5"} 0
go_gc_duration_seconds{quantile="0.75"} 0
go_gc_duration_seconds{quantile="1"} 0
go_gc_duration_seconds_sum 0
go_gc_duration_seconds_count 0
# HELP go_goroutines Number of goroutines that currently exist.
# TYPE go_goroutines gauge
go_goroutines 7
```

```
labuser@ip-172-31-20-95: ~/node_exporter
# TYPE process_resident_memory_bytes gauge
process_resident_memory_bytes 1.3893632e+07
# HELP process_start_time_seconds Start time of the process since unix epoch in seconds.
# TYPE process_start_time_seconds gauge
process_start_time_seconds 1.72552878191e+09
# HELP process_virtual_memory_bytes Virtual memory size in bytes.
# TYPE process_virtual_memory_bytes gauge
process_virtual_memory_bytes 1.111728128e+09
# HELP process_virtual_memory_max_bytes Maximum amount of virtual memory available in bytes.
# TYPE process_virtual_memory_max_bytes gauge
process_virtual_memory_max_bytes 1.8446744073709552e+19
# HELP promhttp_metric_handler_errors_total Total number of internal errors encountered by the promhttp metric handler.
# TYPE promhttp_metric_handler_errors_total counter
promhttp_metric_handler_errors_total{cause="encoding"} 0
promhttp_metric_handler_errors_total{cause="gathering"} 0
# HELP promhttp_metric_handler_requests_in_flight Current number of scrapes being served.
# TYPE promhttp_metric_handler_requests_in_flight gauge
promhttp_metric_handler_requests_in_flight 1
# HELP promhttp_metric_handler_requests_total Total number of scrapes by HTTP status code.
# TYPE promhttp_metric_handler_requests_total counter
promhttp_metric_handler_requests_total{code="200"} 0
promhttp_metric_handler_requests_total{code="500"} 0
promhttp_metric_handler_requests_total{code="503"} 0
[1]+  Exit 1                  sudo ./node_exporter > /dev/null 2>&1
labuser@ip-172-31-20-95:~/node_exporter$
```

Step 2: Set up a Prometheus server on localhost to scrape Node Exporter metrics

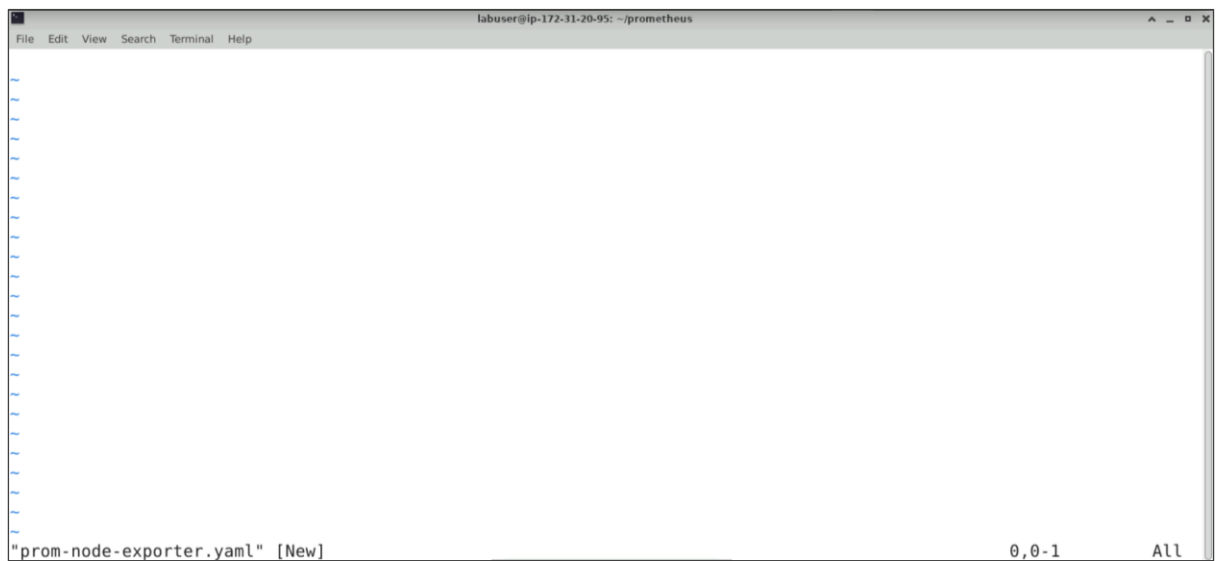
- 2.1 Change the current directory into the **prometheus** directory, then open the **prom-node-exporter.yaml** file in the **Vim** editor for editing using the following commands:

```
cd ..
cd prometheus
sudo vim prom-node-exporter.yaml
```

```
labuser@ip-172-31-20-95:~/prometheus
# HELP promhttp_metric_handler_errors_total Total number of internal errors encountered by the promhttp metric handler.
# TYPE promhttp_metric_handler_errors_total counter
promhttp_metric_handler_errors_total{cause="encoding"} 0
promhttp_metric_handler_errors_total{cause="gathering"} 0
# HELP promhttp_metric_handler_requests_in_flight Current number of scrapes being served.
# TYPE promhttp_metric_handler_requests_in_flight gauge
promhttp_metric_handler_requests_in_flight 1
# HELP promhttp_metric_handler_requests_total Total number of scrapes by HTTP status code.
# TYPE promhttp_metric_handler_requests_total counter
promhttp_metric_handler_requests_total{code="200"} 0
promhttp_metric_handler_requests_total{code="500"} 0
promhttp_metric_handler_requests_total{code="503"} 0
[1]+  Exit 1                  sudo ./node_exporter > /dev/null 2>&1
labuser@ip-172-31-20-95:~/node_exporter$
labuser@ip-172-31-20-95:~/node_exporter$ cd ..
labuser@ip-172-31-20-95:~$
labuser@ip-172-31-20-95:~$ ls
Desktop  Pictures  alertmanager-0.27.0.linux-arm64  node_exporter-1.8.2.linux-arm64  snap
Documents  Public    elk.sh                             prometheus                          thinclient_drives
Downloads  Templates  kubectl.sha256                    prometheus-2.54.1.linux-arm64
Music      Videos    node_exporter                     pushgateway-1.9.0.linux-arm64
labuser@ip-172-31-20-95:~$
labuser@ip-172-31-20-95:~$ cd prometheus
labuser@ip-172-31-20-95:~/prometheus$
labuser@ip-172-31-20-95:~/prometheus$ sudo vim prom-node-exporter.yaml
```

Note: Other editors like **vi**, **nano**, and more can also be used instead of **Vim**.

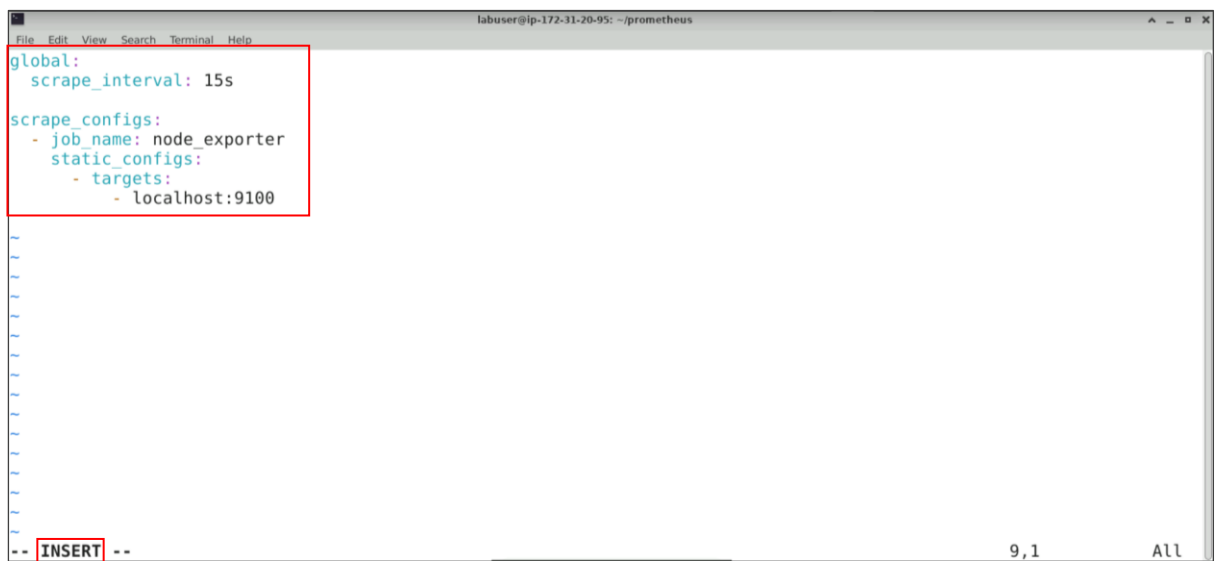
The **Vim** editor appears as shown below:



2.2 Press **I** to switch to **INSERT** mode, then copy the following YAML configuration into the file:

```
global:
  scrape_interval: 15s

scrape_configs:
  - job_name: node_exporter
    static_configs:
      - targets:
        - localhost:9100
```



2.3 Type **:wq** to save and exit the file

```
labuser@ip-172-31-20-95: ~/prometheus
File Edit View Search Terminal Help
global:
  scrape_interval: 15s

scrape_configs:
  - job_name: node_exporter
    static_configs:
      - targets:
        - localhost:9100

:wq
```

2.4 Execute the following command to start the Prometheus server using the configuration file to monitor Node Exporter:

```
sudo ./prometheus --config.file=prom-node-exporter.yaml
```

```
labuser@ip-172-31-20-95: ~/prometheus
File Edit View Search Terminal Help
labuser@ip-172-31-20-95:~/prometheus$ sudo ./prometheus --config.file=prom-node-exporter.yaml
ts=2024-09-05T09:53:53.966Z caller=main.go:601 level=info msg="No time or size retention was set so using the default
time retention" duration=15d
ts=2024-09-05T09:53:53.966Z caller=main.go:645 level=info msg="Starting Prometheus Server" mode=server version="(ver
sion=2.54.1, branch=HEAD, revision=e6cfa720fbe6280153fab13090a483dbd40bece3)"
ts=2024-09-05T09:53:53.966Z caller=main.go:650 level=info build_context="(go=go1.22.6, platform=linux/arm64, user=ro
ot@812ff0741951, date=20240827-10:59:03, tags=netgo,builtinassets,stringlabels)"
ts=2024-09-05T09:53:53.966Z caller=main.go:651 level=info host_details="(Linux 6.5.0-1017-aws #17-22.04.2-Ubuntu SMP
Mon Mar 25 20:47:22 UTC 2024 aarch64 ip-172-31-20-95 (none))"
ts=2024-09-05T09:53:53.966Z caller=main.go:652 level=info fd_limits="(soft=1048576, hard=1048576)"
ts=2024-09-05T09:53:53.966Z caller=main.go:653 level=info vm_limits="(soft=unlimited, hard=unlimited)"
ts=2024-09-05T09:53:53.973Z caller=web.go:571 level=info component=web msg="Start listening for connections" address
=0.0.0.0:9090
ts=2024-09-05T09:53:53.977Z caller=main.go:1160 level=info msg="Starting TSDB ..."
ts=2024-09-05T09:53:53.986Z caller=tsl_config.go:313 level=info component=web msg="Listening on" address=[::]:9090
ts=2024-09-05T09:53:53.987Z caller=tsl_config.go:316 level=info component=web msg="TLS is disabled." http2=false add
ress=[::]:9090
ts=2024-09-05T09:53:53.986Z caller=dir_locker.go:77 level=warn component=tsdb msg="A lockfile from a previous execut
ion already existed. It was replaced" file=/home/labuser/prometheus/data/lock
ts=2024-09-05T09:53:54.002Z caller=head.go:626 level=info component=tsdb msg="Replaying on-disk memory mappable chun
ks if any"
ts=2024-09-05T09:53:54.003Z caller=head.go:713 level=info component=tsdb msg="On-disk memory mappable chunks replay
completed" duration=43.938µs
ts=2024-09-05T09:53:54.003Z caller=head.go:721 level=info component=tsdb msg="Replaying WAL, this may take a while"
ts=2024-09-05T09:53:54.057Z caller=head.go:793 level=info component=tsdb msg="WAL segment loaded" segment=0 maxSegme
nt=1
```

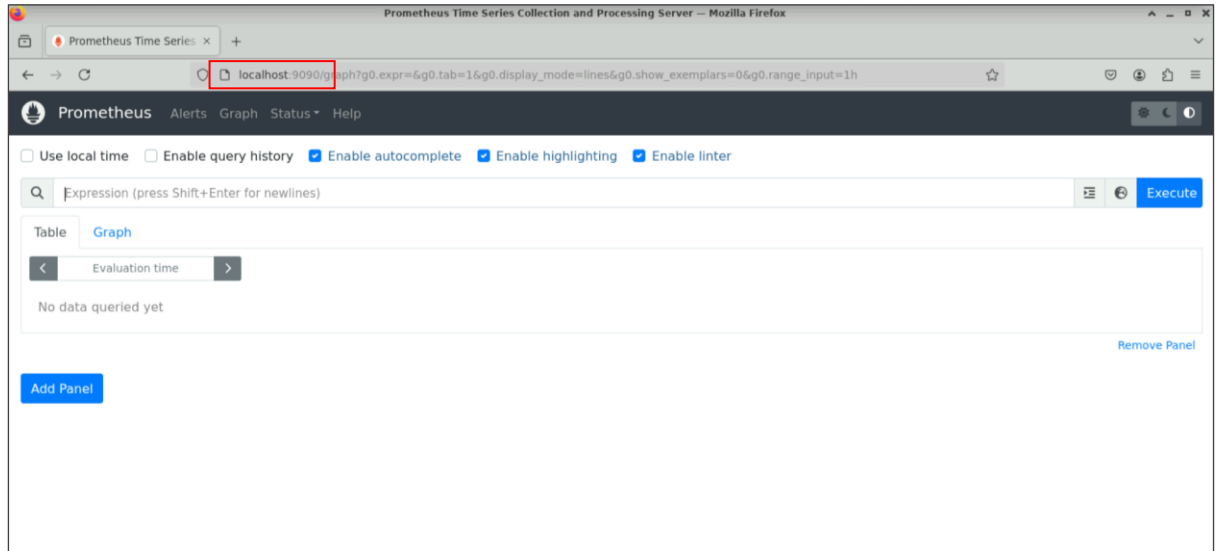
Note: If you encounter any port conflicts, run the following commands to resolve them:

Find which process is occupying the 9090 port: **sudo lsof -i :9090**

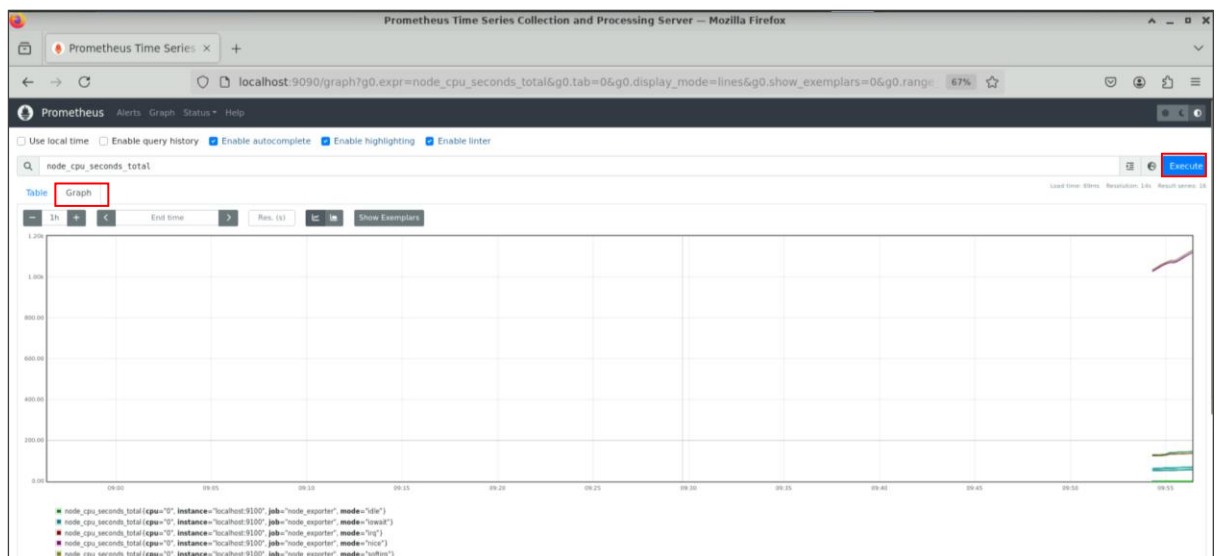
Stop that process: **sudo systemctl stop <process name>**

Step 3: Access Node Exporter metrics using Prometheus UI

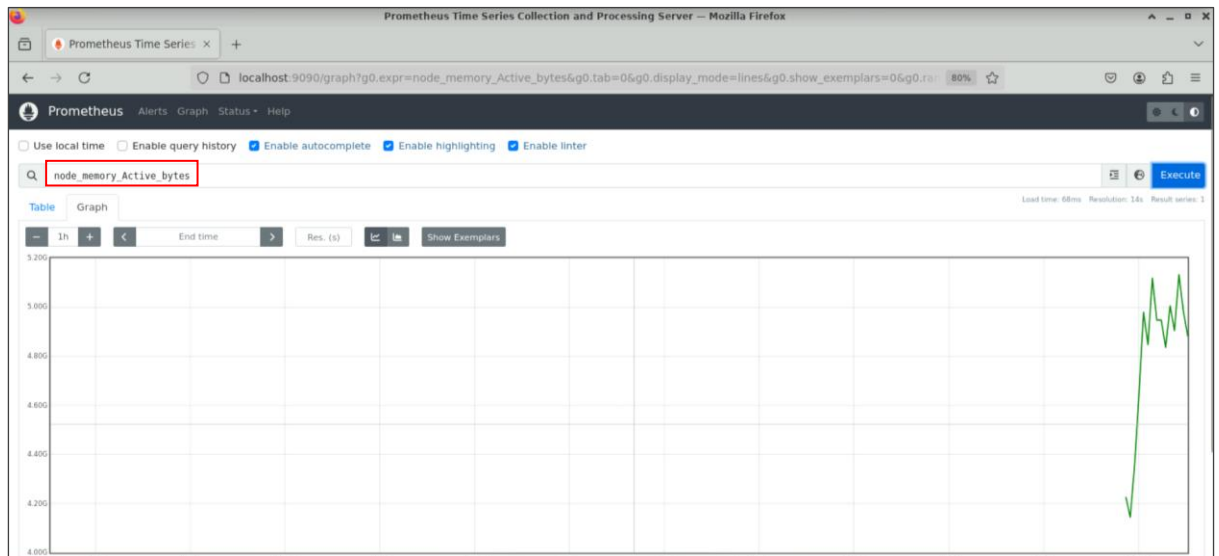
3.1 Navigate to the browser and enter the URL **http://localhost:9090/** or **http://<public-ip>:9090/** to access the Prometheus console



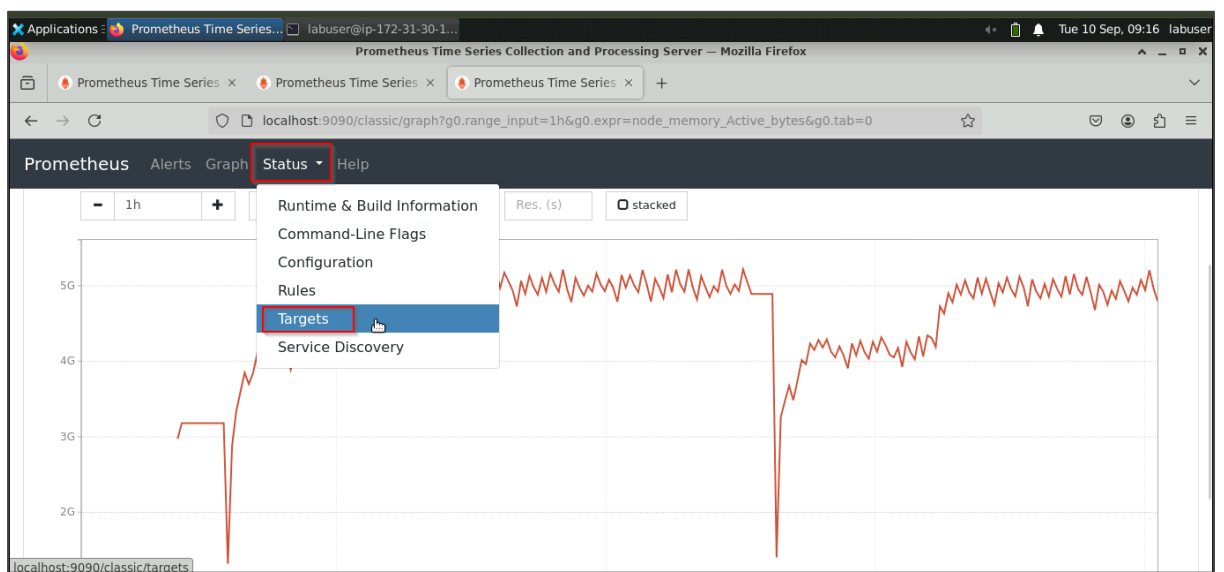
3.2 Click on **Graph** and use the expression browser to plot the **node_cpu_seconds_total** metric, then click on **Execute**



3.3 Visualize the graph using the `node_memory_Active_bytes` metric



3.4 Select **Targets** under the **Status** section to view the health of the scraped `node_exporter` target



Applications Prometheus Time Series... labuser@ip-172-31-30-1... Prometheus Time Series Collection and Processing Server — Mozilla Firefox

Prometheus Time Series x Prometheus Time Series x Prometheus Time Series x +

localhost:9090/classic/targets

Prometheus Alerts Graph Status Help

Targets

All Unhealthy Collapse All

Node_Exporter (1/1 up) show less

| Endpoint | State | Labels | Last Scrape | Scrape Duration | Error |
|-------------------------------|-------|--|-------------|-----------------|-------|
| http://localhost:9101/metrics | UP | instance="localhost:9101" job="Node Exporter" | 31ms ago | 26.21ms | |

Pushgateway (1/1 up) show less

| Endpoint | State | Labels | Last Scrape | Scrape Duration | Error |
|-------------------------------|-------|---------------------------|-------------|-----------------|-------|
| http://localhost:9091/metrics | UP | instance="localhost:9091" | 7.486s ago | 1.502ms | |

Applications Prometheus Time Series... labuser@ip-172-31-30-1... Prometheus Time Series Collection and Processing Server — Mozilla Firefox

File Edit View History Bookmarks Tools Help

Prometheus Time Series x Prometheus Time Series x Prometheus Time Series x +

localhost:9090/classic/targets

Prometheus Alerts Graph Status Help

| Endpoint | State | Labels | Last Scrape | Scrape Duration | Error |
|----------|-------|---------------------|-------------|-----------------|-------|
| | | job="Node Exporter" | | | |

Pushgateway (1/1 up) show less

| Endpoint | State | Labels | Last Scrape | Scrape Duration | Error |
|-------------------------------|-------|--|-------------|-----------------|-------|
| http://localhost:9091/metrics | UP | instance="localhost:9091" job="Pushgateway" | 7.486s ago | 1.502ms | |

prometheus (1/1 up) show less

| Endpoint | State | Labels | Last Scrape | Scrape Duration | Error |
|-------------------------------|-------|---|-------------|-----------------|-------|
| http://localhost:9090/metrics | UP | instance="localhost:9090" job="prometheus" | 75ms ago | 5.145ms | |

By following these steps, you have successfully set up and monitored system metrics from a Linux host using Node Exporter, integrating it effectively within the Prometheus ecosystem.