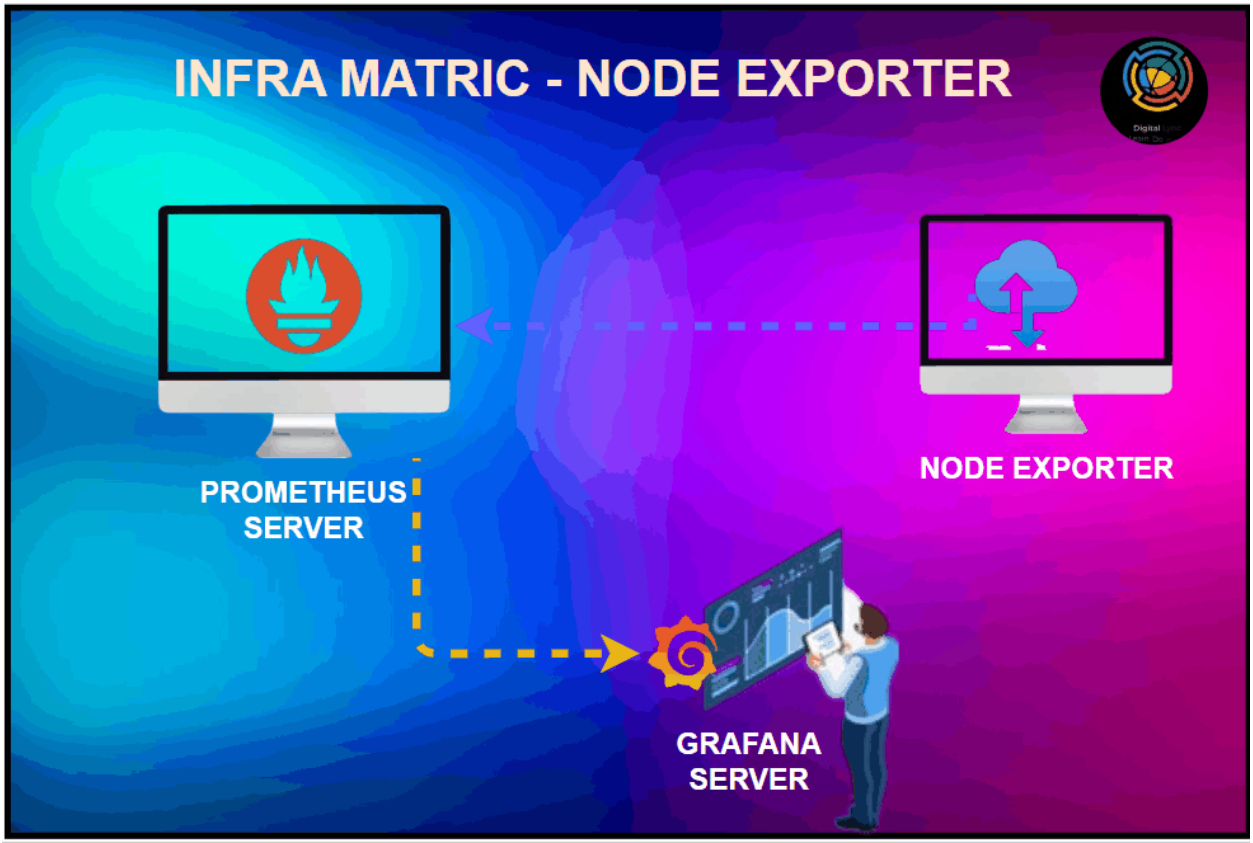
Stories 3: Infra metrics - Node Exporter - Prometheus - Grafana



- [ ] INTRODUCTION TO PROMETHEUS AND GRAFANA
- [ ] ARHCITECTURE OF PROMETHEUS
- [ ] PROMETHEUS INSTALLATION ON LINUX
- [ ] NODE EXPORTER ON APPLICATION
- [ ] CONFIGURATIONS OF PROMETHEUS WITH NODE-EXPORTER
- [ ] SCRAPING THE METRICS FROM THE APPLICATION SERVER
- [ ] GRAFANA INSTALLATION
- [ ] CONFIGURING PROMETHEUS WITH GRAFANA

☐ **GRAFANA DASHBOARDS FOR APPLICATION SERVER**

Prometheus and Grafana

- Prometheus and Grafana two powerful tools that are used for monitoring and visualization in the world of cloud technology.
- Prometheus is an open-source monitoring and alerting system, while Grafana is a feature-rich data visualization platform.
- Together, they form a robust combination that helps organizations gain insights into their systems' performance and health.

Introduction to Prometheus

- *Prometheus as a monitoring and alerting toolkit*
- *Developed at SoundCloud*
- *Built with a focus on reliability, scalability, and simplicity*
- *Core components: Prometheus Server, exporters, and client*

Prometheus provides several key features that make it a powerful monitoring tool:

Data Collection:

Prometheus collects metrics from various sources, including HTTP endpoints, exporters, and client libraries. It supports dynamic service discovery, allowing it to automatically discover and monitor new instances as they come online.

Data Storage:

Prometheus has its own built-in time series database (TSDB) that efficiently stores and indexes collected metrics. The TSDB allows for efficient querying and analysis of historical data.

Query Language:

Prometheus uses PromQL (Prometheus Query Language) to query and aggregate collected metrics. PromQL allows users to perform powerful and flexible queries to extract specific information from the collected data.

Alerting:

Prometheus has a built-in alerting mechanism that allows users to define alerting rules based on metric thresholds or more complex conditions. When an alert rule is triggered, Prometheus can send notifications to various integrations, such as email, PagerDuty, or slack .

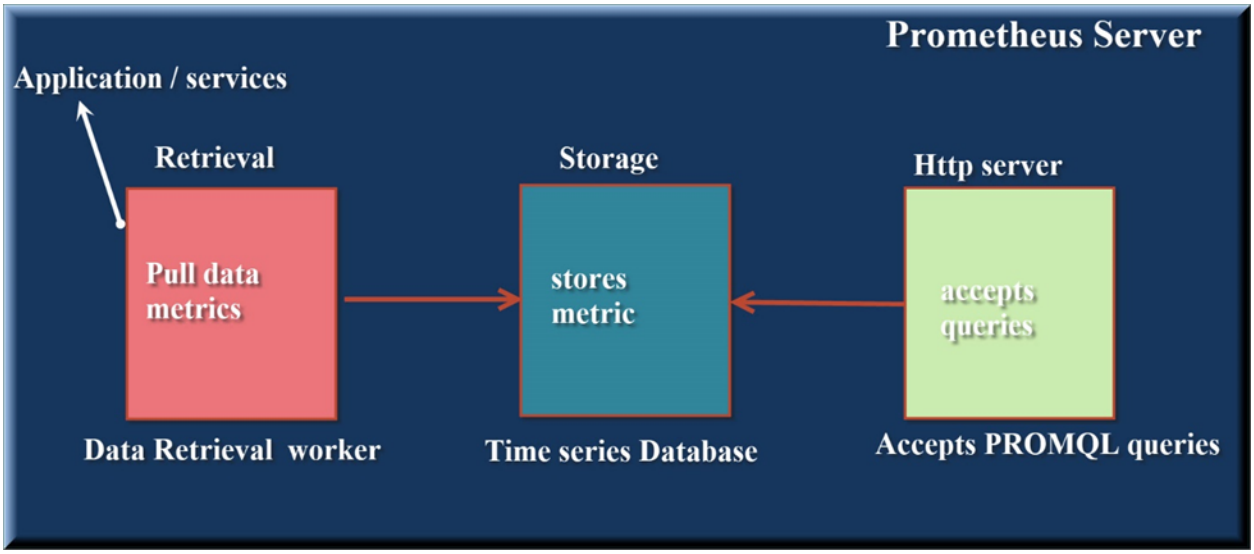
Visualization:

While Prometheus itself provides a basic web-based interface for querying and exploring metrics, it is often used in conjunction with visualization tools like Grafana. Grafana integrates with Prometheus to provide a feature-rich, customizable dashboarding and visualization experience.

Time Series Database:

Prometheus uses its own time-series database for storing collected metrics. The data is stored in a compressed and efficient format, enabling quick retrieval and analysis.

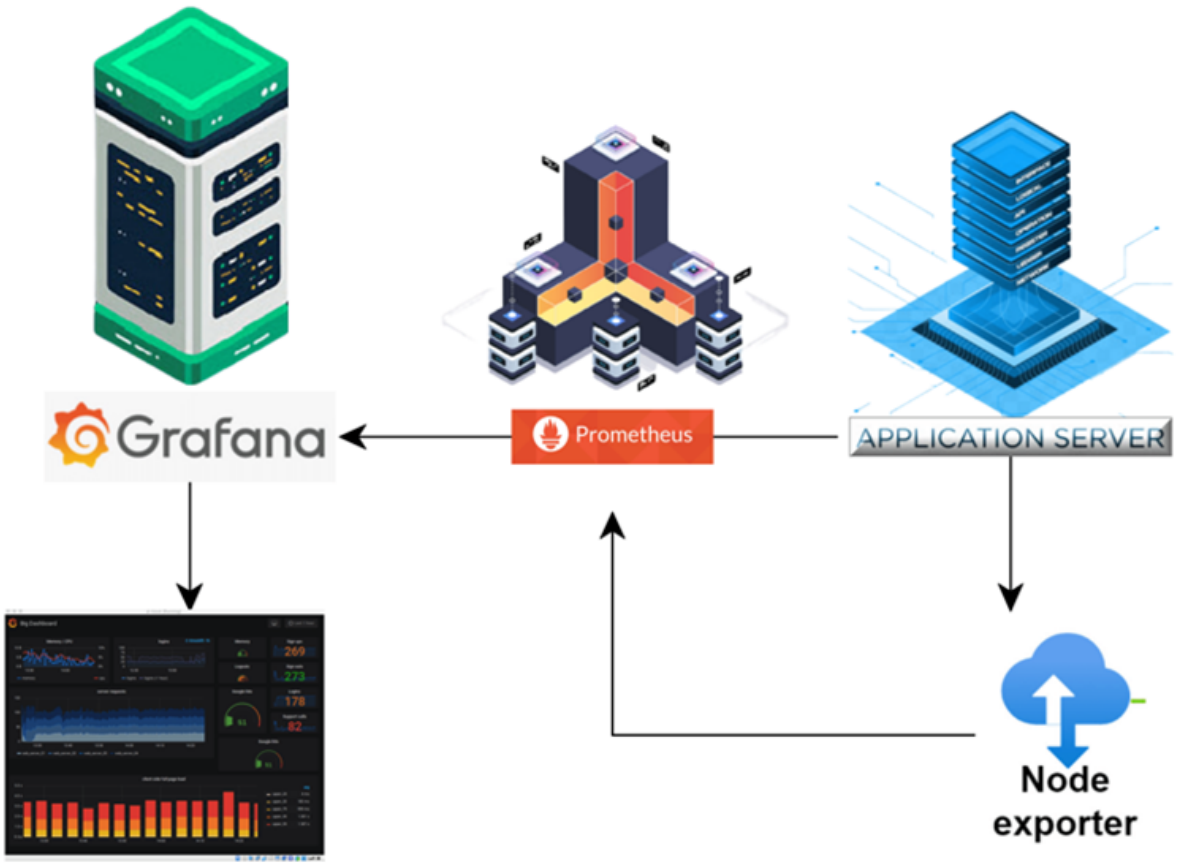
ARCHITECTURE OF PROMETHEUS



Lab :

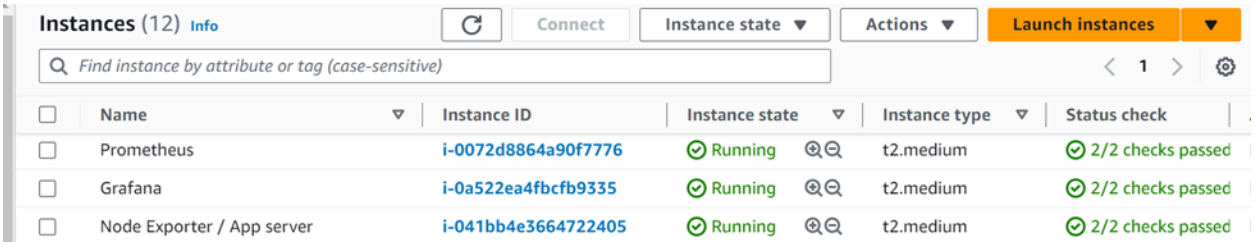
Launch Three Servers

Prometheus and Grafana Infra Metrics



Install Prometheus in Prometheus server, Application server and grafana server

Server 1	1. Prometheus Installation on Linux	
Server 2	2. Application Server	
server 3	3. Grafana Server	



Server 1 (Prometheus server)

Launch the Ubuntu version 20 Virtual Machine:

- Install the ubuntu version 20 from the AWS Cloud
- Allow the Inbound rule 9090 which is the port number of Prometheus
- To install the Prometheus visit the official website site https://prometheus.io
- For the Installation of Prometheus we have created a below script file
- Name of the script file is sh Prometheus repo **https://github.com/mubeen507/Prometheus.git**

https://github.com/prometheus/prometheus/releases/download/v2.50.0-rc.1/prometheus-2.50.0-rc.1.linux-amd64.tar.gz

```
!#/bin/bash
sudo apt update

sudo wget https://github.com/prometheus/prometheus/releases/dow

sudo groupadd --system prometheus

sudo useradd -s /sbin/nologin --system -g prometheus prometheus

sudo mkdir /var/lib/prometheus

sudo mkdir -p /etc/prometheus/rules

sudo mkdir -p /etc/prometheus/rules.s

sudo mkdir -p /etc/prometheus/files_sd
```

```
sudo tar xvf prometheus-2.45.0-rc.0.linux-amd64.tar.gz

cd prometheus-2.45.0-rc.0.linux-amd64

sudo mv prometheus promtool /usr/local/bin/

sudo mv prometheus.yml /etc/prometheus/prometheus.yml

sudo tee /etc/systemd/system/prometheus.service<<EOF
[Unit]
Description=Prometheus
Documentation=https://prometheus.io/docs/introduction/overview/
Wants=network-online.target
After=network-online.target

[Service]
Type=simple
User=prometheus
Group=prometheus
ExecReload=/bin/kill -HUP $MAINPID
ExecStart=/usr/local/bin/prometheus \
  --config.file=/etc/prometheus/prometheus.yml \
  --storage.tsdb.path=/var/lib/prometheus \
  --web.console.templates=/etc/prometheus/consoles \
  --web.console.libraries=/etc/prometheus/console_libraries \
  --web.listen-address=0.0.0.0:9090 \
  --web.external-url=

SyslogIdentifier=prometheus
Restart=always

[Install]
WantedBy=multi-user.target
EOF
```

Starting Service , enabling service and assinging permissions

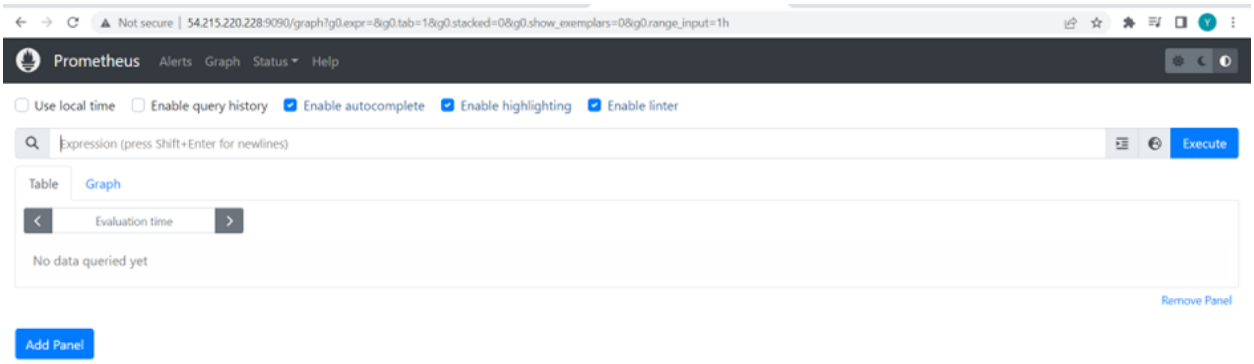
```
sudo chown -R prometheus:prometheus /etc/prometheus

sudo chown -R prometheus:prometheus /etc/prometheus/*

sudo chmod -R 775 /etc/prometheus

sudo chmod -R 755 /etc/prometheus/*

sudo chown -R prometheus:prometheus /var/lib/prometheus/

sudo chown -R prometheus:prometheus /var/lib/prometheus/*

sudo systemctl daemon-reload

sudo systemctl start prometheus

sudo systemctl enable prometheus
```

Explanation:

The line "WantedBy=multi-user.target" appears to be a configuration directive in a systemd service unit file. In systemd, service unit files are used to define and manage services and daemons on a Linux system. The "WantedBy" directive specifies the target units that should start the service when those targets are activated.

In this case, "WantedBy=multi-user.target" means that the service is configured to start when the "multi-user.target" is activated. The "multi-user.target" is typically a target unit that represents the system's multi-user runlevel, which is a state where the system is fully operational and available for multiple users to log in.

- Take the public ip of the instance and check in browser for the Prometheus application .



- **Successfully we launched the Prometheus application**

Install node exporter in application server

	2. NODE EXPORTER ON APPLICATION SERVER

Server 2 (Node exporter with any appserver)

Launch the Ubuntu version 20 Virtual Machine:

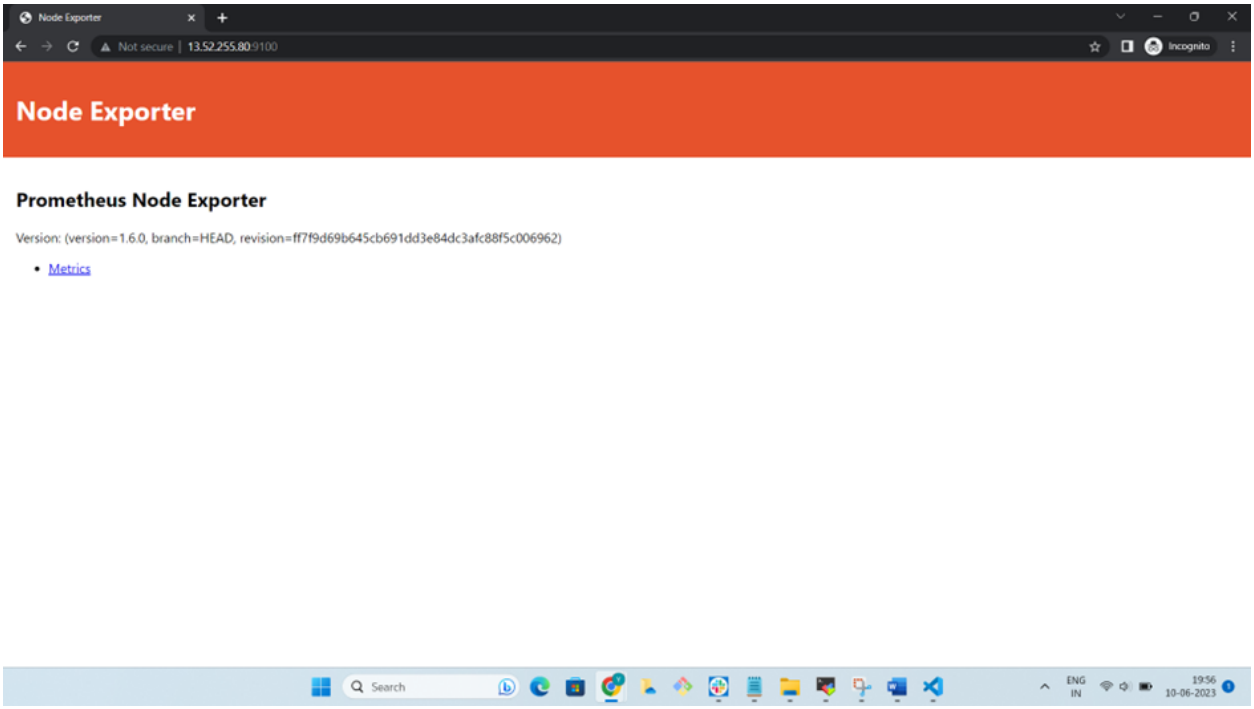
- Install the ubuntu version 20 from the AWS Cloud
- Allow the Inbound rule 9100 which is the port number of node-exporter
- To install the node-exporter visit the official website site https://prometheus.io
- For the Installation of node-exporter we have created a below script file
- Name of the script file is node-exporter.sh

```
!#/bin/bash
sudo apt update

sudo wget https://github.com/prometheus/node_exporter/releases/
```

```
sudo groupadd --system prometheus

sudo useradd -s /sbin/nologin --system -g prometheus prometheus

sudo mkdir /var/lib/node

sudo tar xvf node_exporter-1.6.0.linux-amd64.tar.gz

cd node_exporter-1.6.0.linux-amd64

sudo mv node_exporter /var/lib/node

sudo tee /etc/systemd/system/node.service<<EOF
[Unit]
Description=Prometheus Node Exporter
Documentation=https://prometheus.io/docs/introduction/overview/
Wants=network-online.target
After=network-online.target

[Service]
Type=simple
User=prometheus
Group=prometheus
ExecReload=/bin/kill -HUP $MAINPID
ExecStart=/var/lib/node/node_exporter

SyslogIdentifier=prometheus_node_exporter
Restart=always

[Install]
WantedBy=multi-user.target
EOF
```

```
sudo chown -R prometheus:prometheus /var/lib/node

sudo chown -R prometheus:prometheus /var/lib/node/*

sudo chmod -R 775 /var/lib/node

sudo chmod -R 755 /var/lib/node/*

sudo systemctl daemon-reload

sudo systemctl start node

sudo systemctl enable node
```

- Take the public ip of the instance and check in browser for the node-exporter

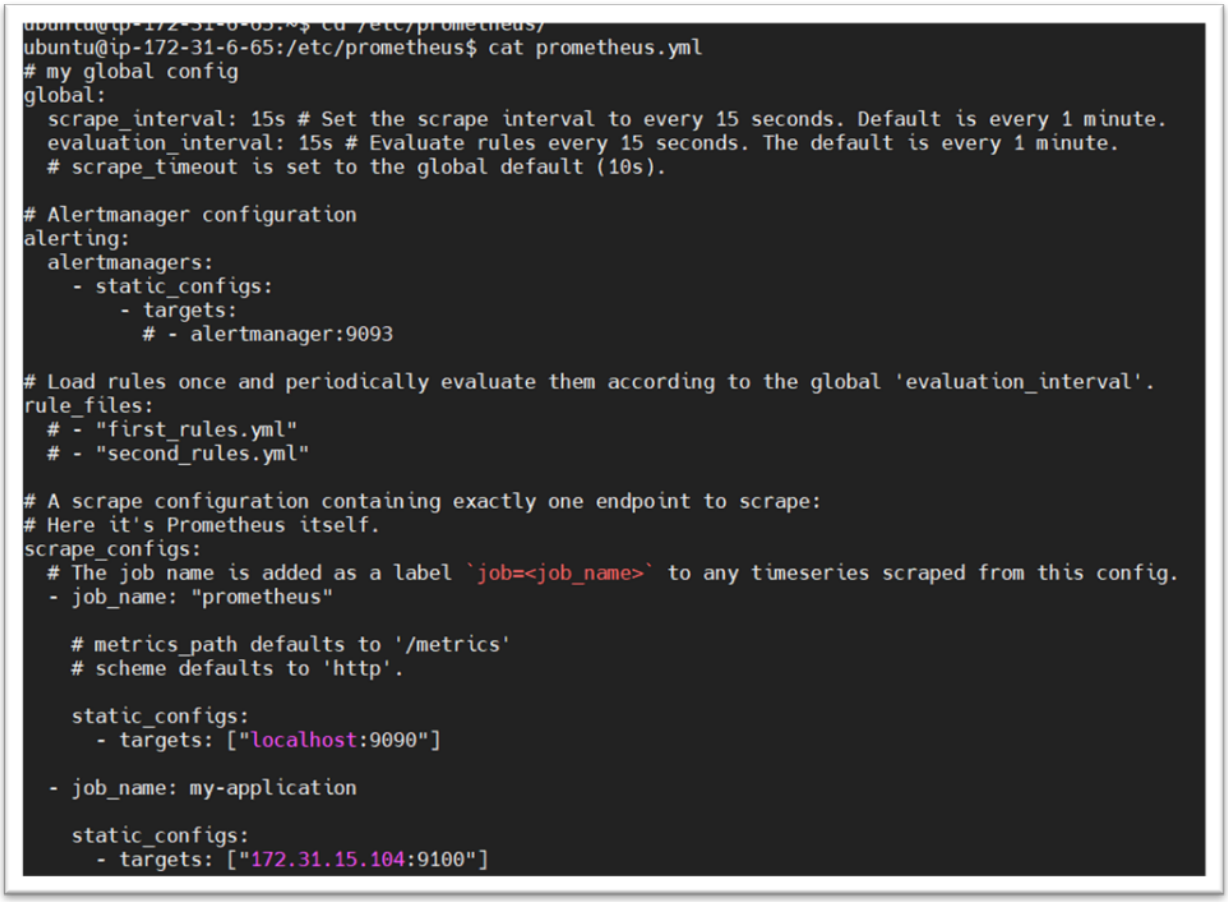


Configure Prometheus with node exporter in

Prometheus server by editing Prometheus.yaml file

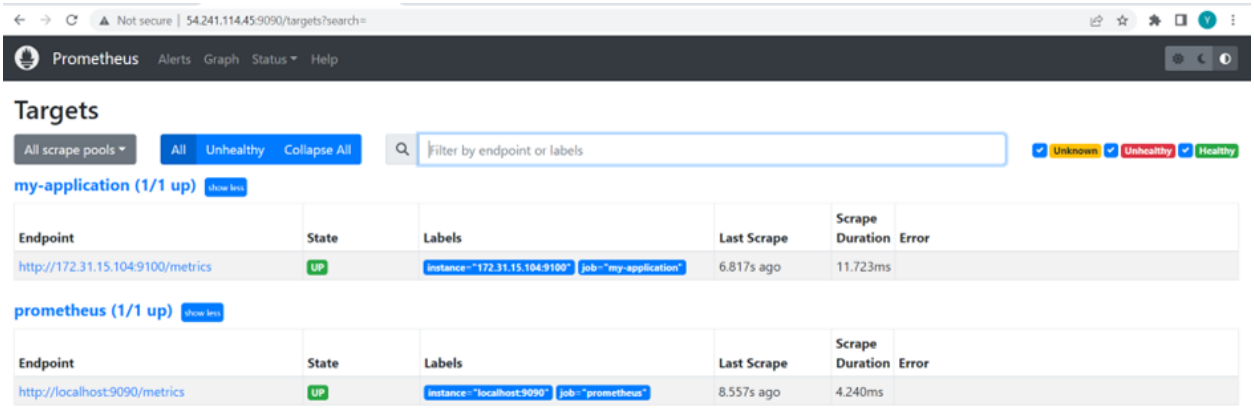
	3.CONFIGURATIONS OF PROMETHEUS WITH NODE-EXPORTER

- Inorder to configure the Prometheus with the node-exporter application server we need to edit the Prometheus.yml file which is located in /etc/prometheus/prometheus.yml
- We need to configure the private ip address of the node-exporter server along with port number.
- Here the example will be 31.15.104:9100.



- If you check the status of the Prometheus in Targets section you will find the node-exporter status up and running restart the Prometheus

sudo systemctl restart prometheus

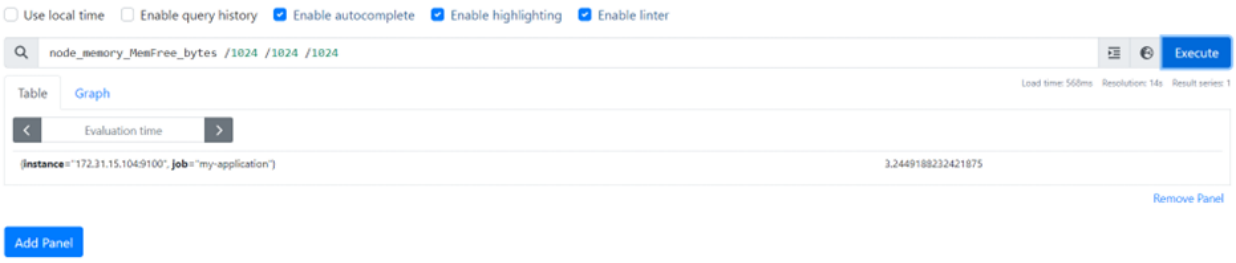


	4. SCRAPING THE METRICS FROM THE APPLICATION SERVER

FREE RAM METRIC:

- In order to get the free RAM on an application server we need to provide PROMQL Query on the Prometheus server.

```
node_memory_MemFree_bytes /1024 /1024 /1024
```



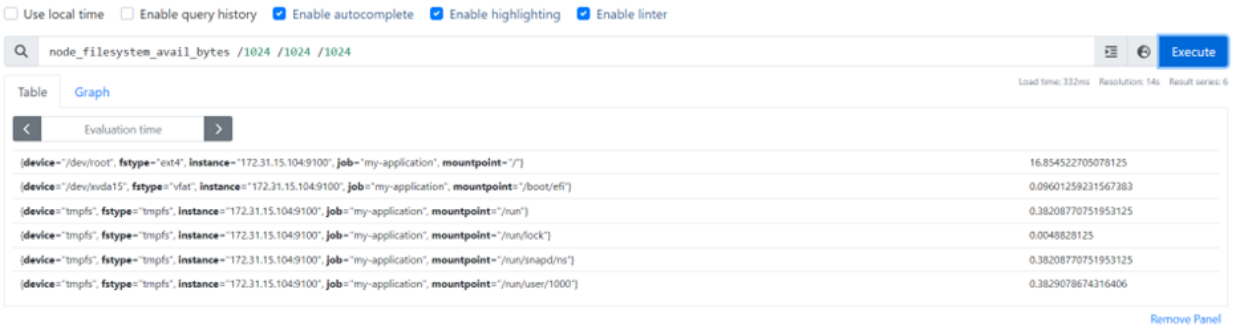
- Checking the free RAM on the Application Server by the command free -h

```
ubuntu@ip-172-31-15-104:~$ free -h
               total        used        free      shared  buff/cache   available
Mem:           3.8Gi       198Mi       3.2Gi       0.0Ki       400Mi       3.4Gi
Swap:             0B          0B          0B
ubuntu@ip-172-31-15-104:~$
```

HARD DISK SPACE:

- In order to scrape the Hard Disk Space from the Application Server we need to Query the Prometheus Server

```
node_filesystem_avail_bytes /1024 /1024 /1024
```



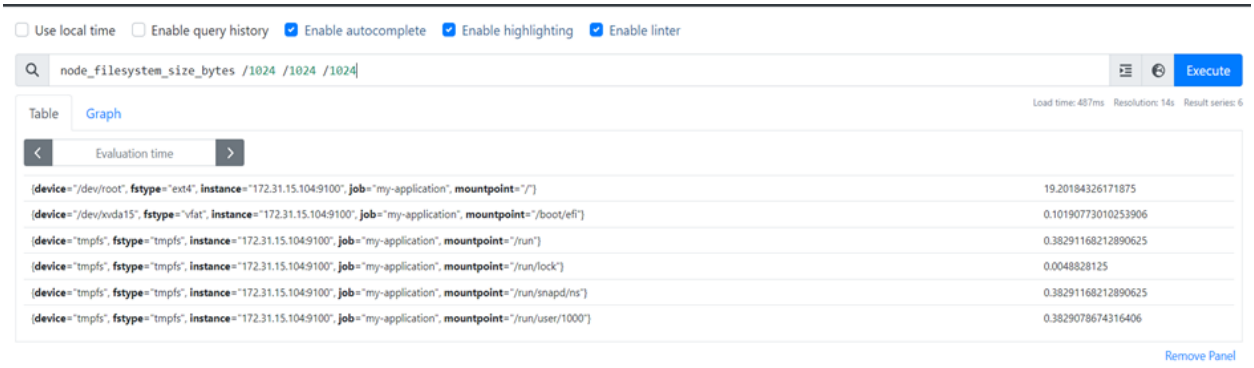
- Checking the Hard Disk Space on the Application Server by the command df -h.

```
ubuntu@ip-172-31-15-104:~$ df -h
Filesystem      Size  Used Avail Use% Mounted on
/dev/root        20G  2.4G   17G  13% /
devtmpfs        2.0G     0  2.0G   0% /dev
tmpfs           2.0G     0  2.0G   0% /dev/shm
tmpfs           393M  864K  392M   1% /run
tmpfs           5.0M     0  5.0M   0% /run/lock
tmpfs           2.0G     0  2.0G   0% /sys/fs/cgroup
/dev/loop0       25M   25M     0 100% /snap/amazon-ssm-agent/6563
/dev/loop1       25M   25M     0 100% /snap/amazon-ssm-agent/6312
/dev/loop2       56M   56M     0 100% /snap/core18/2751
/dev/loop3       56M   56M     0 100% /snap/core18/2785
/dev/loop5       92M   92M     0 100% /snap/lxd/24061
/dev/loop6       54M   54M     0 100% /snap/snapd/19122
/dev/loop4       64M   64M     0 100% /snap/core20/1891
/dev/loop7       54M   54M     0 100% /snap/snapd/19361
/dev/xvda15     105M  6.1M   99M   6% /boot/efi
tmpfs           393M     0  393M   0% /run/user/1000
ubuntu@ip-172-31-15-104:~$
```

TOTAL HARD DISK SIZE:

- In order to get the Total Hard Disk Size on an application server we need to provide PROMQL Query on the Prometheus server.

```
node_filesystem_size_bytes /1024 /1024 /1024
```

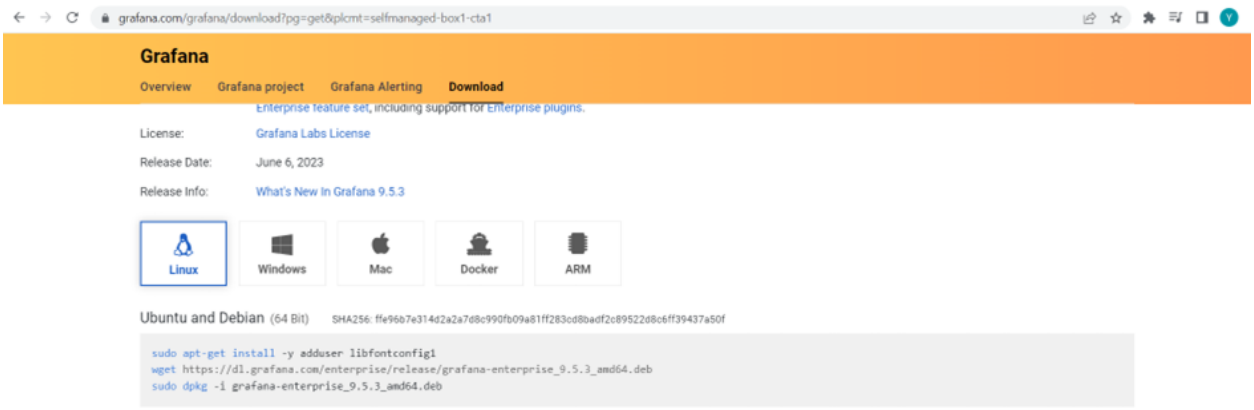


	5. GRAFANA

Launch the Ubuntu version 20 Virtual Machine:

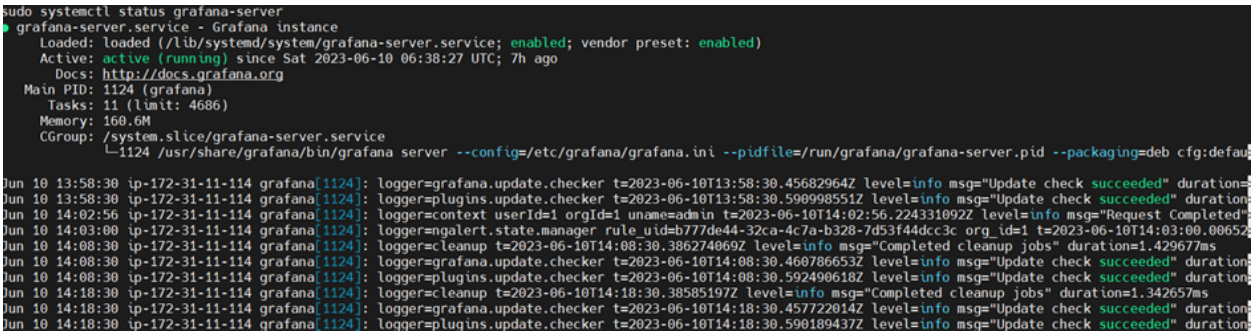
- Install the ubuntu version 20 from the AWS Cloud

- Allow the Inbound rule 3000 which is the port number of Grafana
- To install the Grafana visit the official website site https://grafana.com
- For the Installation of Grafana we have created a below script file
- Name of the script file is sh




```
#!/bin/bash
sudo apt-get install -y adduser libfontconfig1
wget https://dl.grafana.com/enterprise/release/grafana-enterpris
sudo dpkg -i grafana-enterprise_9.5.3_amd64.deb

sudo systemctl start grafana-server
sudo systemctl enable grafana-server
sudo systemctl status grafana-server
```

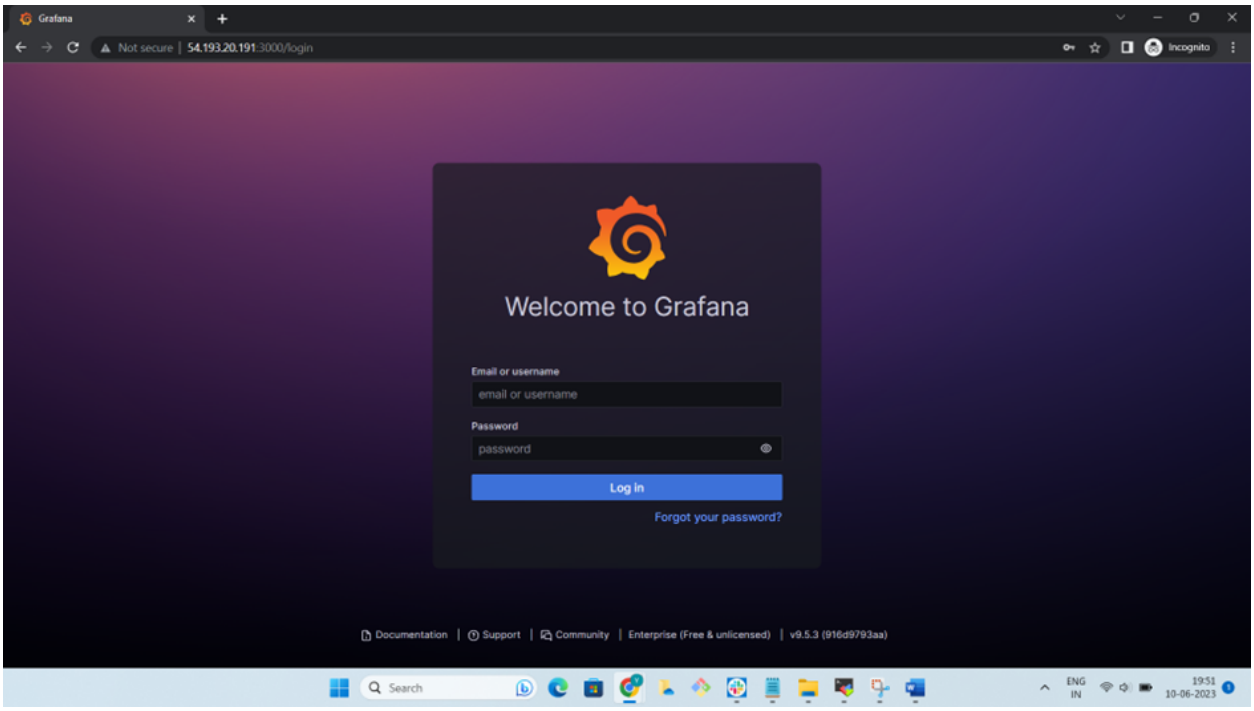
- Take the public ip of the instance and check in browser for the Grafana application .
-



- **Successfully we launched the Grafana application**

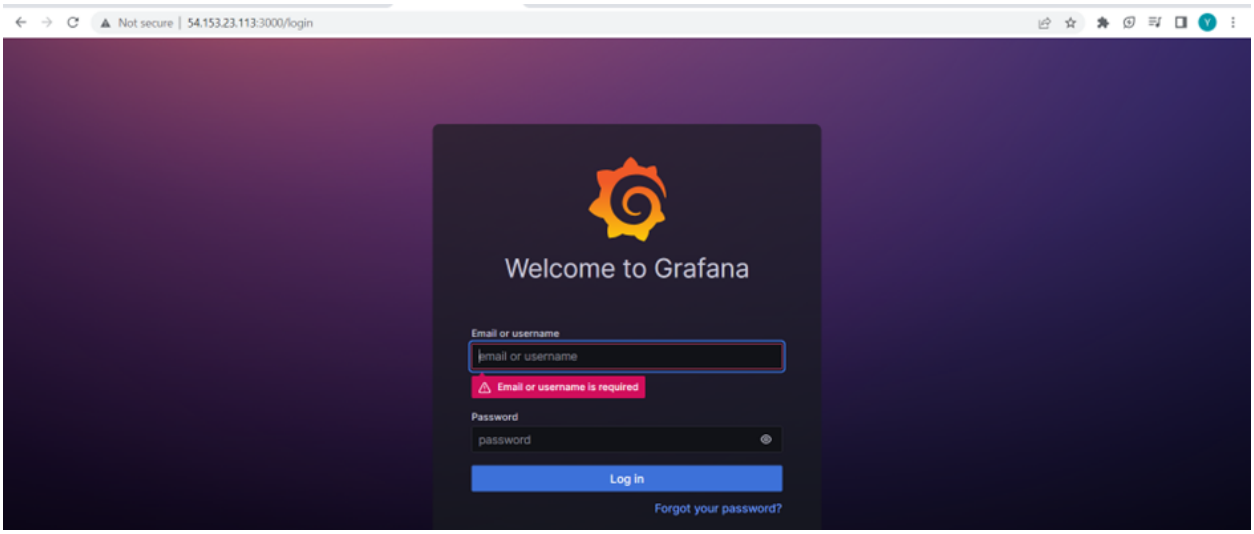
	6. CONFIGURING PROMETHEUS WITH GRAFANA

- Login into the Grafana Server with the username and password
- After Login into the Grafana goto the Connections option and click on your connections
- Click on Add data source and add Prometheus as shown in the below pics
- After giving the Prometheus URL click on SAVE&TEST option in order to test the connection between Prometheus and Grafana.
- Successfully Prometheus and Grafana configured
-



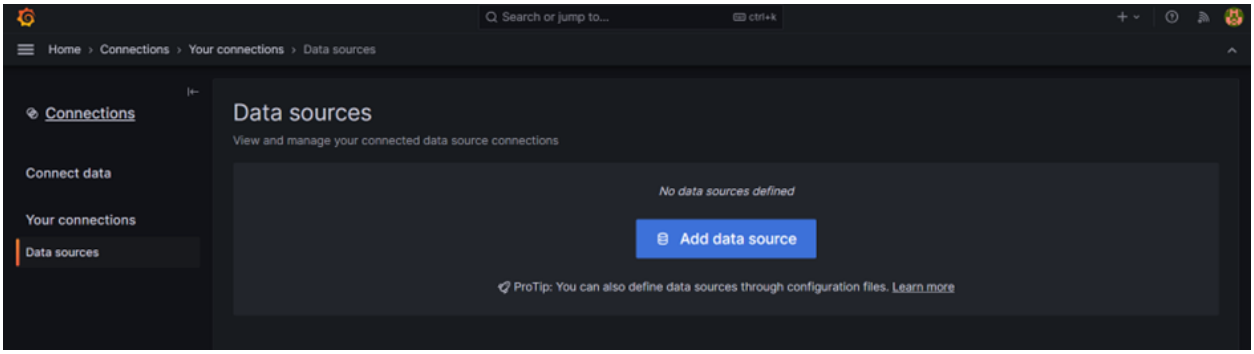
	6. CONFIGURING PROMETHEUS WITH GRAFANA

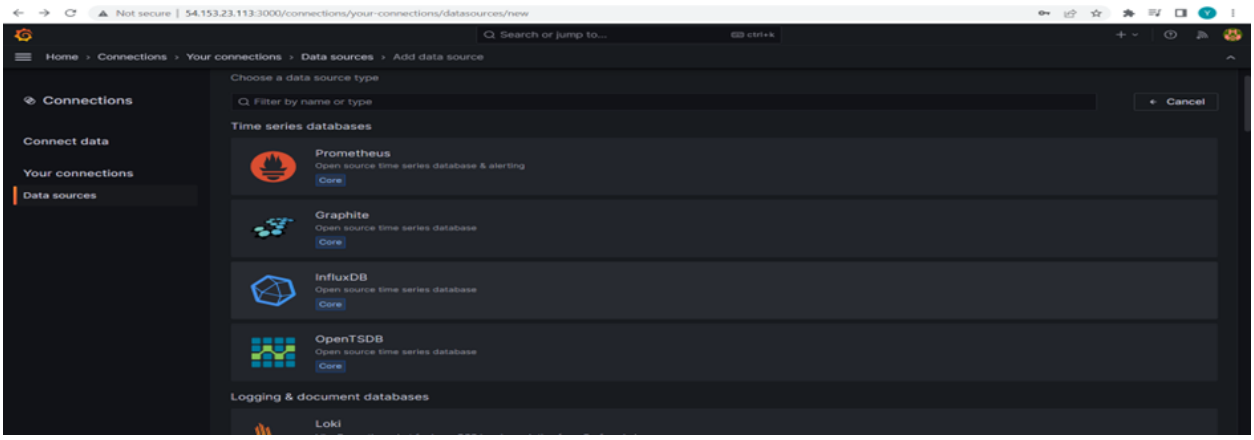
- Login into the Grafana Server with the username and password
-

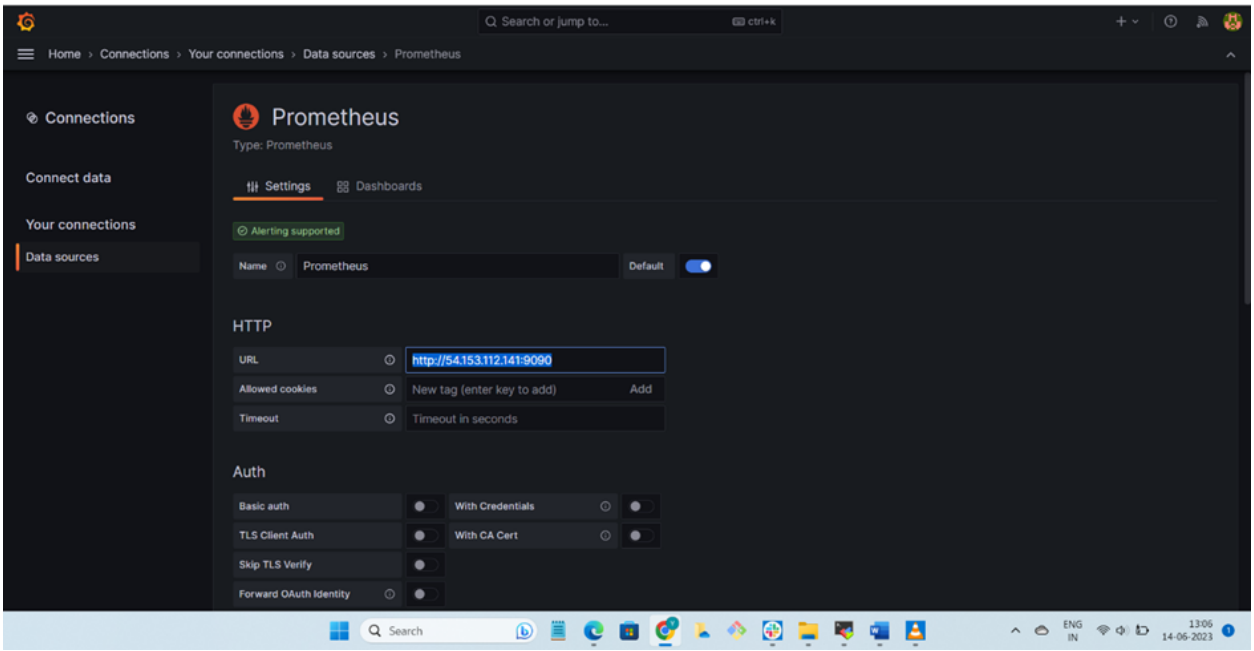


- After Login into the Grafana goto the Connections option and click on your connections

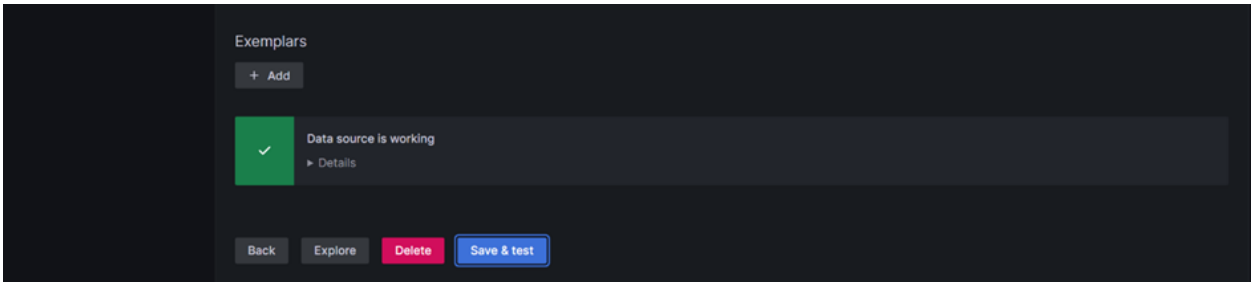
- Click on Add data source and add Prometheus as shown in the below pics
-







- After giving the Prometheus URL click on SAVE&TEST option in order to test the connection between Prometheus and Grafana.
-



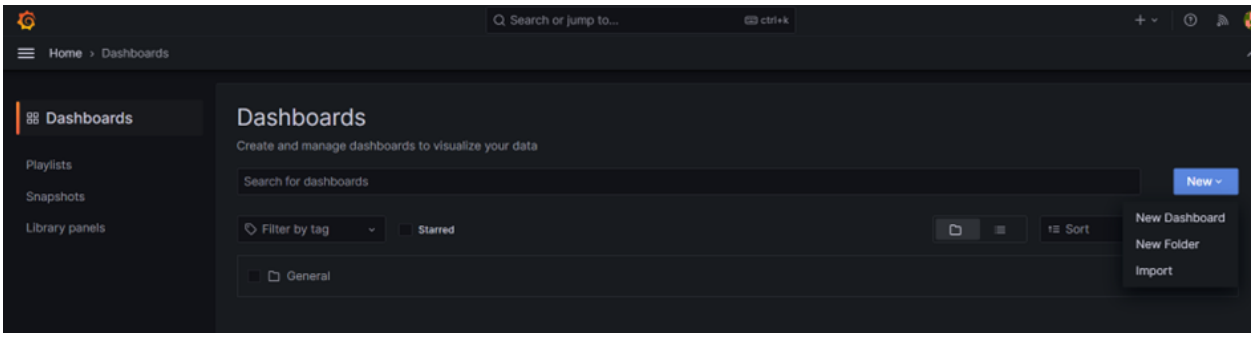
- Successfully Prometheus and Grafana configured

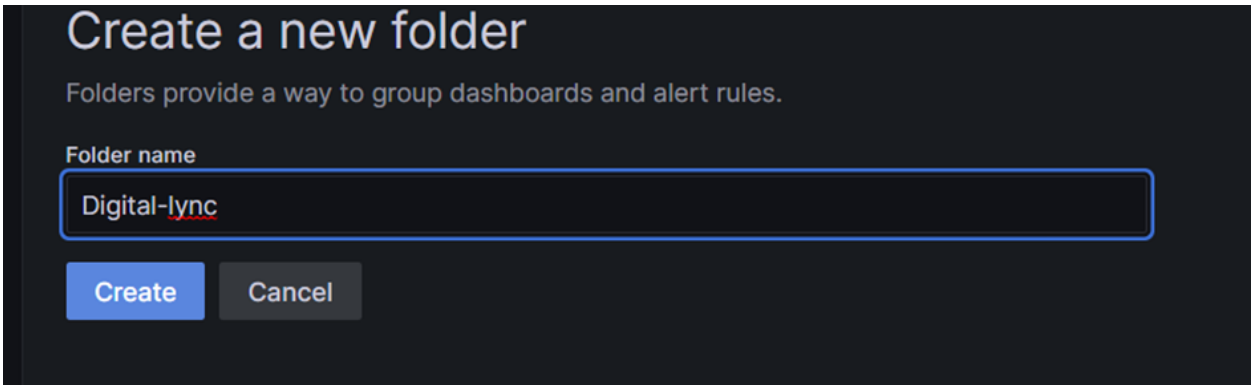
7. GRAFANA DASHBOARDS FOR APPLICATION SERVER

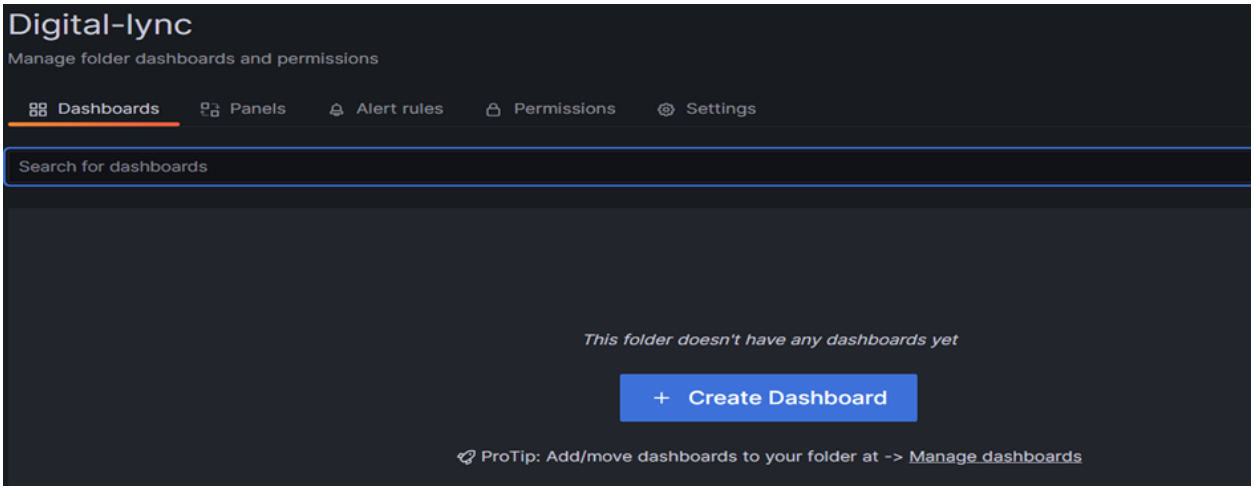
- Creating the Grafana Dashboards of the Application server metrics for FREE RAM , HARD DISK SPACE , TOTAL HARD DISK SIZE.

1.FREE RAM METRIC:

- Creating the Dashboard for the FREE RAM follow the below steps
- Create a new folder with the name Digital-lync
-



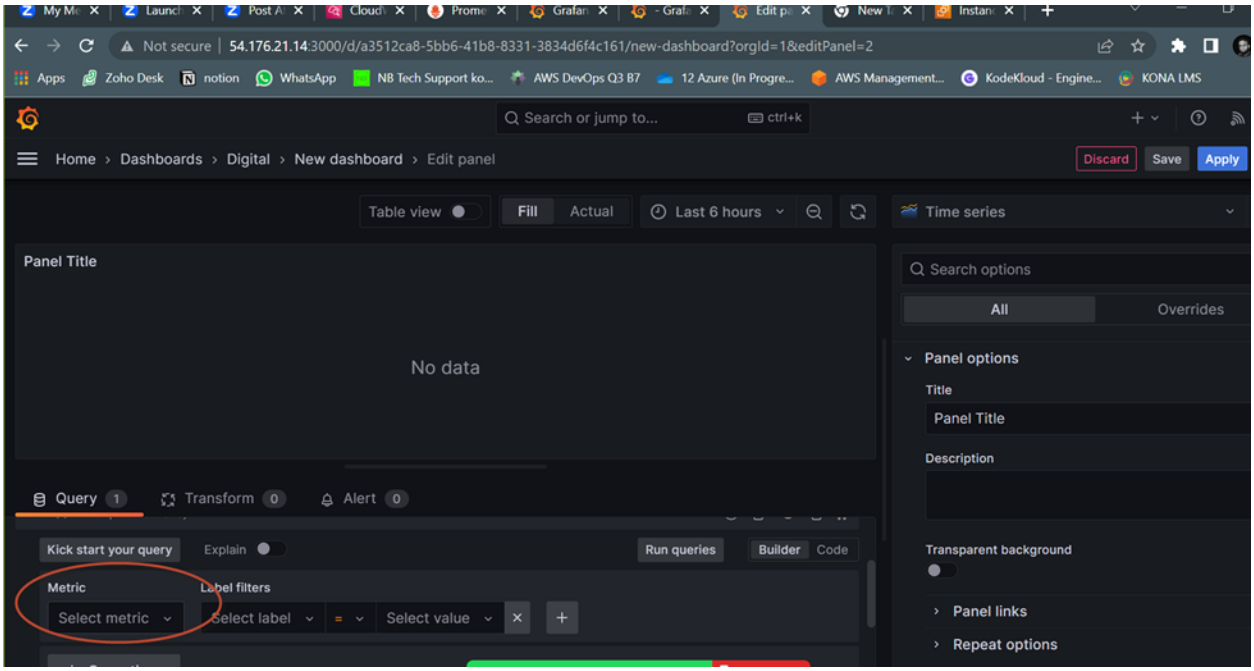


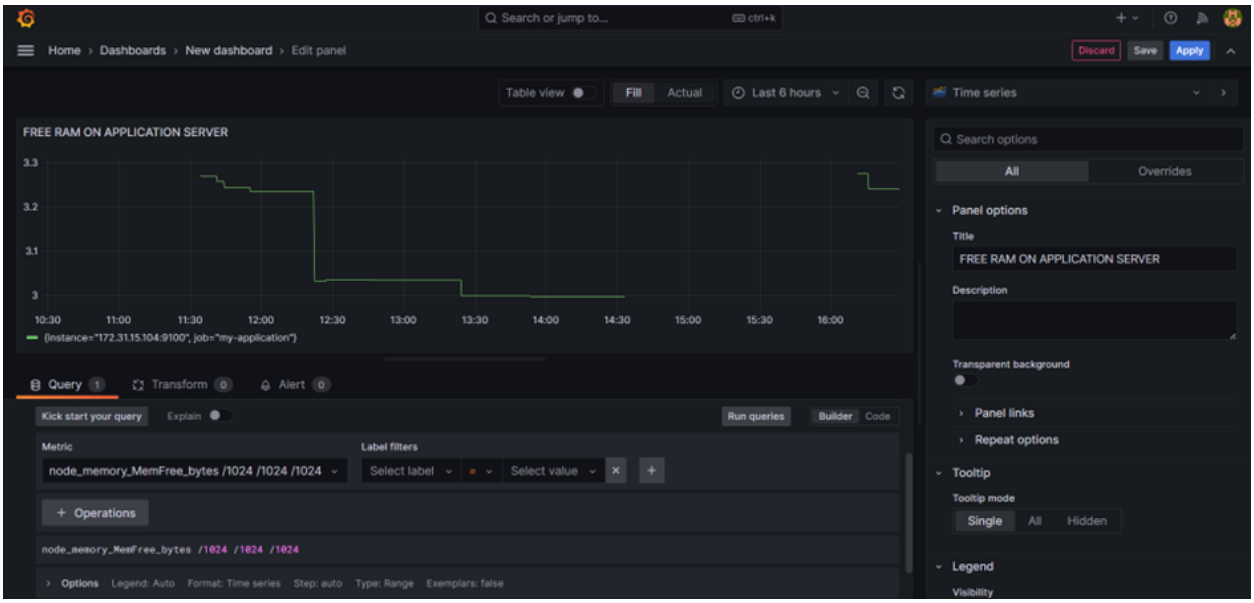


- Now create the Dashboard inside the folder Digital-lync
- We need to give the Prometheus query on the Grafana Dashboard as shown below then it will fetch the data from the Application server with the Prometheus Tool.

```
node_memory_MemFree_bytes /1024 /1024 /1024
```

Paste the query here





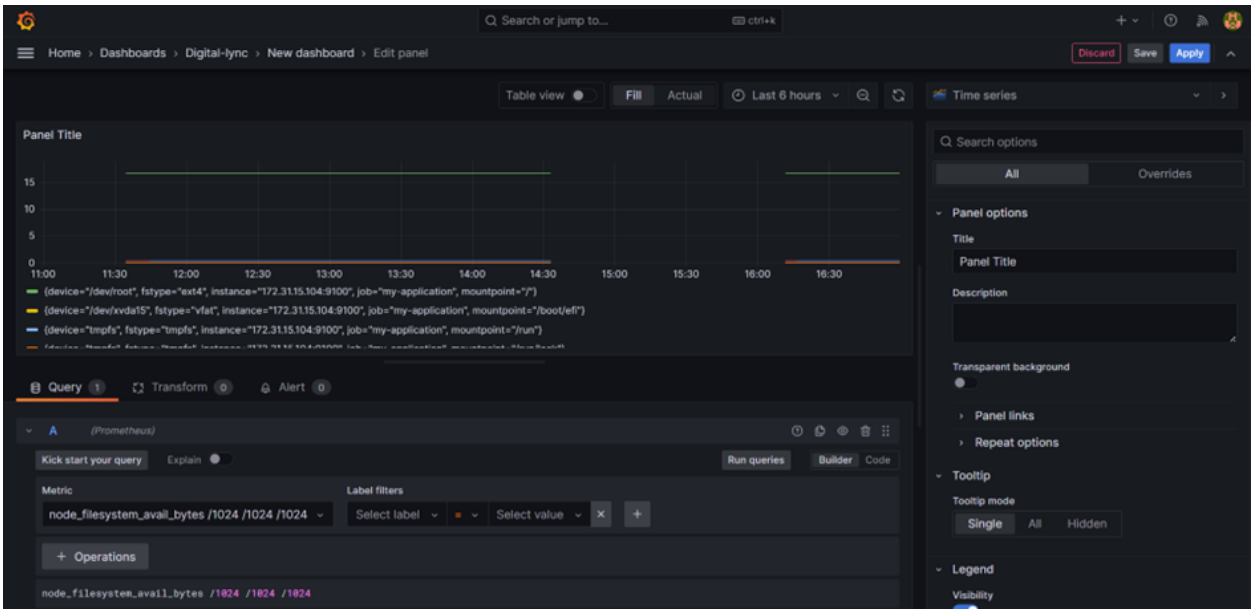
- The Grafana will fetch the live Free RAM data from the Application server with the provided time intervel

2.HARD DISK SPACE METRIC:

- In the same dashboard create a another new visualization for the Hard Disk Space Metric.

- We need to give the Hard Disk Space Prometheus query on the Grafana Dashboard as shown below then it will fetch the data from the Application server with the Prometheus Tool.

```
node_filesystem_avail_bytes /1024 /1024 /1024
```

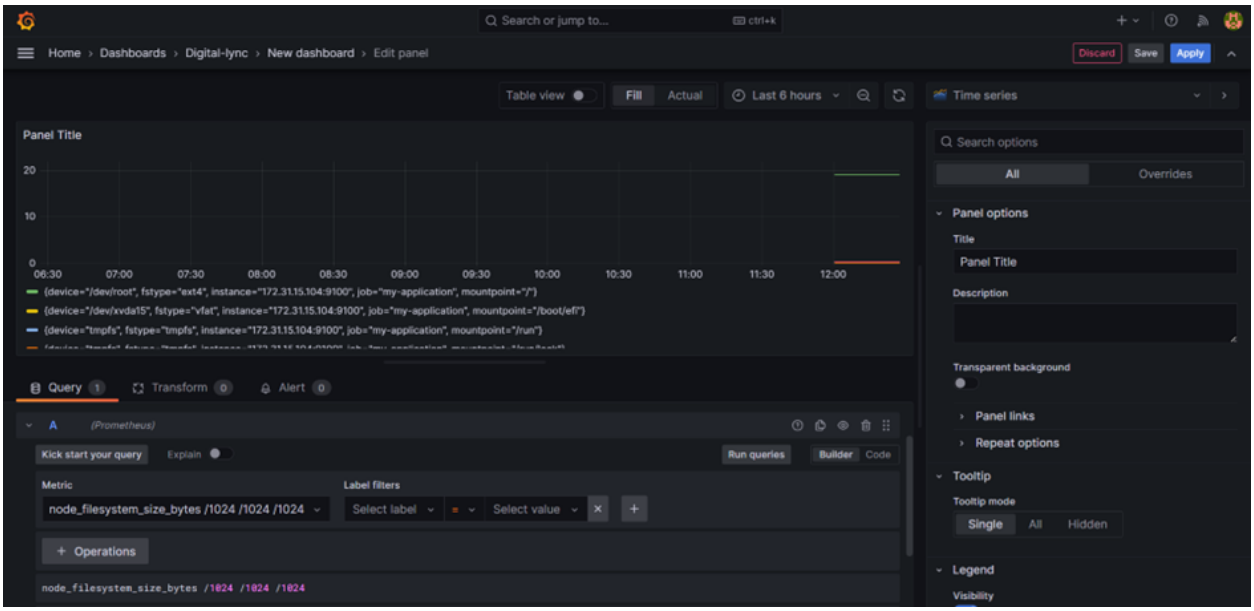


- The Grafana will fetch the live Hard Disk size Sapce data from the Application server.

1. **TOTAL HARD DISK SIZE:**

- In the same dashboard create a another new visualization for the Total Hard Disk Space Metric.
- We need to give the Total Hard Disk Space Prometheus query on the Grafana Dashboard as shown below then it will fetch the data from the Application server with the Prometheus Tool.

```
node_filesystem_size_bytes /1024 /1024 /1024
```



- The Grafana will fetch the live Total Hard Disk size Sapce data from the Application server .