Configuring Prometheus & Grafana Monitoring System for a Cardano Node Running in a Docker Container

The following instruction is provided by MINI1 stake pool. We would be glad to receive any donation as a sign of gratitude for the documentation provided to this address:
addr1q8em0r5drze99d6q0vydrvy7hs3f9wzqa3nmvmv70urzamsujynq0cnwzds23p497urgfxe7y7txnl6sfete297rw7ysgz2plt

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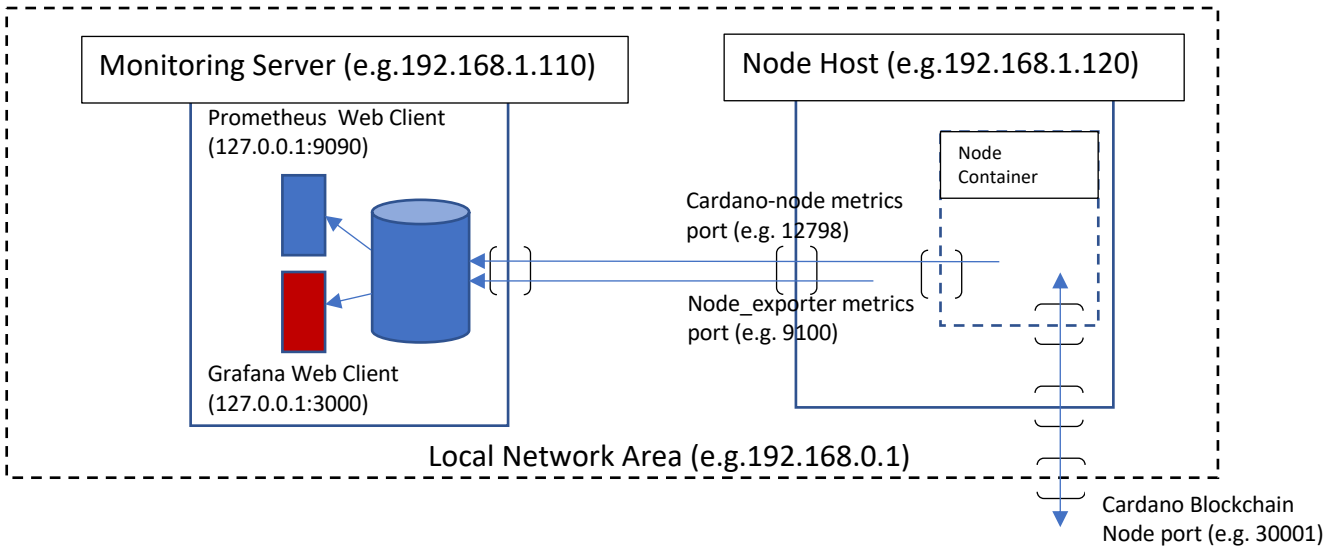
1. Goal

Setting up a Prometheus & Grafana monitoring system for a Cardano node, within the same local area network, according to the diagram below:



2. Prerequisites

The following instructions assume that you have successfully installed and activated a Cardano node based on the step-by-step instructions by Easy1 stake pool (visit his GitHub repository for more information: https://github.com/speedwing/cardano-staking-pool-edu).

3. Install & Configure Prometheus

1) If the node container is currently running, we'll need to stop it and remove it in order to apply some changes in the **run-node.sh** script and the **mainnet/testnet-config.json** configuration file.

```
docker ps -a                          # retrieve the container id
docker stop "container id"
docker rm "container id"
```

Note: As we are now changing settings in the original files provided by Easy1, it is suggested to create a copy of the entire **cardano-staking-pool-edu** *folder and name it for instance* **cardano-staking-pool-edu-copy.** *In this case we still keep the original files provided by Easy1 unchanged on the RaspPi.*

2) So let's copy the folder and its files.

```
cd /home/ubuntu
sudo cp -avr cardano-staking-pool-edu cardano-staking-pool-edu-copy
```

3) Now that we have made a copy of the folder, we can make the desired changes in it.

```
cd cardano-staking-pool-edu-copy/cardano-node
sudo nano run-node.sh
```

4) We now opened the **run-node.sh** script in the nano editor. We have to add and change following parts:
Note: This example is made for the BP (block producing node). Same concept ca be applied to the relay node.

   a. Add Prometheus port forwarding from container to host (see yellow highlighted parts below)
   b. Change path to the **mainnet/testnet-config.json** file (see green highlighted parts below)

```
docker run --name "cardano-node-${NETWORK}" -d -v $DB_FOLDER:/db -v
/home/ubuntu/cardano-staking-pool-edu-copy/cardano-
node/config/testnet:/etc/config/cardano-node/config -v
/home/ubuntu/.keys/testnet:/etc/config/cardano-node/keys -p
30001:30001 -p 12798:12798 -e CARDANO_NODE_SOCKET_PATH=/db/node.socket
"${@:3}" "cardano-node:${IMAGE_TAG} \
"cardano-node run \
--topology /etc/config/cardano-node/config/${NETWORK}-topology.json \
--database-path /db \
--socket-path /db/node.socket \
--host-addr 0.0.0.0 \
--port $CARDANO_NODE_PORT \
--config /etc/config/cardano-node/config/${NETWORK}-config.json \
--shelley-kes-key ${KES_SKEY_PATH} \
--shelley-vrf-key ${VRF_SKEY_PATH} \
--shelley-operational-certificate ${NODE_OP_CERT_PATH}"
```

5) Now that we have applied these changes, save the file and close nano with the following keyboard combination:

```
^o
(Press Enter)
^x
```

6) We now need to make a change in the **mainnet/testnet-config.json** file that is then deployed from our new **run-node.sh** command we just modified. So let's open it in nano:

```
sudo nano /home/ubuntu/cardano-staking-pool-edu-copy/cardano-
node/config/testnet/testnet-config.json
```

7) Scroll down to the line **"hasPrometheus": [** and change the IP address from **“127.0.0.1”** to **"0.0.0.0"**

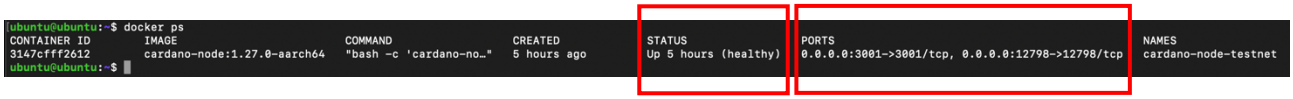
8) So now that all the needed changes have been made, let’s start the node.

```
cd ~/cardano-staking-pool-edu-copy/cardano-node
NETWORK=testnet ./run-node.sh /home/ubuntu/cardano-node/testnet 30001 --restart unless-stopped
```

9) Check if the node successfully started, has the port forwarded and it gives a healthy state.

```
docker ps
```

10) We should see something like this:



Now we configured the node for transmitting the Prometheus metrics to the host over port 12798. We now need to set up a Prometheus server that scrapes the Prometheus metrics from the node via the 12798 port. We can use another RaspPi or just our own PC/Mac. Whatever device you use, let's run Ubuntu 20.04 on it too (just for simplicity).

11) Log in to your device where you intend to set-up the Prometheus server and open the terminal.

12) Let’s install Prometheus.

```
sudo apt install prometheus
```

13) We need to configure the **prometheus.yml** file so that the server is scaping the metrics from the node. Let’s open it with nano.

```
sudo nano /etc/prometheus/prometheus.yml
```

14) Scroll down where the **scrape_configs:** section start.

Change **job_name: 'node'** → **'cardano'**
Insert the IP and port of the cardano node under
static_configs:
- targets: ['192.168.1.120:12798']

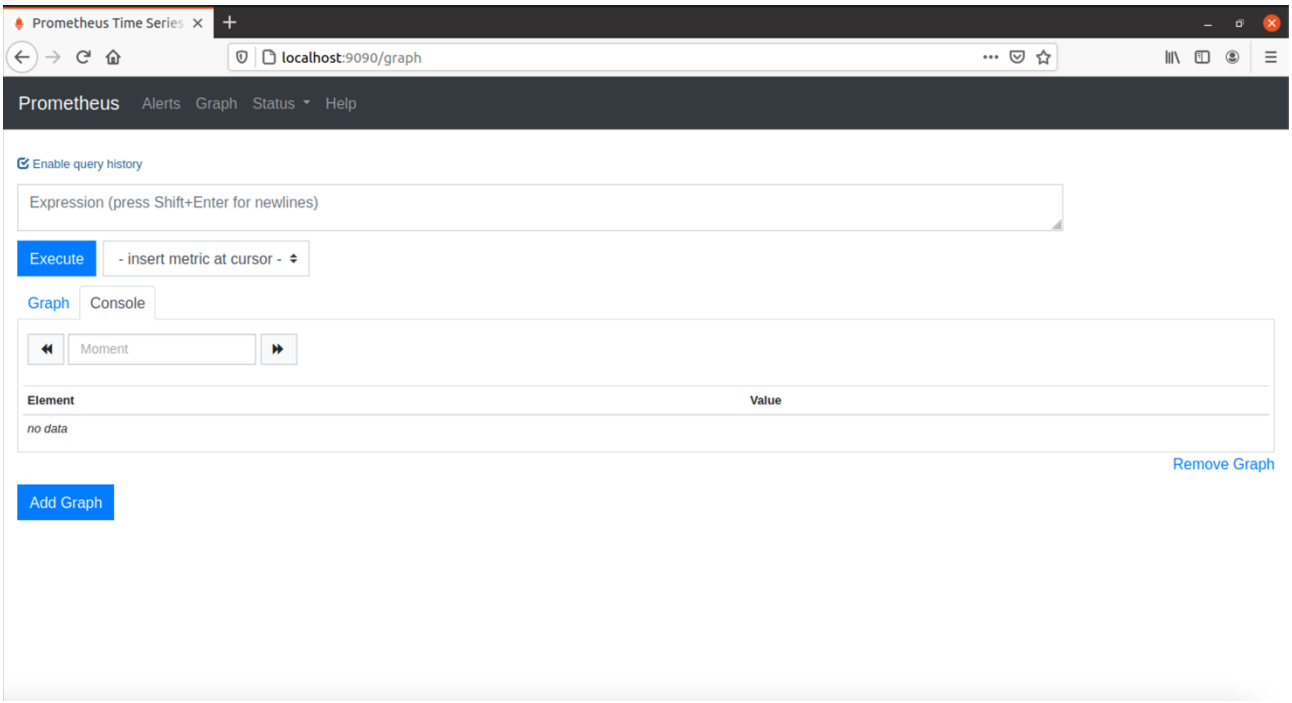
15) Now that we have applied these changes, save the file and close nano with the following keyboard combination:

```
^o
(Press Enter)
^x
```

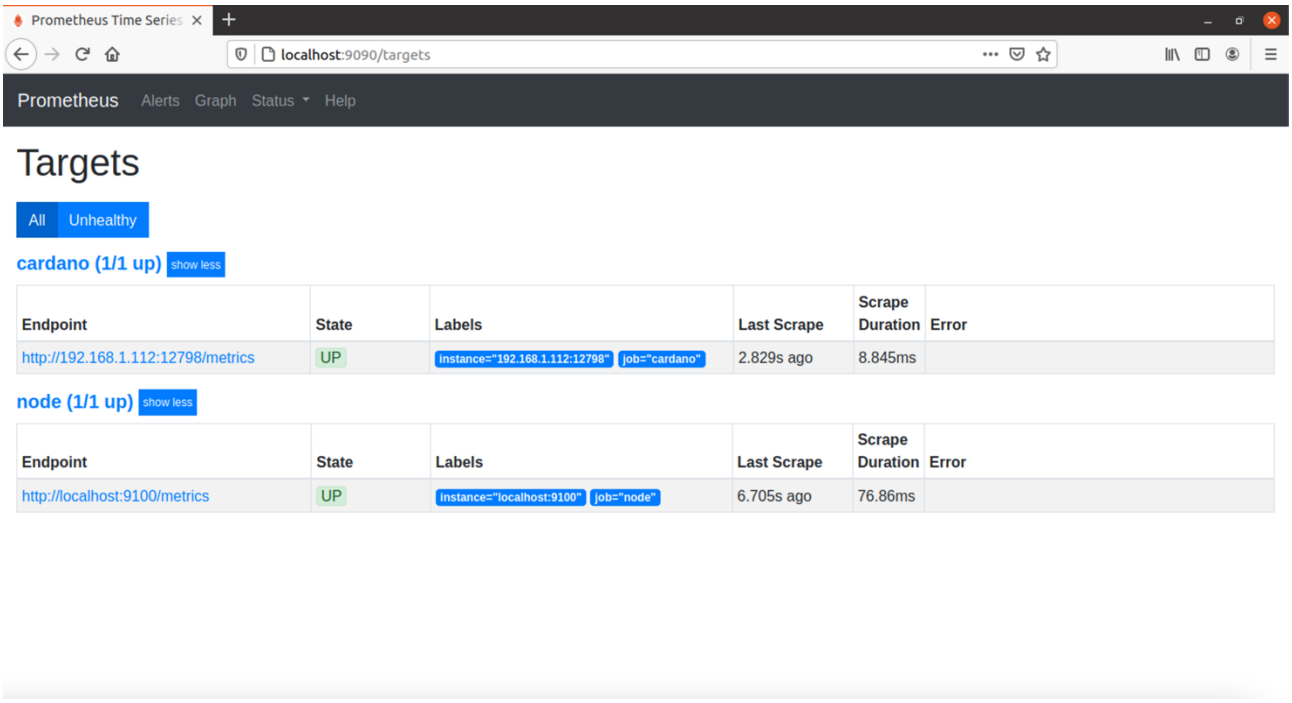
16) Let's restart the Prometheus service with the new configuration

```
sudo systemctl restart prometheus.service
```

17) Open the web browser and enter the address http://localhost:9090/graph. You should see the following screen:



18) Go to **Status** > **Targets** and you should see this screen:



Check if the cardano endpoint state is UP (like in the screen above). If so, CONGRATULATIONS, you successfully installed your Prometheus monitoring system.

4. Install & Configure Grafana

Prometheus is certainly a great monitoring tool but as soon as we'd like to represent several metrics on the same dashboard for a better overview of the nodes performance, then Prometheus could become inadequate. Grafana provides a much better graphical representation of the metrics provided by Prometheus. So let us install and configure a nice Grafana dashboard.

1) First we need to download and extract the Prometheus **node_exporter** on our Node host. This allows us to scrape additional important metrics about the node that are not provided within the cardano-node metrics. Log into your node and execute the following commands:

```
wget https://github.com/prometheus/node_exporter/releases/download/v1.1.2/node_exporter-1.1.2.linux-arm64.tar.gz
tar xvfz node_exporter-1.1.2.linux-arm64.tar.gz
cd node_exporter-1.1.2.linux-arm64
```

2) Since we want to run **node_exporter** in a continuous mode in the background, we use **tmux**. This allows us to run a session in parallel in the background. Just remember that you have to execute the same commands every time you shutdown or restart the node:

```
tmux
./node_exporter
```
Press the following key combination **^b d** (means **control + b** together followed by **d)**
```
tmux ls
```
You should now see something like this: **0: 1 windows (created Mon May 24 15:53:15 2021)**

3) The **node_exporter** is now running (in the background) on the node host machine under port 9100. At this point we need to enable this port in the firewall:

```
sudo ufw allow 9100/tcp
```

4) On the Monitoring server machine we now have to change the **prometheus.yml** configuration file in order to scrape metrics from the **node_exporter** over port 9100.

```
sudo nano /etc/prometheus/prometheus.yml
```

5) Scroll down where the **scrape_configs:** section start.

Within the **scrape_configs:** section add the following parameter:
```
- job_name: 'node_exporter
scrape_interval: 5s
static_configs:
    - targets: ['192.168.1.120:9100']
```

6) Now that we have applied these changes, save the file and close nano with the following keyboard combination:

```
^o
(Press Enter)
^x
```

7) Let's restart the Prometheus service with the new configuration:

```
sudo systemctl restart prometheus.service
```

8) We have to install the Grafana on our monitoring server now:

```
sudo apt-get install -y adduser libfontconfig1
wget https://dl.grafana.com/oss/release/grafana_7.5.7_arm64.deb
sudo dpkg -i grafana_7.5.7_arm64.deb
```

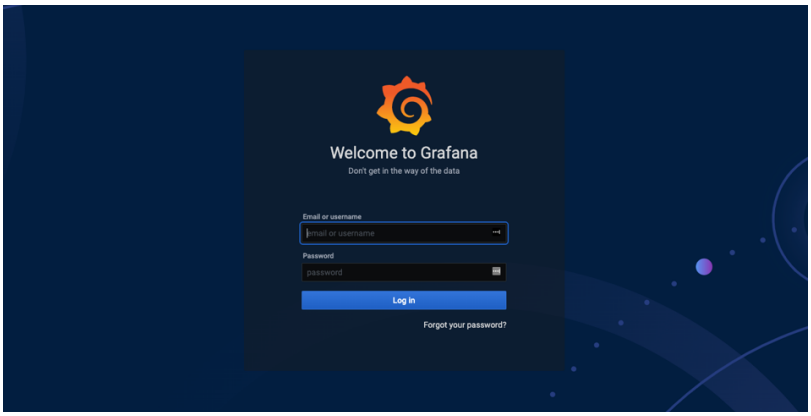
Note: To download the latest version of Grafana visit this site: https://grafana.com/grafana/download?platform=arm

9) Start Grafana-server with:

```
sudo /bin/systemctl start grafana-server
```

10) Open the web browser and go to **localhost:3000**

The Grafana client should appear in the browser now:



From this point onwards I refer to the official Cardano-node documentation for the configuration of the Grafana dashboard. Go to https://docs.cardano.org/projects/cardano-node/en/latest/logging-monitoring/grafana.html and follow the instructions in the chapter **Configuring your dashboard.**

Important note: The IOHK dashboard json configuration file is outdated on the Cardano-node website. MINI POOL provides an updated version for node version 1.27.0. It can be downloaded from the MINI Stake pool GitHub repository:
https://raw.githubusercontent.com/jterrier84/minipool/main/grafana_dashboard.json