

How To - Configure a Prometheus Monitoring Server with a Grafana Dashboard

Installing Prometheus Monitoring Server with a Grafana Dashboard:-

Prometheus :- is a flexible monitoring solution that is in development since 2012.

The software stores all its data in a time series database and offers a multi-dimensional data-model and a powerful query language to generate reports of the monitored resources.

Grafana :- is an open-source platform for data visualization, monitoring and analysis. It allows users to create dashboards with panels, each representing specific metrics over a set time-frame.

There are five steps to use Prometheus with Grafana:

Preparing your Environment

Downloading and Installing Node Exporter

Downloading and Installing Prometheus

Configuring Prometheus

Downloading and Installing Grafana

Preparing your Environment

we use an instance running on [Ubuntu Xenial \(16.04\)](#).

1 . To run Prometheus safely on our server, we have to create a user for Prometheus and Node Exporter without the possibility to log in. To achieve this, we use the parameter `--no-create-home` which skips the creation of a home directory and disable the shell with `--shell /usr/sbin/nologin`.

```
sudo useradd --no-create-home --shell /usr/sbin/nologin prometheus
sudo useradd --no-create-home --shell /bin/false node_exporter
```

2 . Create the folders required to store the binaries of Prometheus and its configuration files:

```
sudo mkdir /etc/prometheus
sudo mkdir /var/lib/prometheus
```

3 . Set the ownership of these directories to our `prometheus` user, to make sure that Prometheus can access to these folders:

```
sudo chown prometheus:prometheus /etc/prometheus
sudo chown prometheus:prometheus /var/lib/prometheus
```

Downloading and Installing Node Exporter

As your Prometheus is only capable of collecting metrics, we want to extend its capabilities by adding **Node Exporter**, a tool that collects information about the system including [CPU, disk, and memory usage](#) and exposes them for scraping.

1 . Download the latest version of Node Exporter:

```
wget https://github.com/prometheus/node_exporter/releases/download/v0.16.0/node_exporter-0.16.0.linux-amd64.tar.gz
```

2 . Unpack the downloaded archive. This will create a directory `node_exporter-0.16.0.linux-amd64`, containing the executable, a readme and license file:

```
tar xvf node_exporter-0.16.0.linux-amd64.tar.gz
```

3 . Copy the binary file into the directory `/usr/local/bin` and set the ownership to the user you have created in step previously:

```
sudo cp node_exporter-0.16.0.linux-amd64/node_exporter /usr/local/bin
sudo chown node_exporter:node_exporter /usr/local/bin/node_exporter
```

4 . Remove the leftover files of Node Exporter, as they are not needed any longer:

```
rm -rf node_exporter-0.16.0.linux-amd64.tar.gz node_exporter-0.16.0.linux-amd64
```

5 . To run Node Exporter automatically on each boot, a Systemd service file is required. Create the following file by opening it in Nano:

```
sudo nano /etc/systemd/system/node_exporter.service
```

6 . Copy the following information in the service file, save it and exit Nano:

```
[Unit]
Description=Node Exporter
Wants=network-online.target
After=network-online.target

[Service]
User=node_exporter
Group=node_exporter
Type=simple
ExecStart=/usr/local/bin/node_exporter

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

7 . Collectors are used to gather information about the system. By default a set of collectors is activated. You can see the details about the set in the [README-file](#). If you want to use a specific set of collectors, you can define them in the `ExecStart` section of the service. Collectors are enabled by providing a `--collector.<name>` flag. Collectors that are enabled by default can be disabled by providing a `--no-collector.<name>` flag.

8 . Reload Systemd to use the newly defined service:

```
sudo systemctl daemon-reload
```

9 . Run Node Exporter by typing the following command:

```
sudo systemctl start node_exporter
```

10 . Verify that the software has been started successfully:

```
sudo systemctl status node_exporter
```

You will see an output like this, showing you the status `active (running)` as well as the main PID of the application:

```
● node_exporter.service - Node Exporter
   Loaded: loaded (/etc/systemd/system/node_exporter.service; disabled; vendor preset: enabled)
   Active: active (running) since Mon 2018-06-25 11:47:06 UTC; 4s ago
     Main PID: 1719 (node_exporter)
        CGroup: /system.slice/node_exporter.service
                └─1719 /usr/local/bin/node_exporter
```

11 . If everything is working, enable Node Exporter to be started on each boot of the server:

```
sudo systemctl enable node_exporter
```

Downloading and Installing Prometheus

1 . Download and Unpack [Prometheus](#) latest release of Prometheus. As exemplified, the version is 2.2.1:

```
sudo apt-get update && apt-get upgrade
wget https://github.com/prometheus/prometheus/releases/download/v2.2.1/prometheus-2.2.1.linux-amd64.tar.gz
tar xzf prometheus-*.tar.gz
cd prometheus-*
```

- ☐ The following two binaries are in the directory:
Prometheus - Prometheus main binary file
promtool
- ☐ The following two folders (which contain the web interface, configuration files examples and the license) are in the directory:
consoles
console_libraries

2 . Copy the binary files into the /usr/local/bin/directory:

```
sudo cp ./prometheus /usr/local/bin/
sudo cp ./promtool /usr/local/bin/
```

3 . Set the ownership of these files to the prometheus user previously created:

```
sudo chown prometheus:prometheus /usr/local/bin/prometheus
sudo chown prometheus:prometheus /usr/local/bin/promtool
```

4 . Copy the consoles and console_libraries directories to /etc/prometheus:

```
sudo cp -r ./consoles /etc/prometheus
sudo cp -r ./console_libraries /etc/prometheus
```

5 . Set the ownership of the two folders, as well as of all files that they contain, to our prometheus user :

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

6 . In our home folder, remove the source files that are not needed anymore:

```
cd .. && rm -rf prometheus-*
```

Configuring Prometheus

1 . Open the file prometheus.yml in a text editor:

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

```
global:
  scrape_interval: 15s
  evaluation_interval: 15s

rule_files:
  # - "first.rules"
  # - "second.rules"

scrape_configs:
  - job_name: 'prometheus'
    scrape_interval: 5s
    static_configs:
      - targets: ['localhost:9090']
```

We add the following part below the configuration for scrapping Prometheus:

```
- job_name: 'node_exporter'
  scrape_interval: 5s
  static_configs:
    - targets: ['localhost:9100']
```

2 . Set the ownership of the file to our Prometheus user:

```
sudo chown prometheus:prometheus /etc/prometheus/prometheus.yml
```

Running Prometheus

1 . Start Prometheus directly from the command line with the following command, which executes the binary file as our Prometheus user:

```
sudo -u prometheus /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
```

The server starts displaying multiple status messages and the information that the server has started:

```
level=info ts=2018-04-12T11:56:53.084000977Z caller=main.go:220 msg="Starting Prometheus" version="(version=2.2.1, branch=HEAD, revision=bc6058c81272a8d938c05e75607371284236aad)"
level=info ts=2018-04-12T11:56:53.084463975Z caller=main.go:221 build_context="(go=go1.10, user=root@149e5b3f0829, date=2018-03-14-14:15:45)"
level=info ts=2018-04-12T11:56:53.084632256Z caller=main.go:222 host_details="(Linux 4.4.127-mainline-rev1 #1 SMP Sun Apr 8 10:38:32 UTC 2018 x86_64 scw-041406 (none))"
level=info ts=2018-04-12T11:56:53.084797692Z caller=main.go:223 fd_limits="(soft=1024, hard=65536)"
level=info ts=2018-04-12T11:56:53.09190775Z caller=web.go:382 component=web msg="Start listening for connections" address=0.0.0.0:9090
level=info ts=2018-04-12T11:56:53.091908126Z caller=main.go:504 msg="Starting TSDB ..."
level=info ts=2018-04-12T11:56:53.102833743Z caller=main.go:514 msg="TSDB started"
level=info ts=2018-04-12T11:56:53.103343144Z caller=main.go:588 msg="Loading configuration file" filename=/etc/prometheus/prometheus.yml
level=info ts=2018-04-12T11:56:53.104047346Z caller=main.go:491 msg="Server is ready to receive web requests."
```

2 . Open your browser and type <http://IP.OF.YOUR.SERVER:9090> to access the Prometheus interface. If everything is working, we end the task by pressing on CTRL + C on our keyboard.

3 . The server is working now, but it cannot yet be launched automatically at boot. To achieve this, we have to create a new systemd configuration file that will tell your OS which services should it launch automatically during the boot process.

```
sudo nano /etc/systemd/system/prometheus.service
```

4 . Copy the following information in the file and save it, then exit the editor:

```
[Unit]
Description=Prometheus Monitoring
Wants=network-online.target
After=network-online.target

[Service]
User=prometheus
Group=prometheus
Type=simple
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
ExecReload=/bin/kill -HUP $MAINPID

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

5 . To use the new service, reload systemd:

```
sudo systemctl daemon-reload
```

```
sudo systemctl enable prometheus
```

6 . Start Prometheus:

```
sudo systemctl start prometheus
```

Prometheus Web Interface

Not secure

novartis.devops.altimetrik.io:9090/targets

Prometheus Alerts Graph Status **Help**

Targets

All **Up/Healthly**

cadvisor (8/9 up) [View logs](#)

Endpoint	State	Labels	Last Scrape	Scrape Duration	Error
http://10.0.0.28:9180/metrics	UP	instance="novartis-altimetrik-ibmcloud" job="cadvisor"	13.718s ago	101ms	
http://10.0.0.10:9180/metrics	UP	instance="novartis-altimetrik-galaxy" job="cadvisor"	2.270s ago	107.4ms	
http://10.0.0.29:9180/metrics	DOWN	instance="novartis-altimetrik-galaxy" job="cadvisor"	6.565s ago	1.061ms	Get http://10.0.0.29:9180/metrics: dial tcp 10.0.0.29:9180: connect: connection refused
http://10.0.0.19:9180/metrics	UP	instance="novartis-altimetrik-galaxy" job="cadvisor"	12.328s ago	102ms	
http://10.0.0.24:9180/metrics	UP	instance="novartis-altimetrik-galaxy" job="cadvisor"	11.616s ago	112.3ms	
http://10.0.0.7:9180/metrics	UP	instance="novartis-altimetrik-galaxy" job="cadvisor"	8.711s ago	102.8ms	
http://10.0.0.14:9180/metrics	UP	instance="novartis-altimetrik-galaxy" job="cadvisor"	5.606s ago	120.3ms	
http://10.0.0.12:9180/metrics	UP	instance="novartis-altimetrik-galaxy" job="cadvisor"	645ms ago	93.3ms	
http://10.0.0.25:9180/metrics	UP	instance="novartis-altimetrik-galaxy" job="cadvisor"	13.807s ago	110.8ms	

jenkins-exporter (1/1 up) [View logs](#)

Endpoint	State	Labels	Last Scrape	Scrape Duration	Error
http://novartis.devops.altimetrik.io:8084/prometheus	UP	instance="novartis-altimetrik-ibmcloud" job="jenkins-exporter"	2.623s ago	23.18ms	

jira-exporter (1/1 up) [View logs](#)

Endpoint	State	Labels	Last Scrape	Scrape Duration	Error
http://novartis.devops.altimetrik.io:8080/plugins/service/prometheus/metrics	UP	instance="novartis-altimetrik-ibmcloud" job="jira-exporter"	3.904s ago	15.25ms	

node-exporter (8/9 up) [View logs](#)

Endpoint	State	Labels	Last Scrape	Scrape Duration	Error
http://10.0.0.28:9100/metrics	UP	instance="novartis-altimetrik-ibmcloud" job="node-exporter"	8.584s ago	21.76ms	
http://10.0.0.10:9100/metrics	UP	instance="novartis-altimetrik-galaxy" job="node-exporter"	13.193s ago	18.07ms	
http://10.0.0.29:9100/metrics	DOWN	instance="novartis-altimetrik-galaxy" job="node-exporter"	9.061s ago	1.291ms	Get http://10.0.0.29:9100/metrics: dial tcp 10.0.0.29:9100: connect: connection refused
http://10.0.0.19:9100/metrics	UP	instance="novartis-altimetrik-galaxy" job="node-exporter"	14.009s ago	18.97ms	
http://10.0.0.24:9100/metrics	UP	instance="novartis-altimetrik-galaxy" job="node-exporter"	12.534s ago	16.88ms	
http://10.0.0.7:9100/metrics	UP	instance="novartis-altimetrik-galaxy" job="node-exporter"	13.556s ago	23.89ms	
http://10.0.0.14:9100/metrics	UP	instance="novartis-altimetrik-galaxy" job="node-exporter"	14.114s ago	25.56ms	

The screenshot shows the Prometheus web interface. At the top, the browser address bar displays the URL: `novartis.devops.altimetrik.io:9090/graph?g0.range_input=1h&g0.expr=node_load1&g0.tab=0`. The interface includes a navigation bar with links for Prometheus, Alerts, Graph, Status, and Help. Below this, there is a section to enable query history and a query input field containing `node_load1`. A blue 'Execute' button is next to the input field. To the right, performance metrics are shown: Load Time 280ms, Resolution 14s, and Total time series 9.

The main area is divided into 'Graph' and 'Console' tabs. The 'Graph' tab is active, showing a line graph of `node_load1` over a 1-hour range. The x-axis represents time, with labels at 04:45, 05:00, 05:15, and 05:30. The y-axis represents the load value, ranging from 0 to 0.8. The graph shows several data series, with a prominent spike in load around 05:30. A legend at the bottom of the graph lists the following series:

- node_load1(instance="novartis-devops-sonar" job="node-exporter")
- node_load1(instance="novartis-devops-prometheus" job="node-exporter")
- node_load1(instance="novartis-devops-texas" job="node-exporter")
- node_load1(instance="novartis-devops-manager" job="node-exporter")
- node_load1(instance="novartis-devops-jira" job="node-exporter")
- node_load1(instance="novartis-devops-jenkins" job="node-exporter")
- node_load1(instance="novartis-devops-grafana" job="node-exporter")
- node_load1(instance="novartis-devops-gitlabci" job="node-exporter")
- node_load1(instance="novartis-devops-bitbucket" job="node-exporter")

Installing Grafana

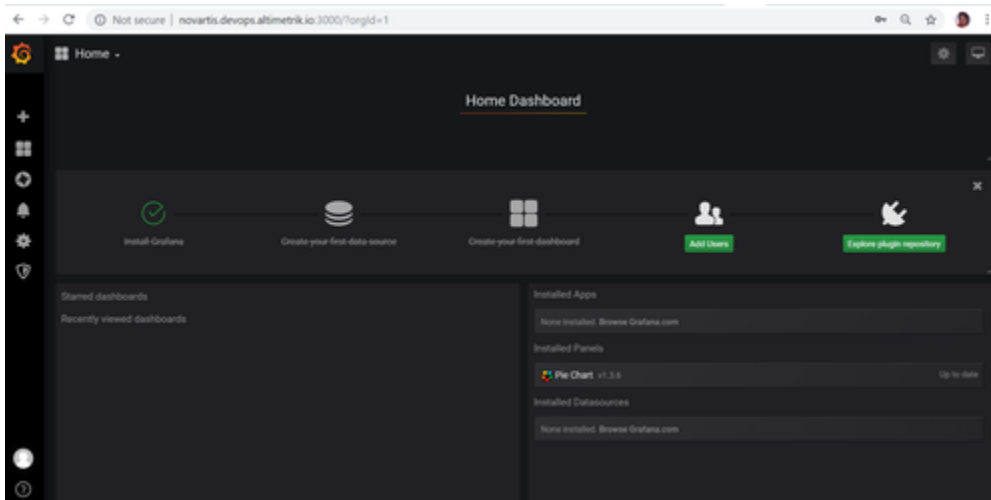
- 1 . Install Grafana on our instance which queries our Prometheus server.

```
wget https://s3-us-west-2.amazonaws.com/grafana-releases/release/grafana_5.0.4_amd64.deb
sudo apt-get install -y adduser libfontconfig
sudo dpkg -i grafana_5.0.4_amd64.deb
```

2 . Enable the automatic start of Grafana by `systemd`:

```
sudo systemctl daemon-reload && sudo systemctl enable grafana-server && sudo systemctl start grafana-server
```

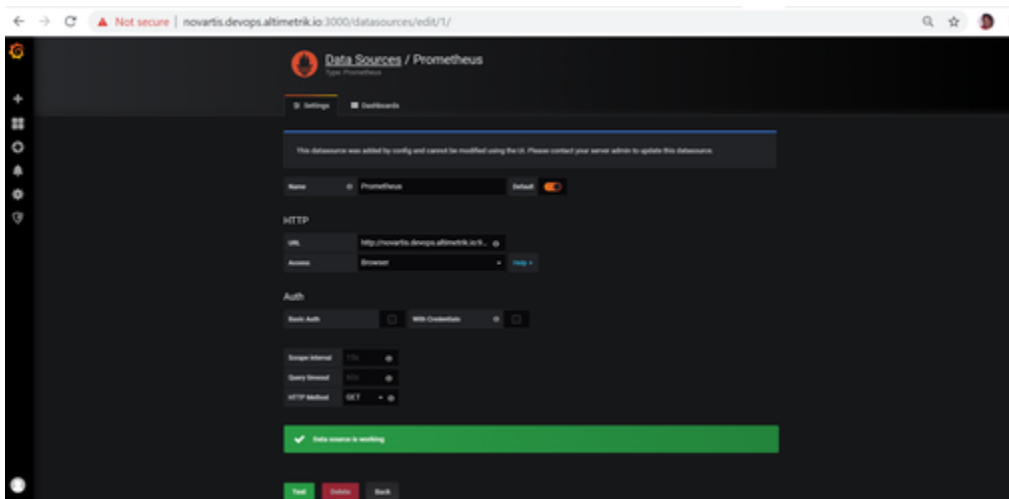
Grafana is running now, and we can connect to it at <http://novartis.devops.altimetrik.io:3000/>



Now you have to create a Prometheus data source:

- Click on the Grafana logo to open the sidebar.
- Click on "Data Sources" in the sidebar.
- Choose "Add New".
- Select "Prometheus" as the data source.
- Set the Prometheus server URL (in our case: <http://novartis.devops.altimetrik.io:9090>)
- Click "Add" to test the connection and to save the new data source.

Your settings should look like this:



You are now ready to create your first dashboard from the information collected by Prometheus. You can also import some dashboards from a collection of [shared dashboards](#)

Here is an example of a Dashboard that uses the CPU usage of our node and presents it in Grafana:

