Lesson-End Project

Running Prometheus as a Docker Container for Monitoring

Project agenda: To demonstrate the setup and running of Prometheus as a Docker container for monitoring, enabling efficient tracking and management of system metrics

Description: You are a developer in a software company responsible for configuring and deploying Prometheus within a Docker container for real-time monitoring of system metrics. You begin by setting up the Docker environment, pulling the Prometheus image, and ensuring it is correctly configured for your infrastructure. After running the container, you verify that Prometheus efficiently collects and displays metrics.

Tools required: Docker and Prometheus

Prerequisites: You must have Docker installed in the lab to proceed. Refer Demo 02 for instructions on installing and starting Prometheus.

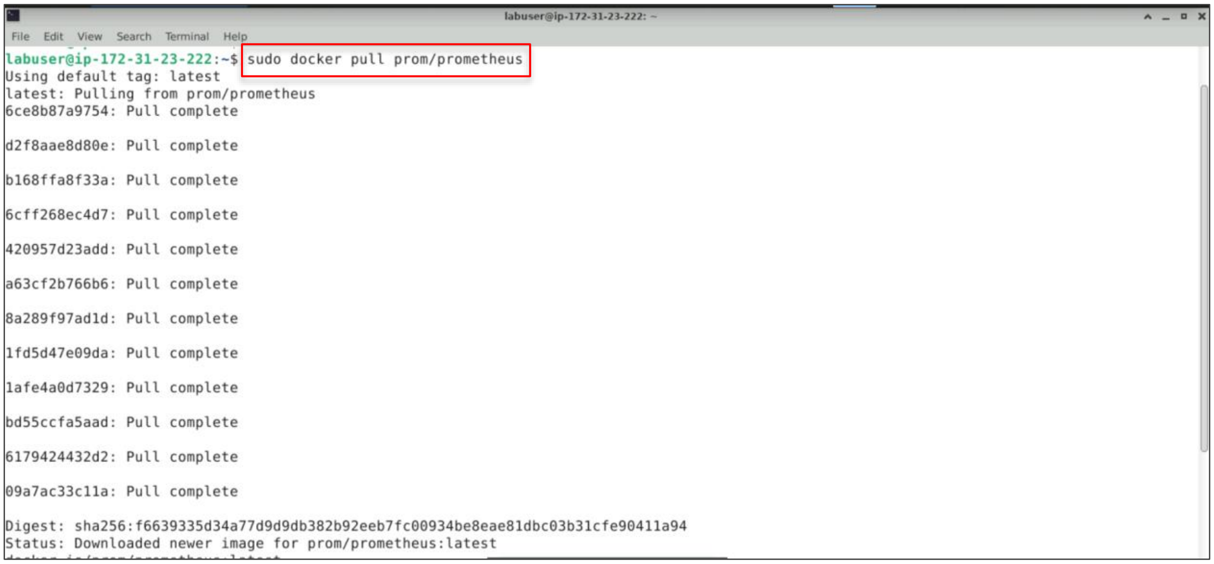
Expected deliverables: A fully configured Prometheus Docker container setup to scrape and visualize system metrics, accessible through a web interface for real-time monitoring and infrastructure management

Steps to be followed:

1. Pull and set up Docker environment
2. Create and edit Prometheus configuration
3. Start the Prometheus container
4. Access the Prometheus web interface

Step 1: Pull and set up Docker environment

1.1 Run the following command on the terminal to pull the Prometheus Docker image from the official Docker Hub repository:
sudo docker pull prom/prometheus


labuser@ip-172-31-23-222: ~
File Edit View Search Terminal Help

```
labuser@ip-172-31-23-222:~$ sudo docker pull prom/prometheus
Using default tag: latest
latest: Pulling from prom/prometheus
6ce8b87a9754: Pull complete

d2f8aae8d80e: Pull complete

b168ffa8f33a: Pull complete

6cff268ec4d7: Pull complete

420957d23add: Pull complete

a63cf2b766b6: Pull complete

8a289f97ad1d: Pull complete

1fd5d47e09da: Pull complete

1afe4a0d7329: Pull complete

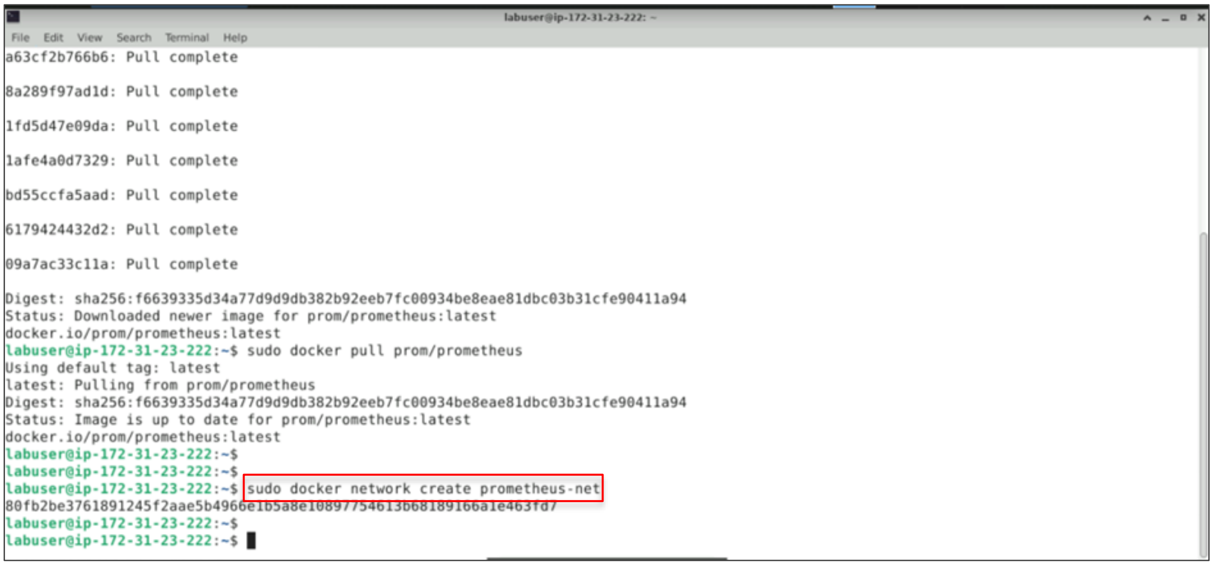
bd55ccfa5aad: Pull complete

6179424432d2: Pull complete

09a7ac33c11a: Pull complete

Digest: sha256:f6639335d34a77d9d9db382b92eeb7fc00934be8eae81dbc03b31cfe90411a94
Status: Downloaded newer image for prom/prometheus:latest
```

1.2 Execute the following command on the terminal to create a Docker network:
sudo docker network create prometheus-net


labuser@ip-172-31-23-222: ~
File Edit View Search Terminal Help

```
a63cf2b766b6: Pull complete

8a289f97ad1d: Pull complete

1fd5d47e09da: Pull complete

1afe4a0d7329: Pull complete

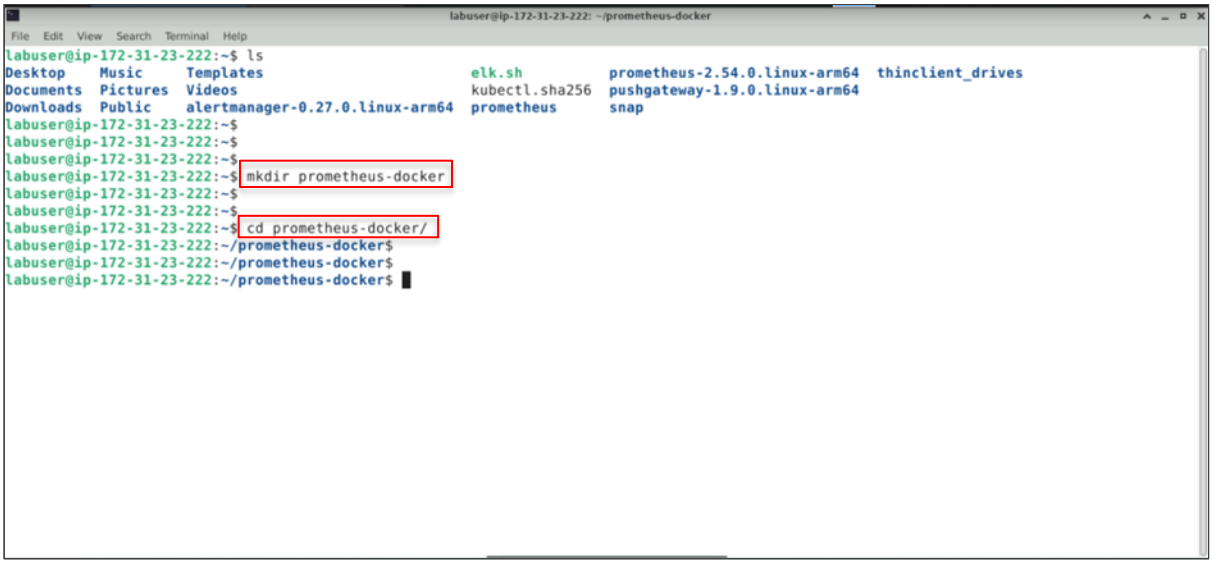
bd55ccfa5aad: Pull complete

6179424432d2: Pull complete

09a7ac33c11a: Pull complete

Digest: sha256:f6639335d34a77d9d9db382b92eeb7fc00934be8eae81dbc03b31cfe90411a94
Status: Downloaded newer image for prom/prometheus:latest
docker.io/prom/prometheus:latest
labuser@ip-172-31-23-222:~$ sudo docker pull prom/prometheus
Using default tag: latest
latest: Pulling from prom/prometheus
Digest: sha256:f6639335d34a77d9d9db382b92eeb7fc00934be8eae81dbc03b31cfe90411a94
Status: Image is up to date for prom/prometheus:latest
docker.io/prom/prometheus:latest
labuser@ip-172-31-23-222:~$
labuser@ip-172-31-23-222:~$
labuser@ip-172-31-23-222:~$ sudo docker network create prometheus-net
80fb2be3761891245f2aae5b4966e1b5a8e10897754613b68189166a1e463fd7
labuser@ip-172-31-23-222:~$
labuser@ip-172-31-23-222:~$ 
```

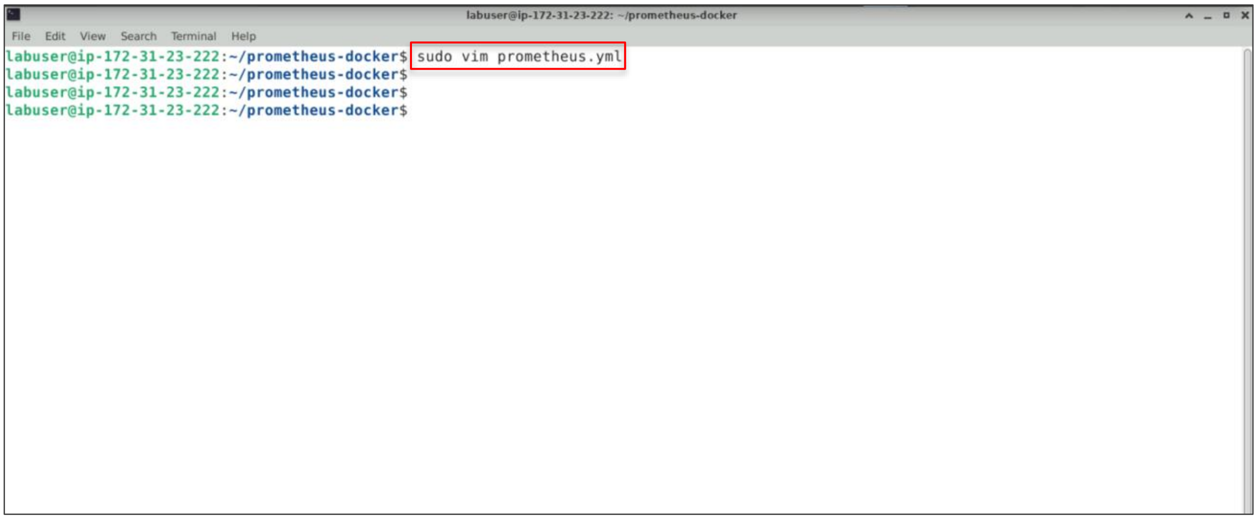
1.3 Run the following commands to create a new directory named **prometheus-docker**, store the Prometheus configuration file in it, and then change to the newly created directory as follows:
mkdir prometheus-docker
cd prometheus-docker/


labuser@ip-172-31-23-222: ~/prometheus-docker
File Edit View Search Terminal Help

```
labuser@ip-172-31-23-222:~$ ls
Desktop    Music     Templates                        elk.sh          prometheus-2.54.0.linux-arm64  thinclient_drives
Documents  Pictures  Videos                           kubectl.sha256  pushgateway-1.9.0.linux-arm64
Downloads  Public    alertmanager-0.27.0.linux-arm64  prometheus      snap
labuser@ip-172-31-23-222:~$
labuser@ip-172-31-23-222:~$
labuser@ip-172-31-23-222:~$
labuser@ip-172-31-23-222:~$ mkdir prometheus-docker
labuser@ip-172-31-23-222:~$
labuser@ip-172-31-23-222:~$
labuser@ip-172-31-23-222:~$ cd prometheus-docker/
labuser@ip-172-31-23-222:~/prometheus-docker$
labuser@ip-172-31-23-222:~/prometheus-docker$
labuser@ip-172-31-23-222:~/prometheus-docker$
```

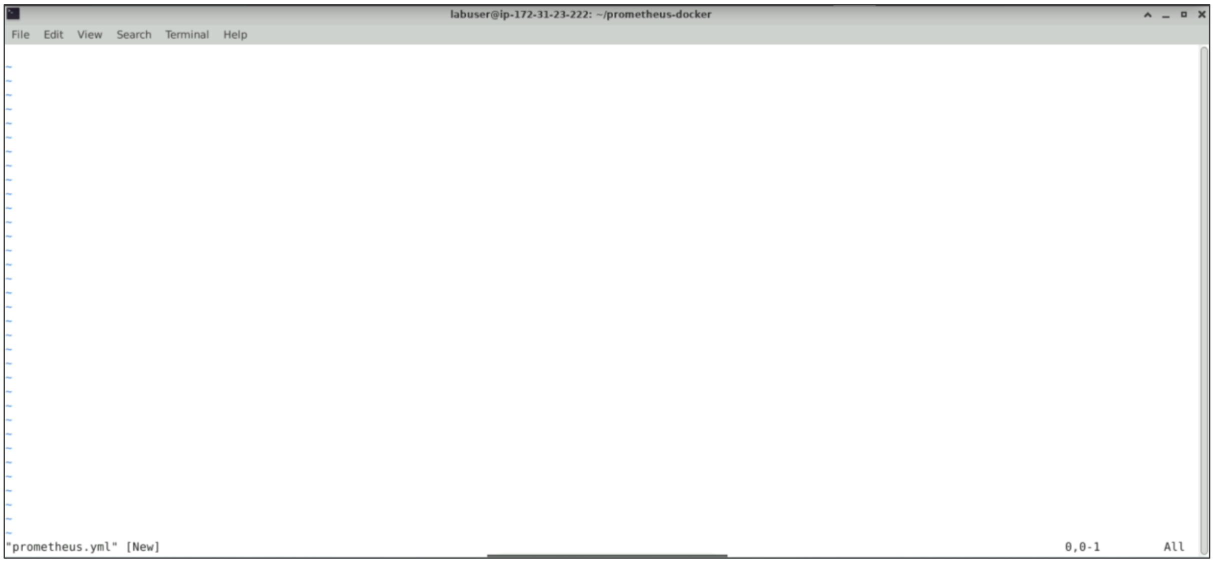
Step 2: Create and edit Prometheus configuration

2.1 Run the command given below to create and edit a file named **prometheus.yml** using **vim** or a preferred text editor within the newly created directory:
sudo vim prometheus.yml


labuser@ip-172-31-23-222: ~/prometheus-docker
File Edit View Search Terminal Help

```
labuser@ip-172-31-23-222:~/prometheus-docker$ sudo vim prometheus.yml
labuser@ip-172-31-23-222:~/prometheus-docker$
labuser@ip-172-31-23-222:~/prometheus-docker$
labuser@ip-172-31-23-222:~/prometheus-docker$
```

The editor appears as follows:



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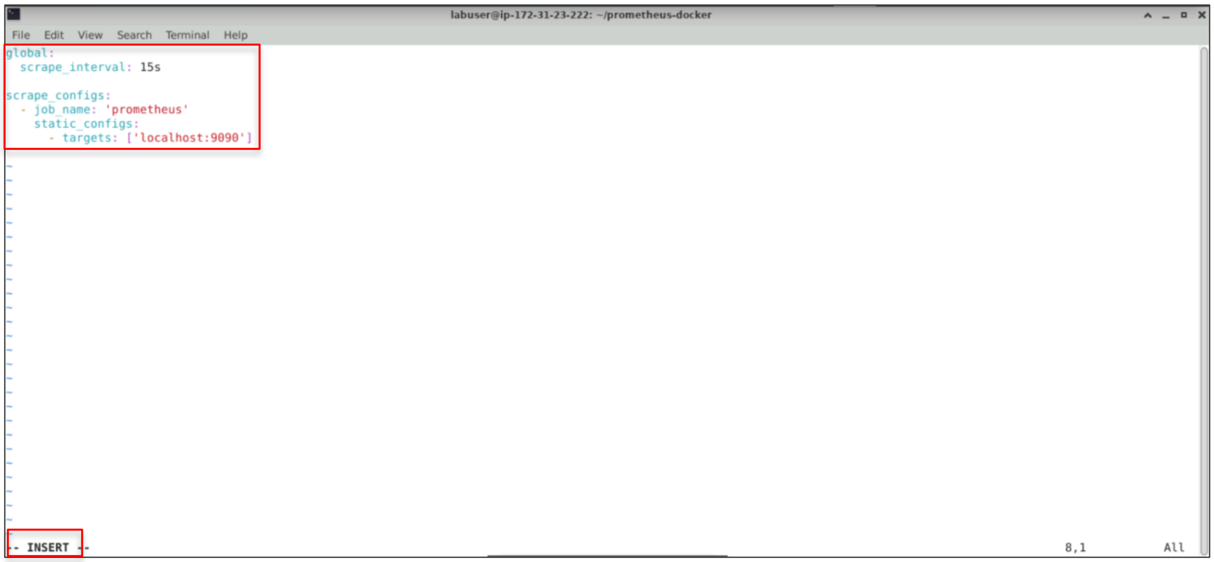
"prometheus.yml" [New]                                                                              0,0-1         All
```

2.2 Press **I** or **i** to switch to **INSERT** mode, then copy and paste the following configuration into the file:

```
global:
  scrape_interval: 15s

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



```
global:
  scrape_interval: 15s

scrape_configs:
  - job_name: 'prometheus'
    static_configs:
      - targets: ['localhost:9090']
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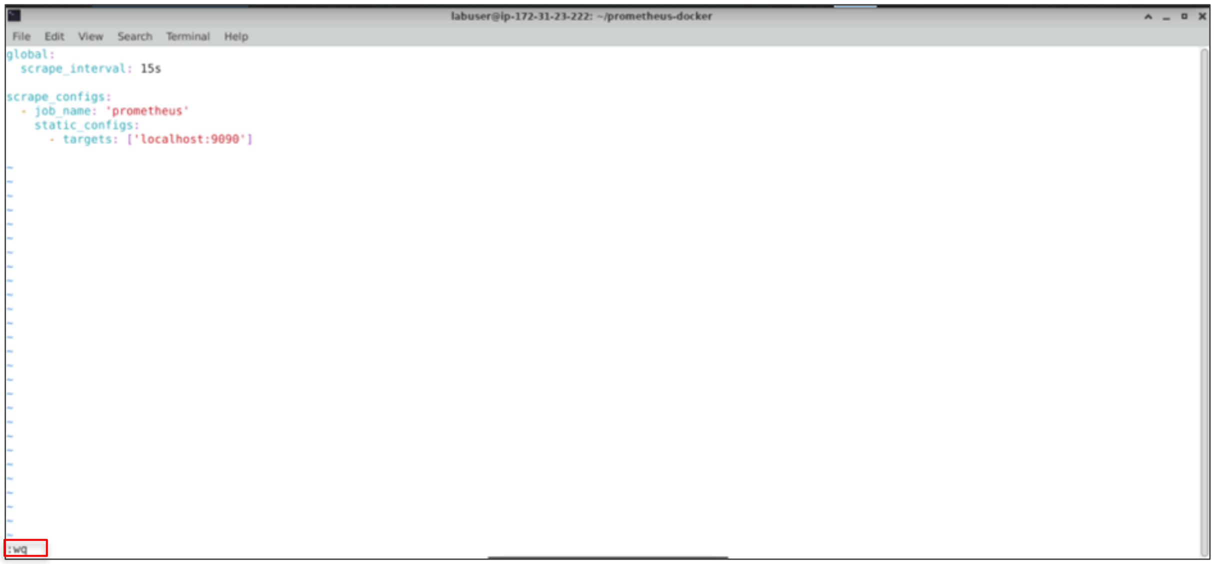
-- INSERT --                                                                                        8,1           All
```

2.3 Press **Esc** to exit INSERT mode, then type **:wq** to save and exit the file


labuser@ip-172-31-23-222: ~/prometheus-docker
File Edit View Search Terminal Help

```
global:
  scrape_interval: 15s

scrape_configs:
  - job_name: 'prometheus'
    static_configs:
      - targets: ['localhost:9090']

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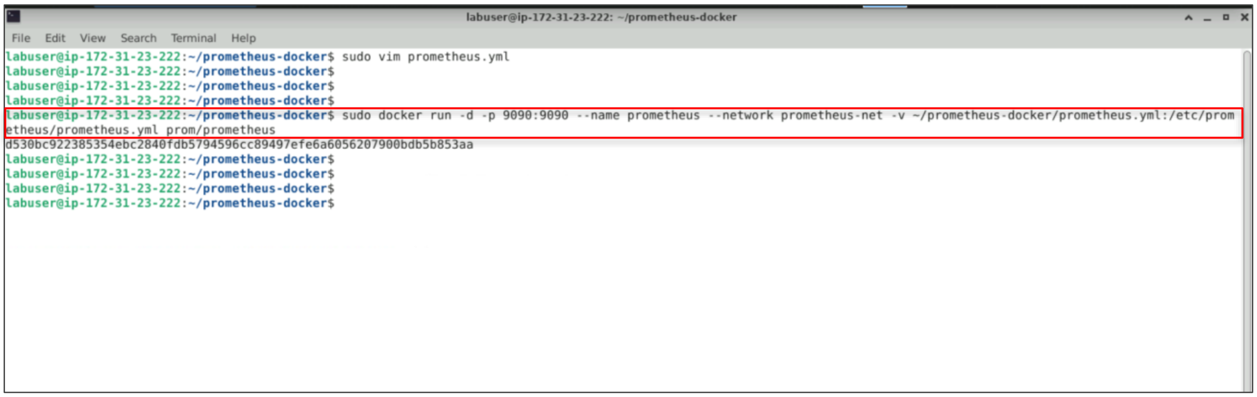
:wq
```

Step 3: Start the Prometheus container

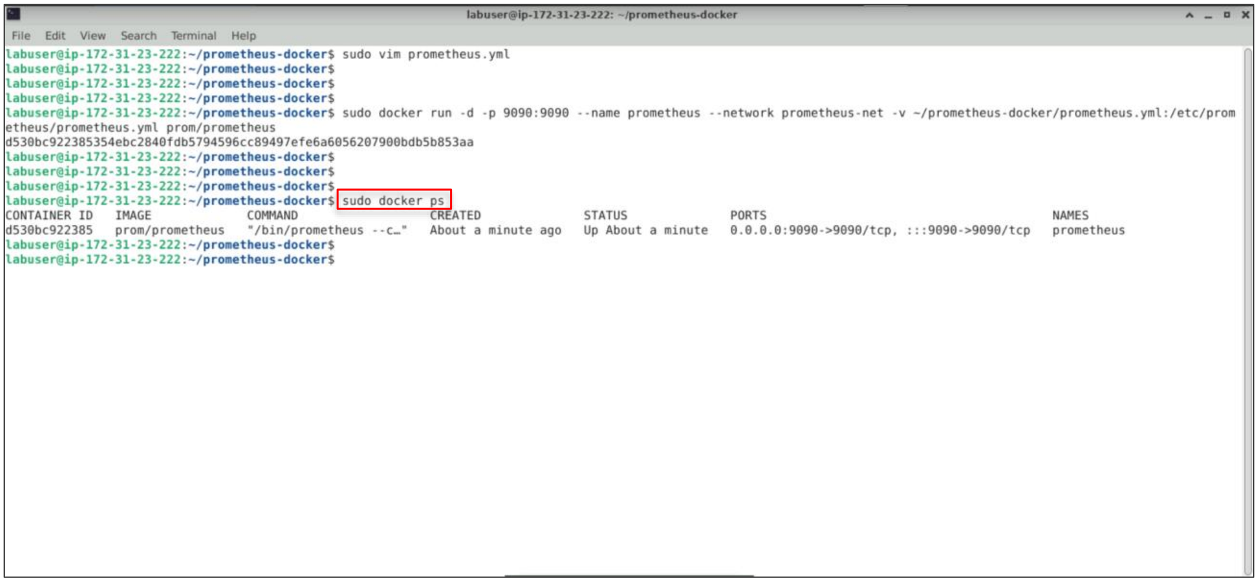
3.1 Run the following command to start a Prometheus container using the Docker image pulled in **Step 1**:
sudo docker run -d -p 9090:9090 --name prometheus --network prometheus-net -v ~/prometheus-docker/prometheus.yml:/etc/prometheus/prometheus.yml prom/prometheus


labuser@ip-172-31-23-222: ~/prometheus-docker
File Edit View Search Terminal Help

```
labuser@ip-172-31-23-222:~/prometheus-docker$ sudo vim prometheus.yml
labuser@ip-172-31-23-222:~/prometheus-docker$
labuser@ip-172-31-23-222:~/prometheus-docker$
labuser@ip-172-31-23-222:~/prometheus-docker$
labuser@ip-172-31-23-222:~/prometheus-docker$ sudo docker run -d -p 9090:9090 --name prometheus --network prometheus-net -v ~/prometheus-docker/prometheus.yml:/etc/prom
etheus/prometheus.yml prom/prometheus
d530bc922385354ebc2840fdb5794596cc89497efe6a6056207900bdb5b853aa
labuser@ip-172-31-23-222:~/prometheus-docker$
labuser@ip-172-31-23-222:~/prometheus-docker$
labuser@ip-172-31-23-222:~/prometheus-docker$
labuser@ip-172-31-23-222:~/prometheus-docker$
```

Note: If the error “**The container name ‘/prometheus’ is already in use by another container**” occurs, run the command: **docker rm -f prometheus** and then restart the Prometheus container.

3.2 Execute the following command to list all running Docker containers:
sudo docker ps

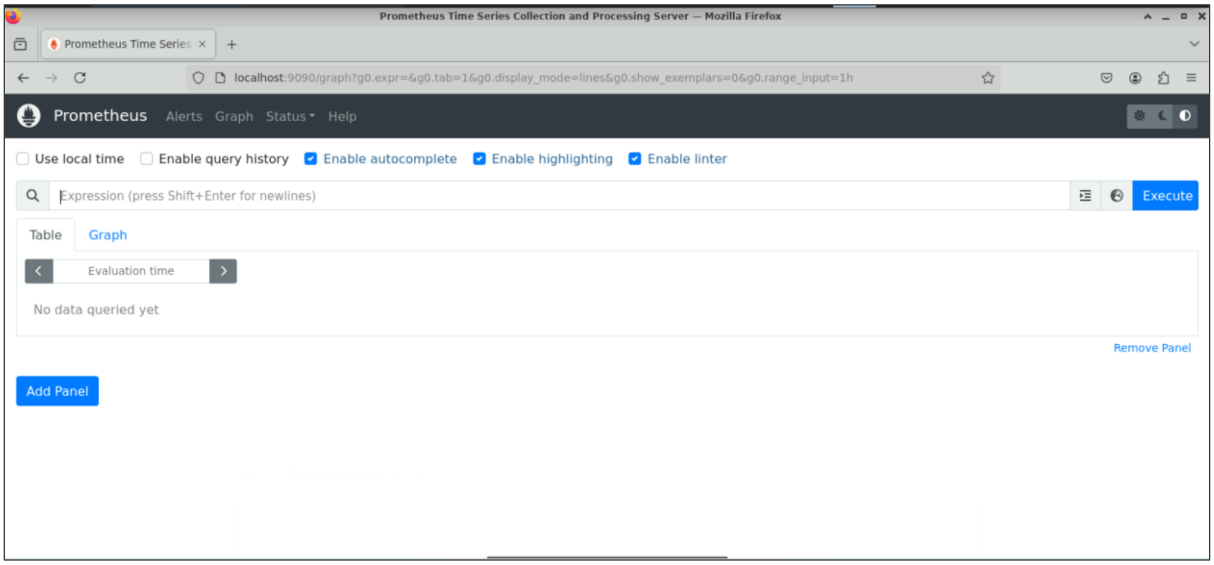


labuser@ip-172-31-23-222: ~/prometheus-docker

```
labuser@ip-172-31-23-222:~/prometheus-docker$ sudo vim prometheus.yml
labuser@ip-172-31-23-222:~/prometheus-docker$
labuser@ip-172-31-23-222:~/prometheus-docker$
labuser@ip-172-31-23-222:~/prometheus-docker$
labuser@ip-172-31-23-222:~/prometheus-docker$ sudo docker run -d -p 9090:9090 --name prometheus --network prometheus-net -v ~/prometheus-docker/prometheus.yml:/etc/prom
etheus/prometheus.yml prom/prometheus
d530bc922385354ebc2840fdb5794596cc89497efe6a6056207900bdb5b853aa
labuser@ip-172-31-23-222:~/prometheus-docker$
labuser@ip-172-31-23-222:~/prometheus-docker$
labuser@ip-172-31-23-222:~/prometheus-docker$
labuser@ip-172-31-23-222:~/prometheus-docker$ sudo docker ps
CONTAINER ID   IMAGE             COMMAND                  CREATED              STATUS              PORTS                                       NAMES
d530bc922385   prom/prometheus   "/bin/prometheus --c…"   About a minute ago   Up About a minute   0.0.0.0:9090->9090/tcp, :::9090->9090/tcp   prometheus
labuser@ip-172-31-23-222:~/prometheus-docker$
labuser@ip-172-31-23-222:~/prometheus-docker$
```

Step 4: Access the Prometheus web interface

4.1 Enter the URL **http://localhost:9090** in the address bar of your preferred web browser to access the Prometheus UI as shown below:



Prometheus Time Series Collection and Processing Server — Mozilla Firefox

localhost:9090/graph?g0.expr=&g0.tab=1&g0.display_mode=lines&g0.show_exemplars=0&g0.range_input=1h

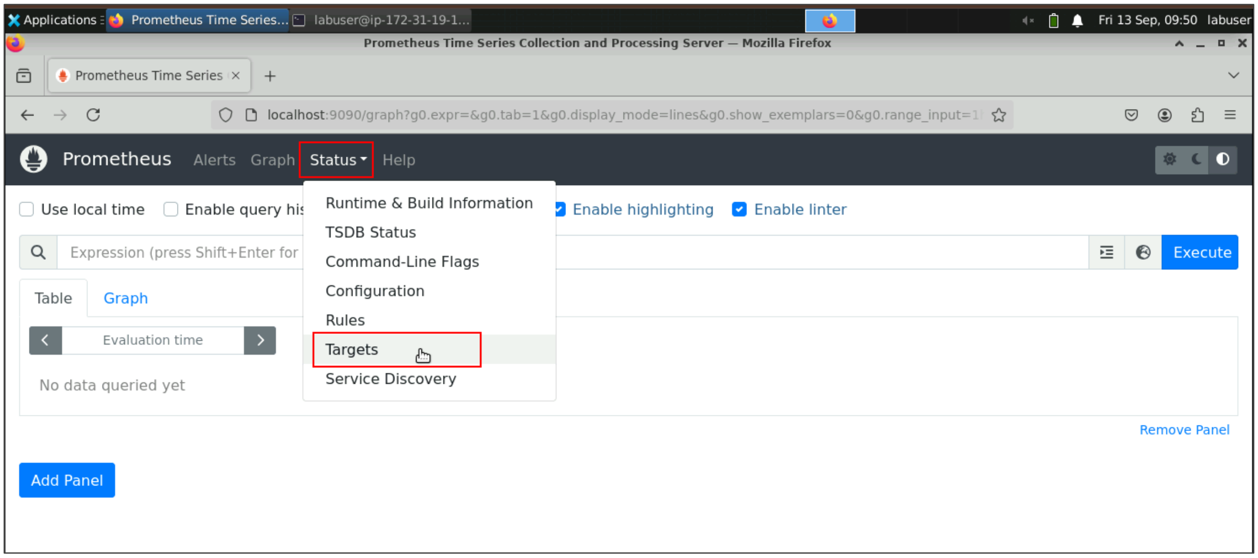
□ Use local time □ Enable query history ☑ Enable autocomplete ☑ Enable highlighting ☑ Enable linter

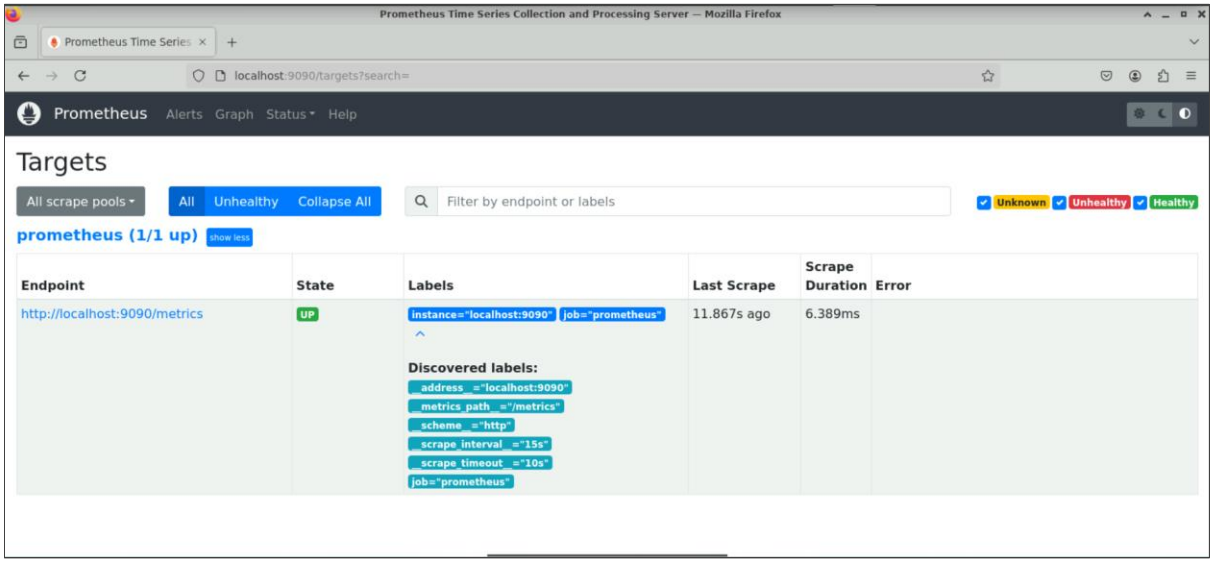
Expression (press Shift+Enter for newlines)

No data queried yet

Note: This URL will connect to the Prometheus web interface running in the Docker container.

4.2 Navigate to the **Targets** section, which shows the health status and last scrape duration of the monitored endpoints


Applications
Prometheus Time Series...
labuser@ip-172-31-19-1...
Fri 13 Sep, 09:50 labuser
Prometheus Time Series Collection and Processing Server — Mozilla Firefox
Prometheus Time Series
localhost:9090/graph?g0.expr=&g0.tab=1&g0.display_mode=lines&g0.show_exemplars=0&g0.range_input=1
Prometheus
Alerts
Graph
Status
Help
Runtime & Build Information
TSDB Status
Command-Line Flags
Configuration
Rules
Targets
Service Discovery
Use local time
Enable query his
Enable highlighting
Enable linter
Expression (press Shift+Enter for
Execute
Table
Graph
Evaluation time
No data queried yet
Remove Panel
Add Panel

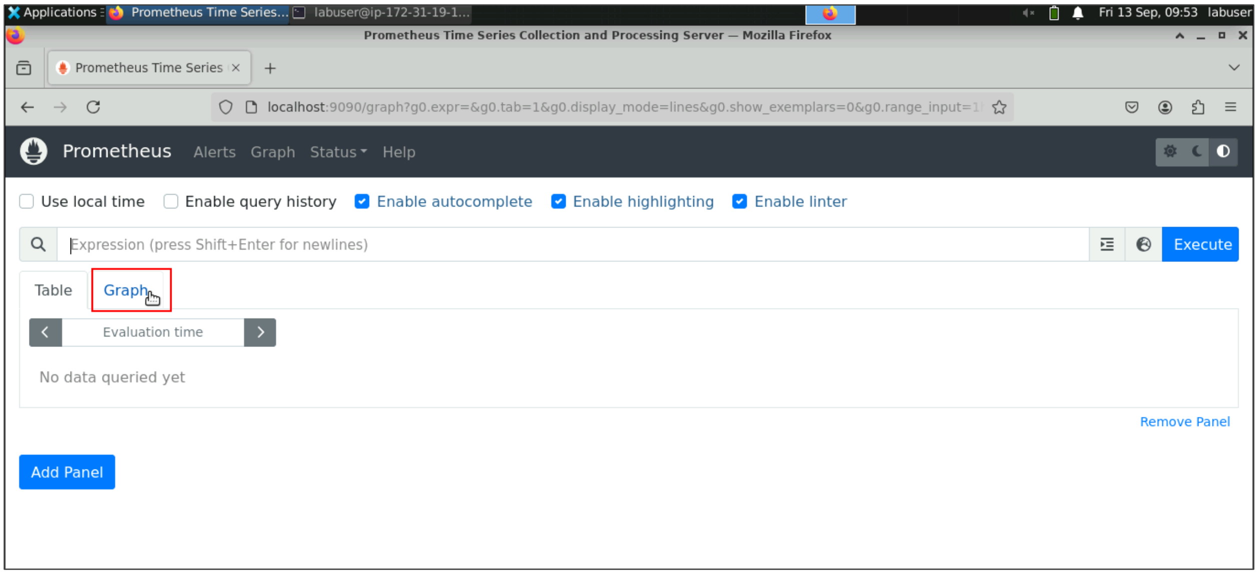

Prometheus Time Series Collection and Processing Server — Mozilla Firefox
Prometheus Time Series
localhost:9090/targets?search=
Prometheus
Alerts
Graph
Status
Help
All scrape pools
All
Unhealthy
Collapse All
Filter by endpoint or labels
Unknown
Unhealthy
Healthy
show less

Targets

prometheus (1/1 up)

Endpoint	State	Labels	Last Scrape	Scrape Duration	Error
http://localhost:9090/metrics	UP	instance="localhost:9090" job="prometheus" Discovered labels: __address__="localhost:9090" __metrics_path__="/metrics" __scheme__="http" __scrape_interval__="15s" __scrape_timeout__="10s" job="prometheus"	11.867s ago	6.389ms	

4.3 Navigate back to the dashboard and click on the **Graph** tab


Applications
Prometheus Time Series...
labuser@ip-172-31-19-1...
Fri 13 Sep, 09:53 labuser
Prometheus Time Series Collection and Processing Server — Mozilla Firefox
Prometheus Time Series
Prometheus
Alerts
Graph
Status
Help
Execute
Table
Graph
Evaluation time
Remove Panel
Add Panel

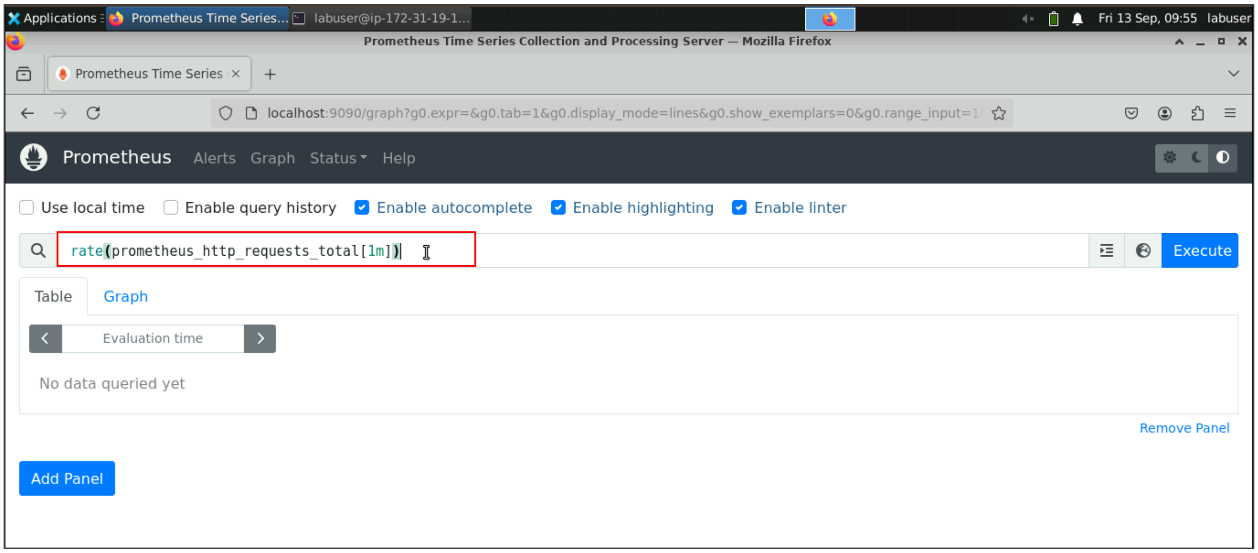
localhost:9090/graph?g0.expr=&g0.tab=1&g0.display_mode=lines&g0.show_exemplars=0&g0.range_input=1

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

Expression (press Shift+Enter for newlines)

No data queried yet

4.4 Enter the following command in the Expression section:
rate(prometheus_http_requests_total[1m])


Applications
Prometheus Time Series...
labuser@ip-172-31-19-1...
Fri 13 Sep, 09:55 labuser
Prometheus Time Series Collection and Processing Server — Mozilla Firefox
Prometheus Time Series
Prometheus
Alerts
Graph
Status
Help
Execute
Table
Graph
Evaluation time
Remove Panel
Add Panel

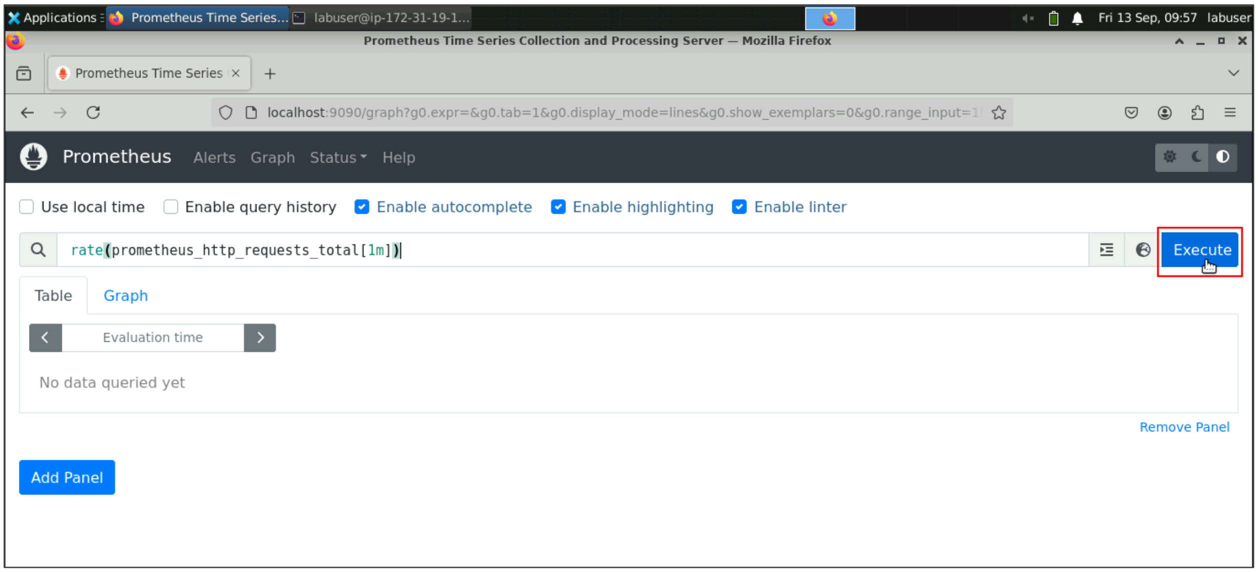
localhost:9090/graph?g0.expr=&g0.tab=1&g0.display_mode=lines&g0.show_exemplars=0&g0.range_input=1

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

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

No data queried yet

4.5 Click on the **Execute** button to visualize the result

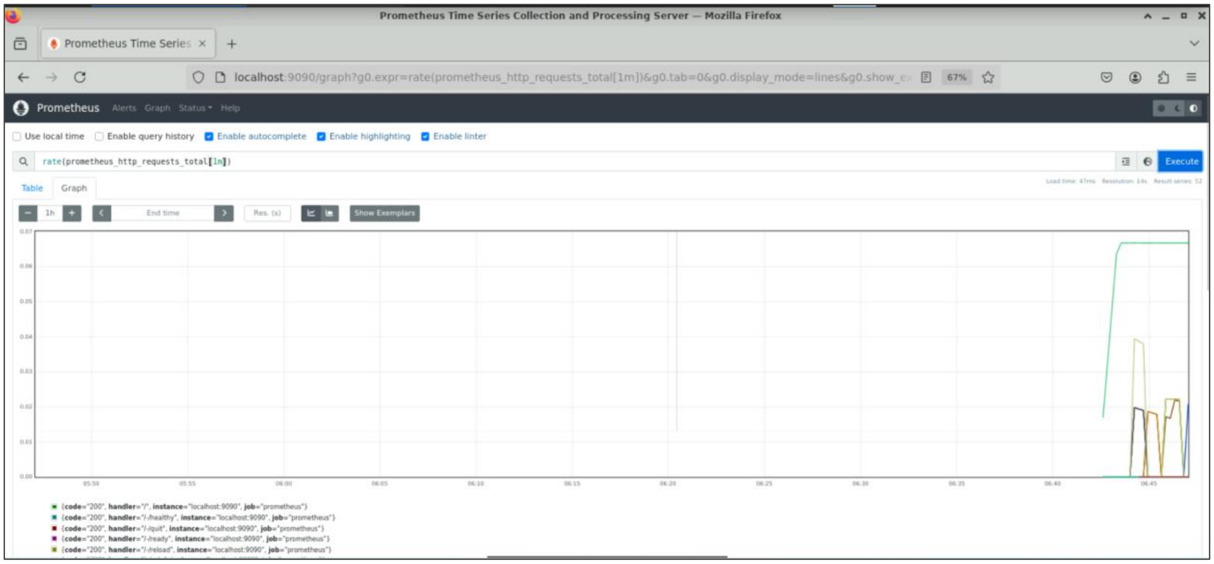

Applications
Prometheus Time Series...
labuser@ip-172-31-19-1...
Fri 13 Sep, 09:57 labuser
Prometheus Time Series Collection and Processing Server — Mozilla Firefox
Prometheus Time Series
Prometheus
Alerts
Graph
Status
Help
Execute
Table
Graph
Evaluation time
Remove Panel
Add Panel

localhost:9090/graph?g0.expr=&g0.tab=1&g0.display_mode=lines&g0.show_exemplars=0&g0.range_input=1

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

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

No data queried yet



localhost:9090/graph?g0.expr=rate(prometheus_http_requests_total[1m])&g0.tab=0&g0.display_mode=lines&g0.show_e

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

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

Load time: 47ms Resolution: 14s Result series: 52

- {**code**="200", **handler**="/", **instance**="localhost:9090", **job**="prometheus"}
- {**code**="200", **handler**="/-/healthy", **instance**="localhost:9090", **job**="prometheus"}
- {**code**="200", **handler**="/-/quit", **instance**="localhost:9090", **job**="prometheus"}
- {**code**="200", **handler**="/-/ready", **instance**="localhost:9090", **job**="prometheus"}
- {**code**="200", **handler**="/-/reload", **instance**="localhost:9090", **job**="prometheus"}

By following these steps, you have successfully set up and run Prometheus as a Docker container. This enables real-time monitoring of system metrics for efficient infrastructure tracking and management.