

Lesson 03 Demo 02

Configuring Alertmanager for Email Notifications

Objective: To set up Prometheus to initiate alerts and validate the alerting and notification system with practical tests for enhanced monitoring and timely responses in system management

Tools required: Linux operating system

Prerequisites: Refer to Demo 01 of Lesson 02 for setting up a Prometheus server and Node Exporter

Steps to be followed:

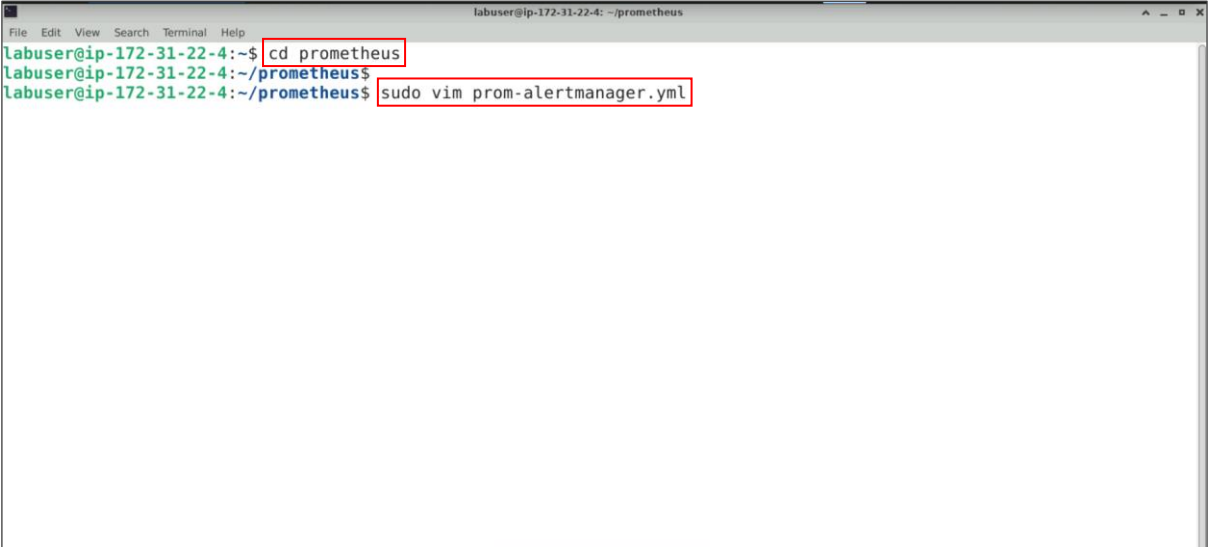
1. Configure Prometheus to work with Alertmanager
2. Install and configure Alertmanager
3. Start Node Exporter and Prometheus
4. Review Alertmanager settings via the Prometheus UI

Step 1: Configure Prometheus to work with Alertmanager

- 1.1 Run the following commands to navigate to the terminal, change the directory to the Prometheus folder, and open the **prom-alertmanager.yml** file for editing using the **Vim** editor:

cd prometheus

sudo vim prom-alertmanager.yml



```
labuser@ip-172-31-22-4: ~$ cd prometheus
labuser@ip-172-31-22-4: ~/prometheus$
labuser@ip-172-31-22-4: ~/prometheus$ sudo vim prom-alertmanager.yml
```

1.2 Switch to **INSERT** mode by entering **I** and copy and paste the following configuration:

global:

scrape_interval: 10s

alerting:

alertmanagers:

- static_configs:

- targets:

- localhost:9093

rule_files:

- rules.yml

scrape_configs:

- job_name: prometheus

scrape_interval: 30s

static_configs:

- targets:

- localhost:9090

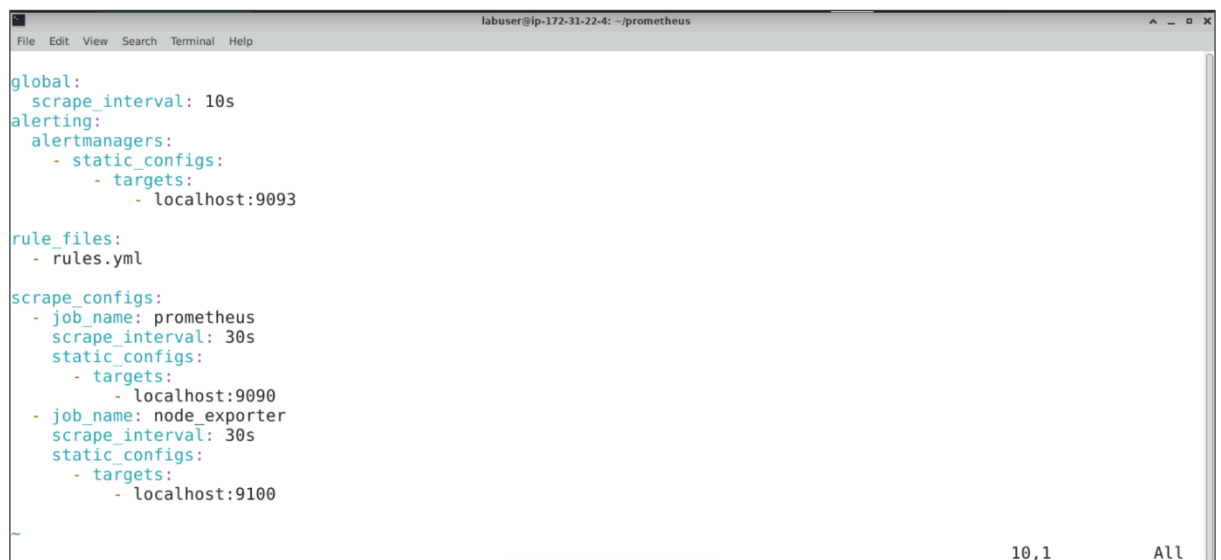
- job_name: node_exporter

scrape_interval: 30s

static_configs:

- targets:

- localhost:9100

A screenshot of a terminal window with a title bar that reads 'labuser@ip-172-31-22-4: ~/prometheus'. The terminal displays the following YAML configuration for Prometheus:

```
global:
  scrape_interval: 10s
alerting:
  alertmanagers:
    - static_configs:
        - targets:
            - localhost:9093

rule_files:
  - rules.yml

scrape_configs:
  - job_name: prometheus
    scrape_interval: 30s
    static_configs:
      - targets:
          - localhost:9090
  - job_name: node_exporter
    scrape_interval: 30s
    static_configs:
      - targets:
          - localhost:9100
```

The terminal shows a cursor at the end of the last line. At the bottom right of the terminal window, the text '10,1' and 'All' are visible.

Note: Press **esc** and type **:wq** to save and exit the file

1.3 Create a file named **rules.yml** for the rules configuration using the following:

```
cat <<EOF | sudo tee rules.yml
```

groups:

- name: alert.rules

rules:

- alert: InstanceDown

expr: up == 0

for: 1m

labels:

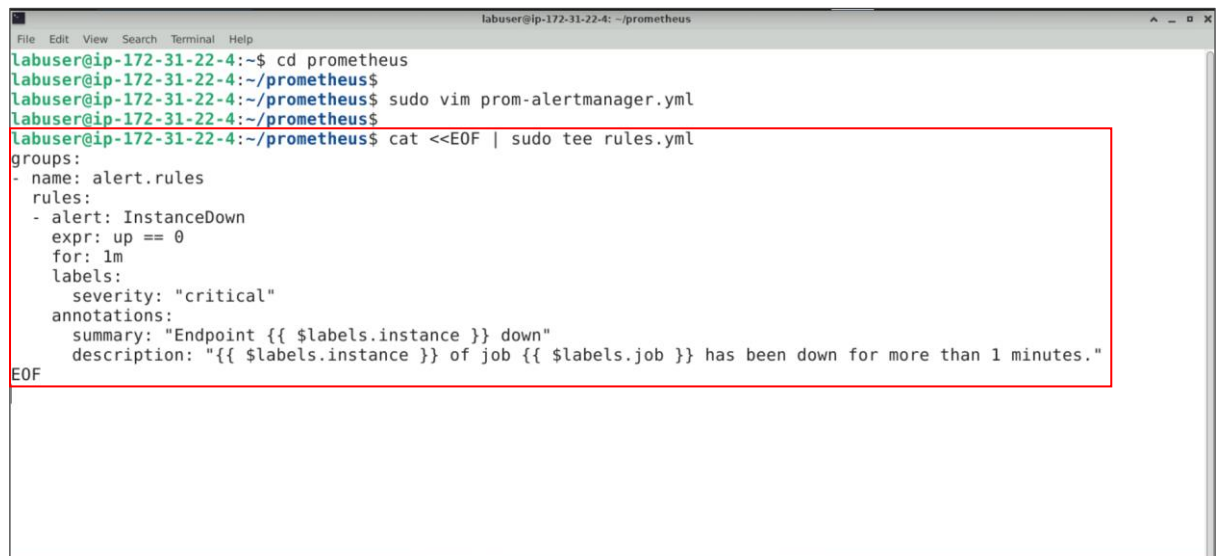
severity: "critical"

annotations:

summary: "Endpoint {{ \$labels.instance }} down"

description: "{{ \$labels.instance }} of job {{ \$labels.job }} has been down for more than 1 minutes."

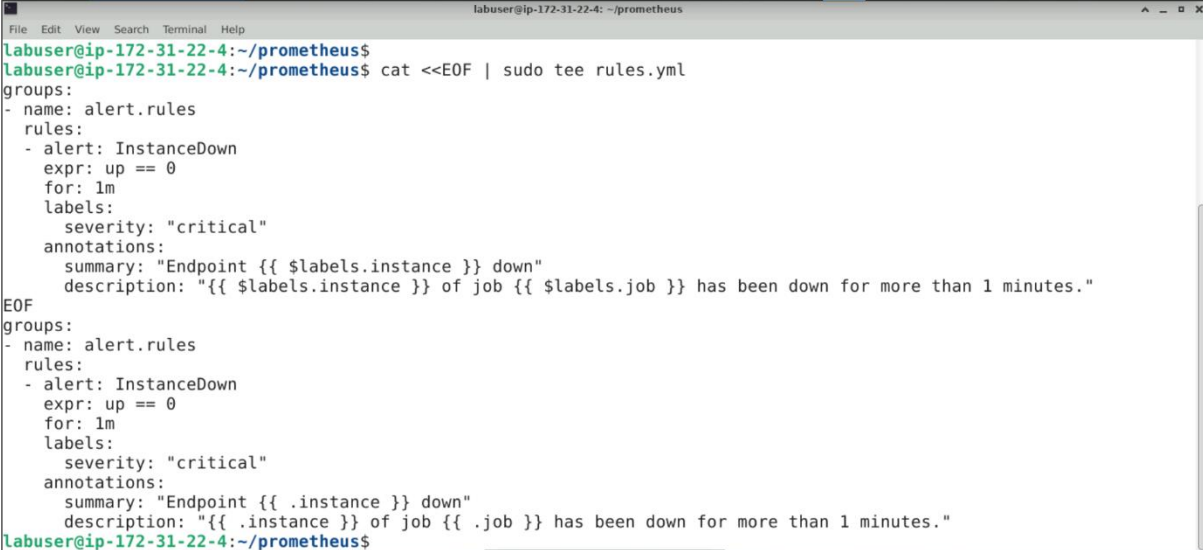
EOF

A terminal window screenshot showing the steps to create the rules.yml file. The user navigates to the prometheus directory and runs 'cat <<EOF | sudo tee rules.yml'. The content of the file is displayed, matching the configuration in the previous block. A red rectangle highlights the command and its output.

```
labuser@ip-172-31-22-4: ~$ cd prometheus
labuser@ip-172-31-22-4: ~/prometheus$
labuser@ip-172-31-22-4: ~/prometheus$ sudo vim prom-alertmanager.yml
labuser@ip-172-31-22-4: ~/prometheus$
labuser@ip-172-31-22-4: ~/prometheus$ cat <<EOF | sudo tee rules.yml
groups:
- name: alert.rules
  rules:
  - alert: InstanceDown
    expr: up == 0
    for: 1m
    labels:
      severity: "critical"
    annotations:
      summary: "Endpoint {{ $labels.instance }} down"
      description: "{{ $labels.instance }} of job {{ $labels.job }} has been down for more than 1 minutes."
EOF
```

Note: Ensure that the **rules.yml** file name is the same as the one mentioned in the **prom-alertmanager.yml** configuration file under **rule_files**. These Prometheus rules trigger alerts by identifying situations and sending notifications to Alertmanager.

After pressing Enter, the file appears as follows:



```
labuser@ip-172-31-22-4: ~/prometheus
File Edit View Search Terminal Help
labuser@ip-172-31-22-4:~/prometheus$
labuser@ip-172-31-22-4:~/prometheus$ cat <<EOF | sudo tee rules.yml
groups:
- name: alert.rules
  rules:
  - alert: InstanceDown
    expr: up == 0
    for: 1m
    labels:
      severity: "critical"
    annotations:
      summary: "Endpoint {{ $labels.instance }} down"
      description: "{{ $labels.instance }} of job {{ $labels.job }} has been down for more than 1 minutes."
EOF
groups:
- name: alert.rules
  rules:
  - alert: InstanceDown
    expr: up == 0
    for: 1m
    labels:
      severity: "critical"
    annotations:
      summary: "Endpoint {{ .instance }} down"
      description: "{{ .instance }} of job {{ .job }} has been down for more than 1 minutes."
labuser@ip-172-31-22-4:~/prometheus$
```

Note: The **EOF** markers are part of the shell command, not the **rules.yml** file. They are used to indicate the start and end of the content being written to the file.

Step 2: Install and configure Alertmanager

2.1 Change the directory and download and install Alertmanager using the following command:

sudo wget

<https://github.com/prometheus/alertmanager/releases/download/v0.27.0/alertmanager-0.27.0.linux-arm64.tar.gz>

```
labuser@ip-172-31-22-4: ~$ sudo wget https://github.com/prometheus/alertmanager/releases/download/v0.27.0/alertmanager-0.27.0.linux-arm64.tar.gz
--2024-09-10 10:43:31-- https://github.com/prometheus/alertmanager/releases/download/v0.27.0/alertmanager-0.27.0.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/11452538/d3d2bee4-7b7c-43fe-beda-30c485d3c43d?X-Amz-Algorithm=AWS4-HMAC-SHA256&X-Amz-Credential=releaseassetproduction%2F20240910%2Fus-east-1%2Fs3%2Faws4_request&X-Amz-Date=20240910T104331Z&X-Amz-Expires=300&X-Amz-Signature=25b4c0a36cbe5d66521f0977ca135873cda7c8527c322be98c97919ce96cb4f9&X-Amz-SignedHeaders=host&actor_id=0&key_id=0&repo_id=11452538&response-content-disposition=attachment%3B%20filename%3Dalertmanager-0.27.0.linux-arm64.tar.gz&response-content-type=application%2Foctet-stream [following]
--2024-09-10 10:43:31-- https://objects.githubusercontent.com/github-production-release-asset-2e65be/11452538/d3d2bee4-7b7c-43fe-beda-30c485d3c43d?X-Amz-Algorithm=AWS4-HMAC-SHA256&X-Amz-Credential=releaseassetproduction%2F20240910%2Fus-east-1%2Fs3%2Faws4_request&X-Amz-Date=20240910T104331Z&X-Amz-Expires=300&X-Amz-Signature=25b4c0a36cbe5d66521f0977ca135873cda7c8527c322be98c97919ce96cb4f9&X-Amz-SignedHeaders=host&actor_id=0&key_id=0&repo_id=11452538&response-content-disposition=attachment%3B%20filename%3Dalertmanager-0.27.0.linux-arm64.tar.gz&response-content-type=application%2Foctet-stream
Resolving objects.githubusercontent.com (objects.githubusercontent.com)... 185.199.108.133, 185.199.111.133, 185.199.109.133, ...
Connecting to objects.githubusercontent.com (objects.githubusercontent.com)|185.199.108.133|:443... connected.
HTTP request sent, awaiting response... 200 OK
Length: 28912418 (28M) [application/octet-stream]
Saving to: 'alertmanager-0.27.0.linux-arm64.tar.gz'

alertmanager-0.27.0.linux-ar 100%[=====] 27.57M 49.2MB/s in 0.6s

2024-09-10 10:43:33 (49.2 MB/s) - 'alertmanager-0.27.0.linux-arm64.tar.gz' saved [28912418/28912418]

labuser@ip-172-31-22-4:~$
```

2.2 Execute the following command to extract the downloaded Alertmanager file:

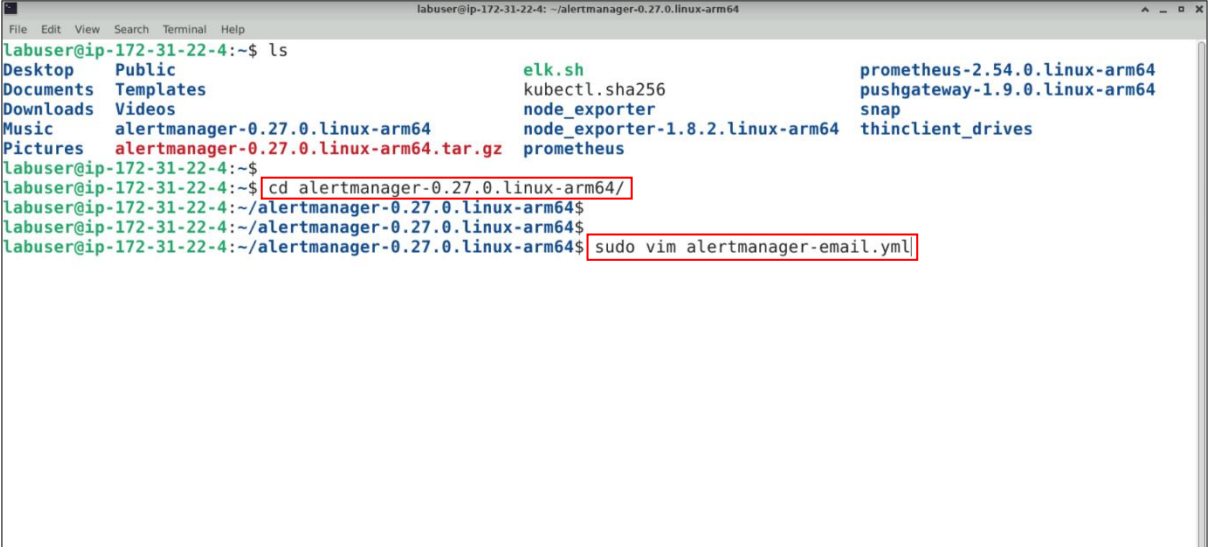
sudo tar xvfz alertmanager-0.27.0.linux-arm64.tar.gz

```
labuser@ip-172-31-22-4: ~$ sudo tar xvfz alertmanager-0.27.0.linux-arm64.tar.gz
alertmanager-0.27.0.linux-arm64/
alertmanager-0.27.0.linux-arm64/alertmanager
alertmanager-0.27.0.linux-arm64/alertmanager.yml
alertmanager-0.27.0.linux-arm64/NOTICE
alertmanager-0.27.0.linux-arm64/amttool
alertmanager-0.27.0.linux-arm64/LICENSE
labuser@ip-172-31-22-4:~$
labuser@ip-172-31-22-4:~$
labuser@ip-172-31-22-4:~$
```

2.3 Change the directory to the Alertmanager folder and create a custom configuration file named **alertmanager-email.yml** using the following commands:

cd alertmanager-0.27.0.linux-arm64/

sudo vim alertmanager-email.yml



```
labuser@ip-172-31-22-4: ~$ ls
Desktop      Public
Documents    Templates
Downloads     Videos
Music         alertmanager-0.27.0.linux-arm64
Pictures      alertmanager-0.27.0.linux-arm64.tar.gz
elk.sh
kubectll.sha256
node_exporter
node_exporter-1.8.2.linux-arm64
prometheus
prometheus-2.54.0.linux-arm64
pushgateway-1.9.0.linux-arm64
snap
thinclient_drives

labuser@ip-172-31-22-4: ~$ cd alertmanager-0.27.0.linux-arm64/
labuser@ip-172-31-22-4: ~/alertmanager-0.27.0.linux-arm64$
labuser@ip-172-31-22-4: ~/alertmanager-0.27.0.linux-arm64$ sudo vim alertmanager-email.yml
```

2.4 Copy and paste the following configuration and save and exit the file:

global:

resolve_timeout: 1m
smtp_smarthost: smtp.gmail.com:587
smtp_from: your-email1@gmail.com
smtp_auth_username: your-email1@gmail.com
smtp_auth_password: <your_gmail_password>
smtp_require_tls: true

templates:

- /etc/alertmanager/template/*.tmpl

route:

group_by:
- alertname
group_wait: 30s
group_interval: 10s
repeat_interval: 1h
receiver: email-notifications

receivers:

- **name:** email-notifications
email_configs:
- **to:** your-email2@gmail.com
send_resolved: true
require_tls: true

inhibit_rules:

- **source_match:**
severity: critical
target_match:
severity: warning
equal:
- alertname
- instance

```
labuser@ip-172-31-22-4: ~/alertmanager-0.27.0.linux-arm64
File Edit View Search Terminal Help
global:
  resolve_timeout: 1m
  smtp_smarthost: smtp.gmail.com:587
  smtp_from: j
  smtp_auth_username:
  smtp_auth_password: <your_gmail_password>
  smtp_require_tls: true
templates:
  - /etc/alertmanager/template/*.tmpl
route:
  group_by:
    - alertname
  group_wait: 30s
  group_interval: 10s
  repeat_interval: 1h
  receiver: email-notifications
receivers:
  - name: email-notifications
    email_configs:
      - to:
        send_resolved: true
        require_tls: true
inhibit_rules:
  - source_match:
      severity: critical
    target_match:
      severity: warning
    equal:
      - alertname
      - instance
```

Note: In this demo, Gmail is used for sending email notifications. The **smtp_from** field represents the sender's and receiver's email ID. Configure the sender's email ID, password, and SMTP settings. In a real-world scenario, your work email will be configured for the same, replace **your-email@gmail.com** with your actual email

2.5 Start Alertmanager in the background using the following command:

sudo ./alertmanager --config.file alertmanager-email.yml > /dev/null 2>&1 &

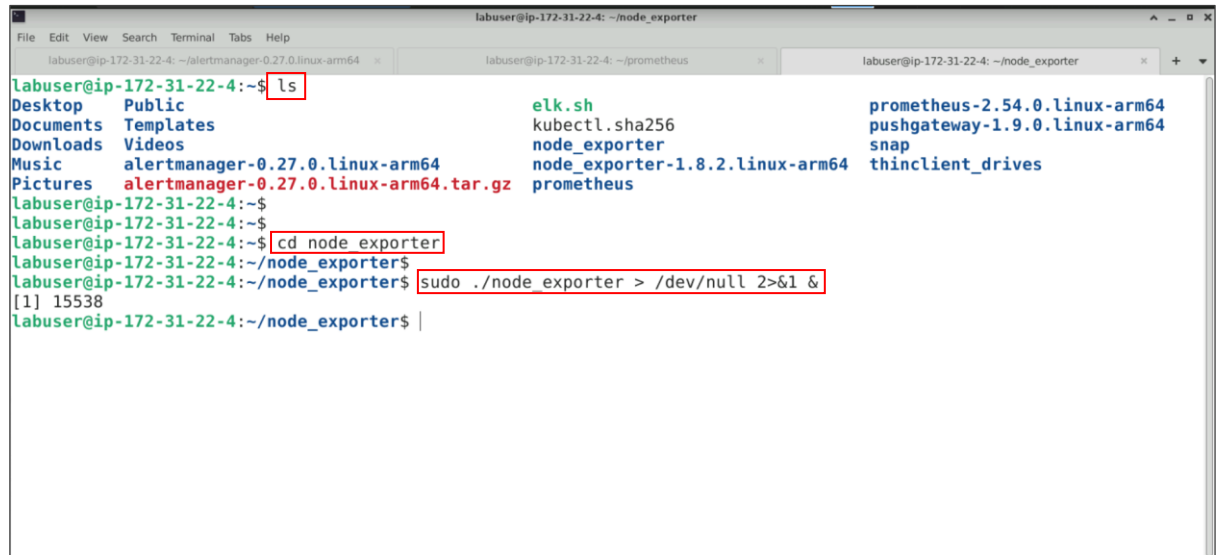
```
labuser@ip-172-31-22-4: ~/alertmanager-0.27.0.linux-arm64
File Edit View Search Terminal Help
labuser@ip-172-31-22-4:~$ ls
Desktop      Public      elk.sh      prometheus-2.54.0.linux-arm64
Documents    Templates   kubectl.sha256  pushgateway-1.9.0.linux-arm64
Downloads    Videos     node_exporter  snap
Music        alertmanager-0.27.0.linux-arm64  node_exporter-1.8.2.linux-arm64  thinclient_drives
Pictures     alertmanager-0.27.0.linux-arm64.tar.gz  prometheus

labuser@ip-172-31-22-4:~$
labuser@ip-172-31-22-4:~$ cd alertmanager-0.27.0.linux-arm64/
labuser@ip-172-31-22-4:~/alertmanager-0.27.0.linux-arm64$
labuser@ip-172-31-22-4:~/alertmanager-0.27.0.linux-arm64$
labuser@ip-172-31-22-4:~/alertmanager-0.27.0.linux-arm64$ sudo vim alertmanager-email.yml
labuser@ip-172-31-22-4:~/alertmanager-0.27.0.linux-arm64$
labuser@ip-172-31-22-4:~/alertmanager-0.27.0.linux-arm64$ sudo ./alertmanager --config.file alertmanager-email.yml > /dev/null 2>&1 &
[1] 5393
labuser@ip-172-31-22-4:~/alertmanager-0.27.0.linux-arm64$ |
```


Step 3: Start Node Exporter and Prometheus

3.1 Execute the following commands to change the directory to **node_exporters** and start it in the background:

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



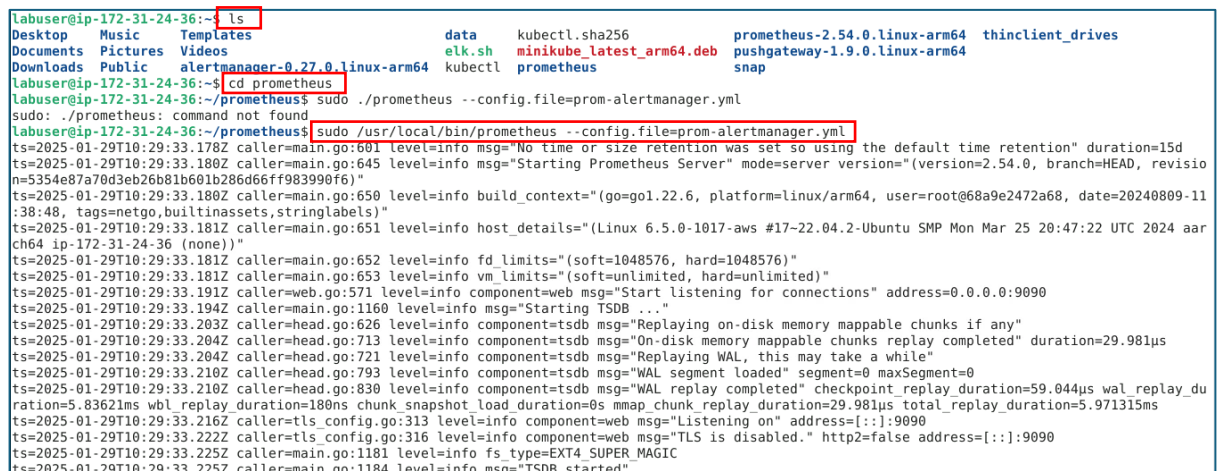
A terminal window titled 'labuser@ip-172-31-22-4: ~/node_exporter' showing the following commands and output:

```
labuser@ip-172-31-22-4:~$ ls
Desktop  Public                               elk.sh                               prometheus-2.54.0.linux-arm64
Documents Templates                         kubectll.sha256                     pushgateway-1.9.0.linux-arm64
Downloads Videos                     node_exporter                       snap
Music    alertmanager-0.27.0.linux-arm64     node_exporter-1.8.2.linux-arm64    thinclient_drives
Pictures alertmanager-0.27.0.linux-arm64.tar.gz prometheus

labuser@ip-172-31-22-4:~$
labuser@ip-172-31-22-4:~$
labuser@ip-172-31-22-4:~$ cd node_exporter
labuser@ip-172-31-22-4:~/node_exporter$
labuser@ip-172-31-22-4:~/node_exporter$ sudo ./node_exporter > /dev/null 2>&1 &
[1] 15538
labuser@ip-172-31-22-4:~/node_exporter$ |
```

3.2 Change the directory and run the following commands to start Prometheus UI:

```
ls
cd prometheus
sudo /usr/local/bin/prometheus --config.file=prom-alertmanager.yml
```



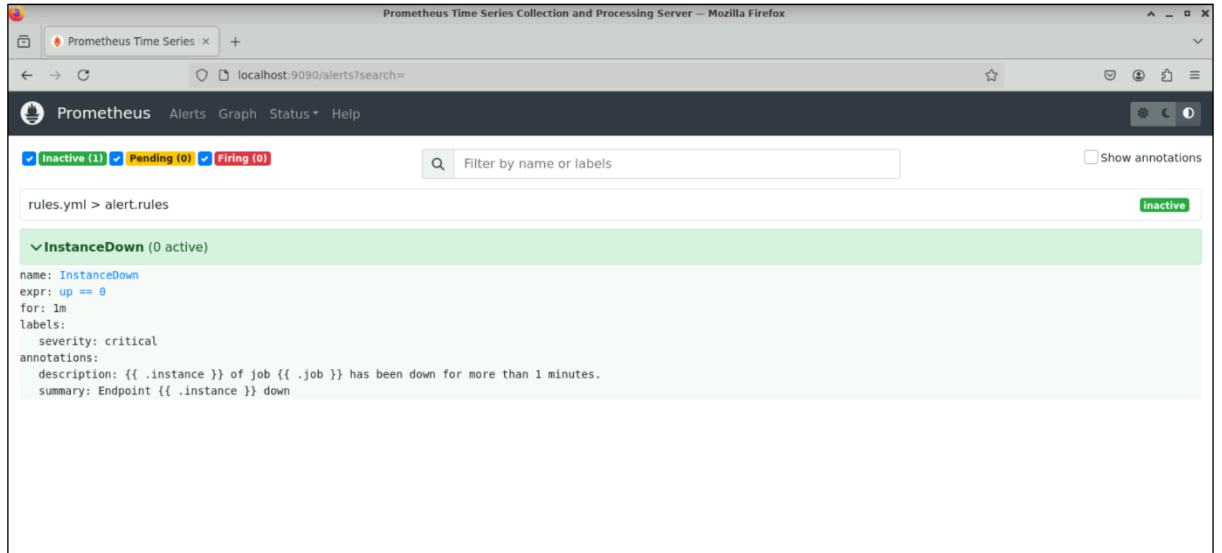
A terminal window titled 'labuser@ip-172-31-24-36: ~' showing the following commands and output:

```
labuser@ip-172-31-24-36:~$ ls
Desktop  Music  Templates  data  kubectll.sha256  prometheus-2.54.0.linux-arm64  thinclient_drives
Documents Pictures Videos  elk.sh  minikube_latest_arm64.deb  pushgateway-1.9.0.linux-arm64
Downloads Public  alertmanager-0.27.0.linux-arm64  kubectll  prometheus  snap

labuser@ip-172-31-24-36:~$ cd prometheus
labuser@ip-172-31-24-36:~/prometheus$ sudo ./prometheus --config.file=prom-alertmanager.yml
labuser@ip-172-31-24-36:~/prometheus$ sudo /usr/local/bin/prometheus --config.file=prom-alertmanager.yml
ts=2025-01-29T10:29:33.178Z caller=main.go:601 level=info msg="No time or size retention was set so using the default time retention" duration=15d
ts=2025-01-29T10:29:33.180Z caller=main.go:645 level=info msg="Starting Prometheus Server" mode=server version="(version=2.54.0, branch=HEAD, revision=5354e87a70d3eb26b81b601b286d66ff983990f6)"
ts=2025-01-29T10:29:33.180Z caller=main.go:650 level=info build_context="(go=go1.22.6, platform=linux/arm64, user=root@68a9e2472a68, date=20240809-11:38:48, tags=netgo,builtinassets,stringlabels)"
ts=2025-01-29T10:29:33.181Z 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-172-31-24-36 (none))"
ts=2025-01-29T10:29:33.181Z caller=main.go:652 level=info fd_limits="(soft=1048576, hard=1048576)"
ts=2025-01-29T10:29:33.181Z caller=main.go:653 level=info vm_limits="(soft=unlimited, hard=unlimited)"
ts=2025-01-29T10:29:33.191Z caller=web.go:571 level=info component=web msg="Start listening for connections" address=0.0.0.0:9090
ts=2025-01-29T10:29:33.194Z caller=main.go:1160 level=info msg="Starting TSDB ..."
ts=2025-01-29T10:29:33.203Z caller=head.go:626 level=info component=tsdb msg="Replaying on-disk memory mappable chunks if any"
ts=2025-01-29T10:29:33.204Z caller=head.go:713 level=info component=tsdb msg="On-disk memory mappable chunks replay completed" duration=29.981µs
ts=2025-01-29T10:29:33.204Z caller=head.go:721 level=info component=tsdb msg="Replaying WAL, this may take a while"
ts=2025-01-29T10:29:33.210Z caller=head.go:793 level=info component=tsdb msg="WAL segment loaded" segment=0 maxSegment=0
ts=2025-01-29T10:29:33.210Z caller=head.go:830 level=info component=tsdb msg="WAL replay completed" checkpoint_replay_duration=59.044µs wal_replay_duration=5.83621ms wbl_replay_duration=180ns chunk_snapshot_load_duration=0s mmap_chunk_replay_duration=29.981µs total_replay_duration=5.971315ms
ts=2025-01-29T10:29:33.216Z caller=tls_config.go:313 level=info component=web msg="Listening on" address=[::]:9090
ts=2025-01-29T10:29:33.222Z caller=tls_config.go:316 level=info component=web msg="TLS is disabled." http2=false address=[::]:9090
ts=2025-01-29T10:29:33.225Z caller=main.go:1184 level=info msg="TSDB started"
```

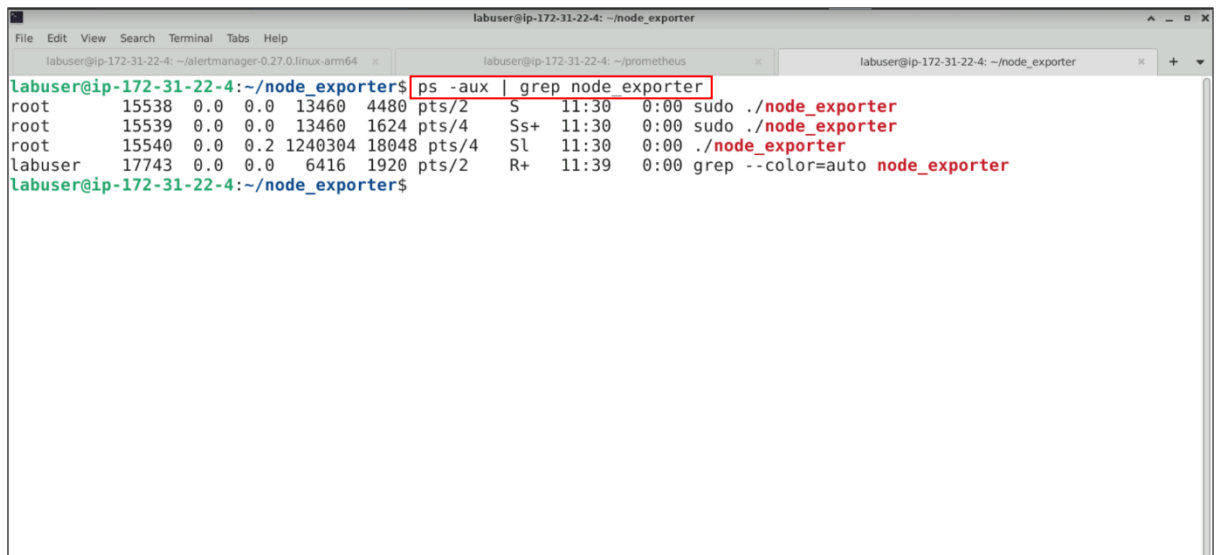
Step 4: Review Alertmanager settings via the Prometheus UI

4.1 Review Alertmanager settings through the Prometheus UI by entering the URL <http://localhost:9090/alerts> in the browser as shown:



4.2 Navigate to the terminal and stop the Node Exporter process using the following command:

`ps -aux | grep node_exporter`

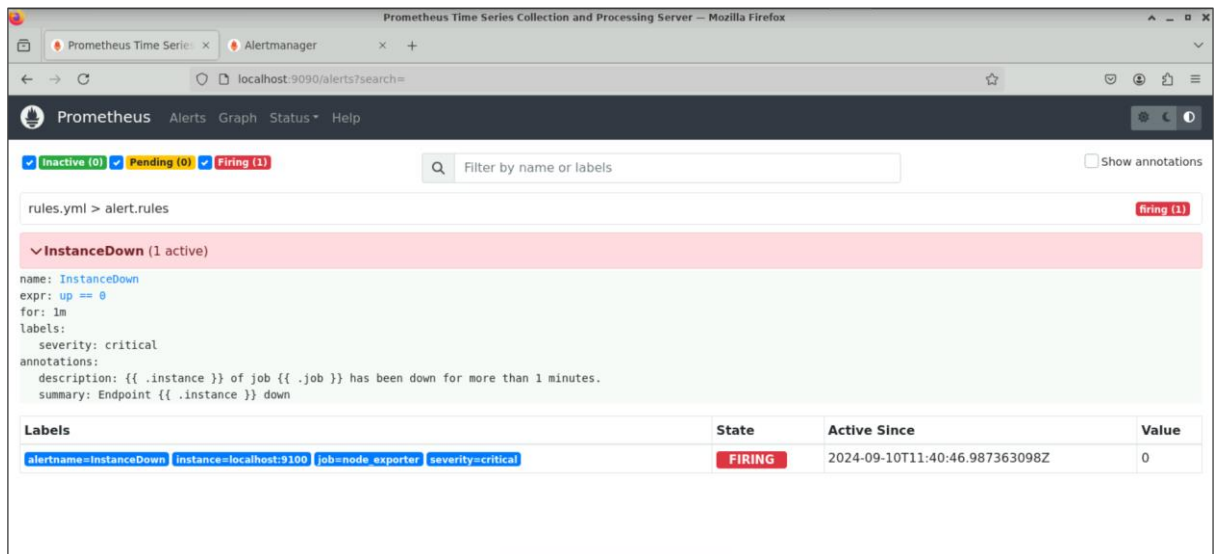


4.3 Run the following command to kill the Node Exporter:

sudo kill <PID of node_exporter>

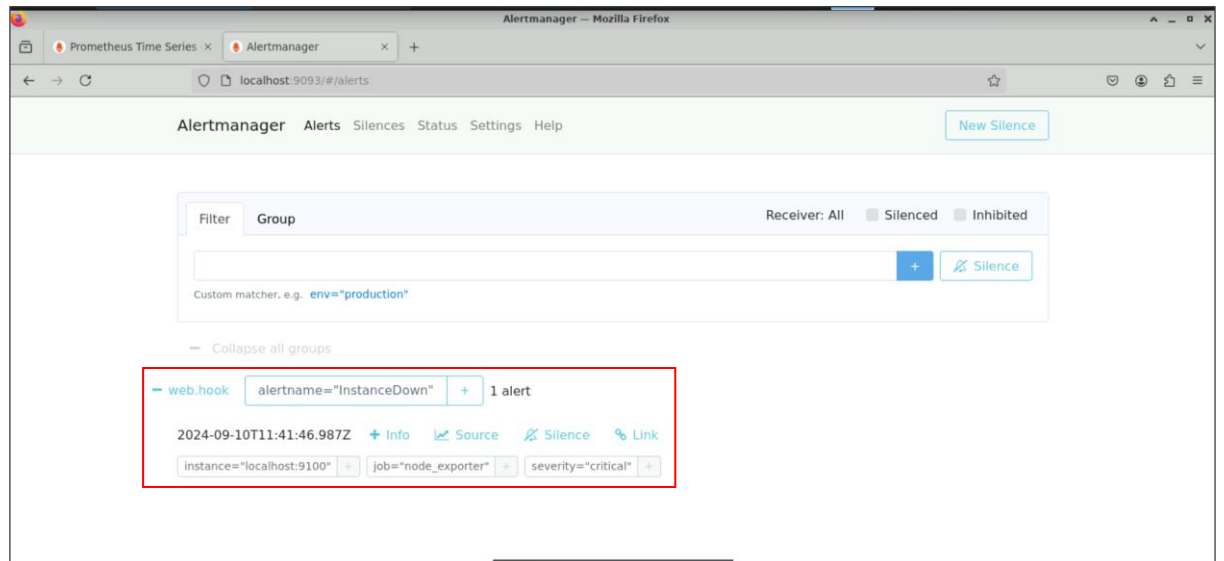
```
labuser@ip-172-31-22-4: ~/node_exporter
labuser@ip-172-31-22-4: ~/node_exporter$ ps -aux | grep node_exporter
root      15538  0.0  0.0 13460 4480 pts/2    S   11:30   0:00 sudo ./node_exporter
root      15539  0.0  0.0 13460 1624 pts/4    Ss+ 11:30   0:00 sudo ./node_exporter
root      15540  0.0  0.2 1240304 18048 pts/4    Sl  11:30   0:00 ./node_exporter
labuser   17743  0.0  0.0  6416 1920 pts/2    R+  11:39   0:00 grep --color=auto node_exporter
labuser@ip-172-31-22-4: ~/node_exporter$ sudo kill 15540
[1]+  Terminated                  sudo ./node_exporter > /dev/null 2>&1
labuser@ip-172-31-22-4: ~/node_exporter$
labuser@ip-172-31-22-4: ~/node_exporter$
labuser@ip-172-31-22-4: ~/node_exporter$
labuser@ip-172-31-22-4: ~/node_exporter$
labuser@ip-172-31-22-4: ~/node_exporter$
labuser@ip-172-31-22-4: ~/node_exporter$
labuser@ip-172-31-22-4: ~/node_exporter$
labuser@ip-172-31-22-4: ~/node_exporter$
labuser@ip-172-31-22-4: ~/node_exporter$
labuser@ip-172-31-22-4: ~/node_exporter$
labuser@ip-172-31-22-4: ~/node_exporter$
labuser@ip-172-31-22-4: ~/node_exporter$
labuser@ip-172-31-22-4: ~/node_exporter$
labuser@ip-172-31-22-4: ~/node_exporter$
labuser@ip-172-31-22-4: ~/node_exporter$
labuser@ip-172-31-22-4: ~/node_exporter$
labuser@ip-172-31-22-4: ~/node_exporter$
```

4.4 Go to the browser, refresh the Prometheus UI, and observe that the **InstanceDown** status has changed from **0 active** to **1 active**, causing the alert to fire



Note: To verify the rules and configurations, the Node Exporter process will be stopped manually to emulate an Instance Down issue.

4.5 Open a new tab in the browser and enter the URL **http://localhost:9093** to see the same status on the Alertmanager UI as follows:



By following these steps, you have successfully set up Alertmanager for email notifications, configured Prometheus to send alerts to Alertmanager, and validated the alerting setup by testing alert triggers and checking the notification system.