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Course/Section: CPE232/ CPE31S6	**Date Submitted:** 10/19/23
Instructor: Dr. Jonathan V. Taylar	**Semester and SY:** 1st Sem(2023-2024)

Activity 9: Install, Configure, and Manage Performance Monitoring tools

1. Objectives

Create and design a workflow that installs, configure and manage enterprise performance tools using Ansible as an Infrastructure as Code (IaC) tool.

2. Discussion

Performance monitoring is a type of monitoring tool that identifies current resource consumption of the workload, in this page we will discuss multiple performance monitoring tool.

Prometheus

Prometheus fundamentally stores all data as timeseries: streams of timestamped values belonging to the same metric and the same set of labeled dimensions. Besides stored time series, Prometheus may generate temporary derived time series as the result of queries. Source: Prometheus - Monitoring system & time series database

Cacti

Cacti is a complete network graphing solution designed to harness the power of RRDTool's data storage and graphing functionality. Cacti provides a fast poller, advanced graph templating, multiple data acquisition methods, and user management features out of the box. All of this is wrapped in an intuitive, easy to use interface that makes sense for LAN-sized installations up to complex networks with thousands of devices. Source: Cacti® - The Complete RRDTool-based Graphing Solution

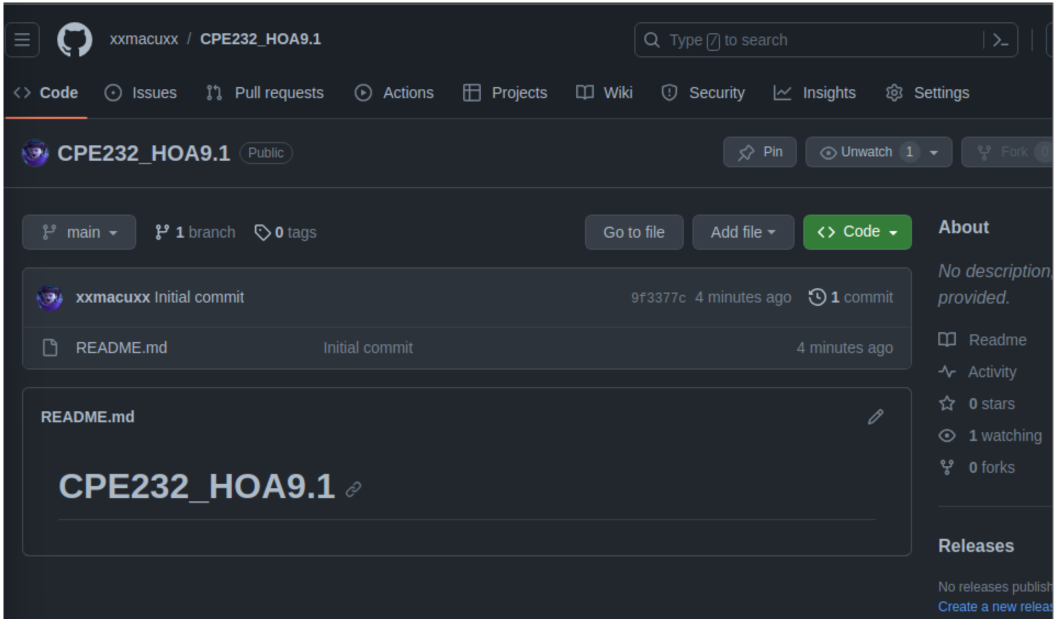
3. Tasks

1. Create a playbook that installs Prometheus in both Ubuntu and CentOS. Apply the concept of creating roles.
2. Describe how you did step 1. (Provide screenshots and explanations in your report. Make your report detailed such that it will look like a manual.)
3. Show an output of the installed Prometheus for both Ubuntu and CentOS.
4. Make sure to create a new repository in GitHub for this activity.

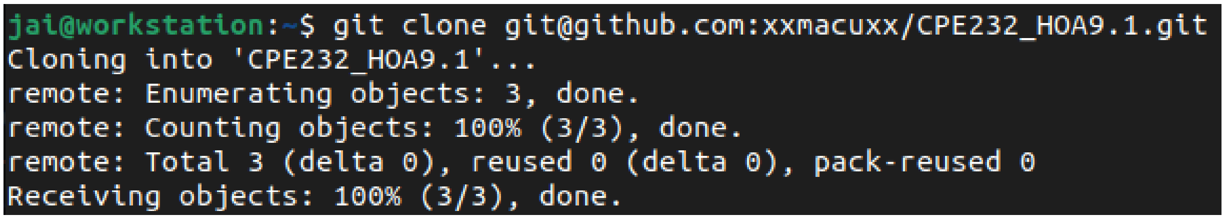
4. Output (screenshots and explanations)

Task 1: Create a File

1. Create a new repository for this Hands-On Activity.

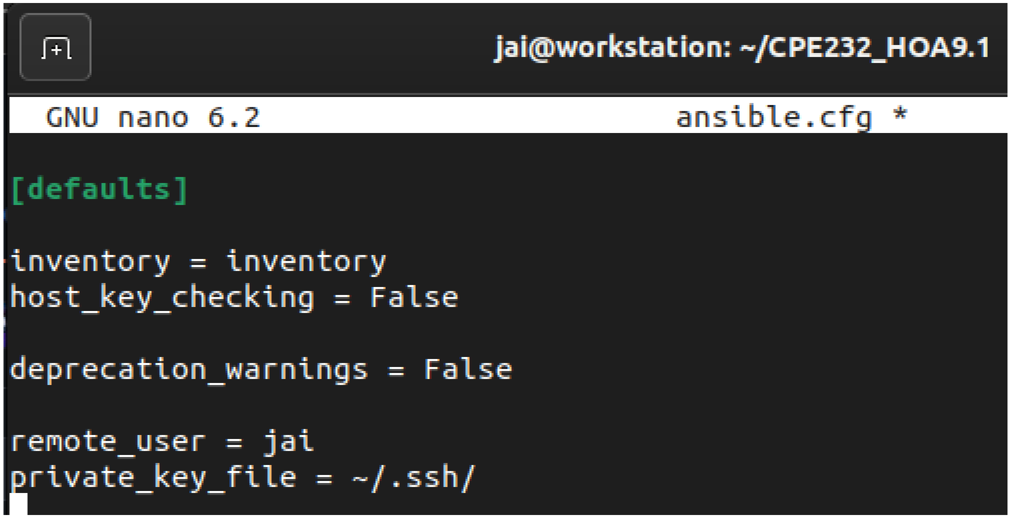


2. Clone the repository to the local machine.

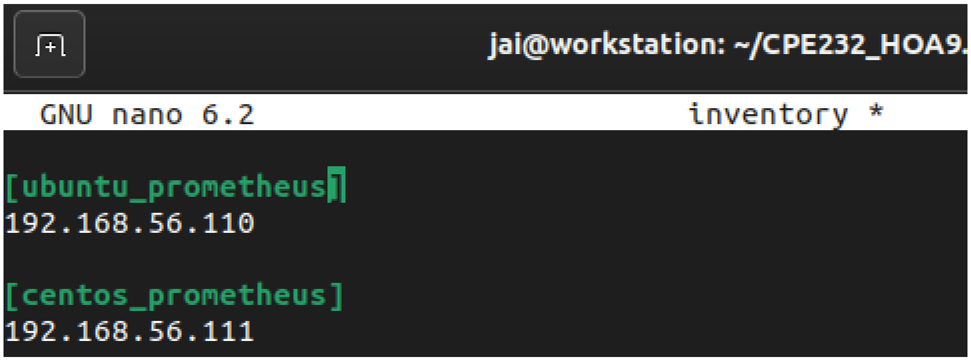


```
jai@workstation:~$ git clone git@github.com:xxmacuxx/CPE232_HOA9.1.git
Cloning into 'CPE232_HOA9.1'...
remote: Enumerating objects: 3, done.
remote: Counting objects: 100% (3/3), done.
remote: Total 3 (delta 0), reused 0 (delta 0), pack-reused 0
Receiving objects: 100% (3/3), done.
```

3. Create the ansible.cfg and inventory file (*must include one Ubuntu and CentOS*)



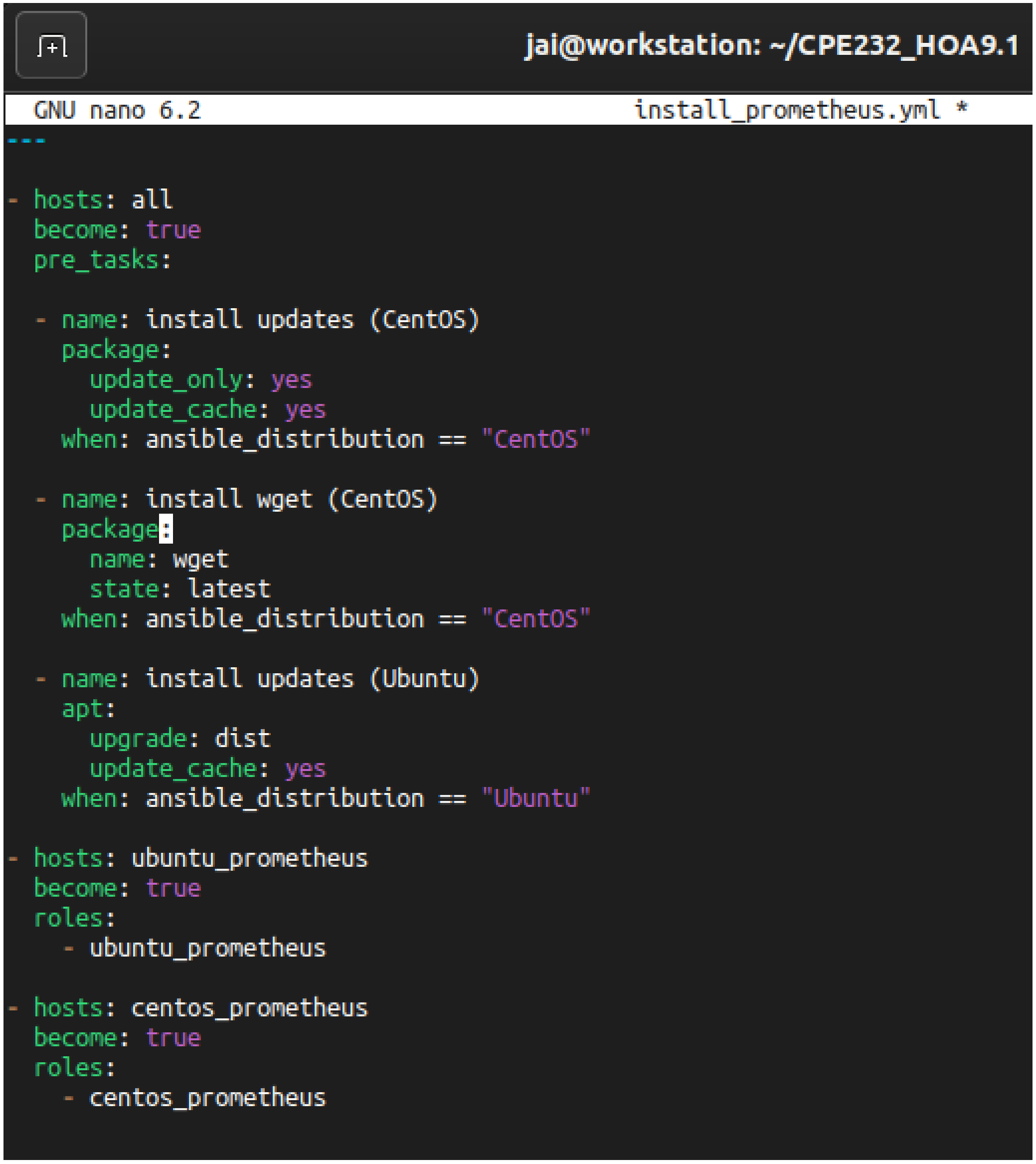
```
  GNU nano 6.2                              ansible.cfg *

[defaults]

inventory = inventory
host_key_checking = False

deprecation_warnings = False

remote_user = jai
private_key_file = ~/.ssh/
```



```
  GNU nano 6.2                              inventory *

[ubuntu_prometheus]
192.168.56.110

[centos_prometheus]
192.168.56.111
```

Task 2: Create Playbook for Installing Prometheus in Ubuntu and CentOS

1. Create a playbook and name it install_prometheus.yml.



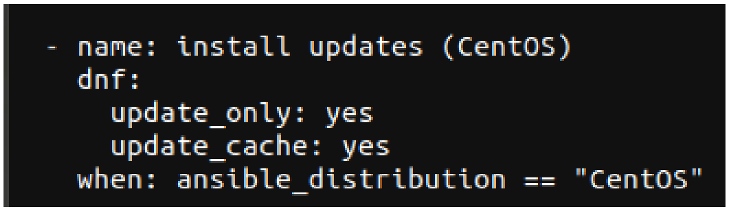
jai@workstation: ~/CPE232_HOA9.1

GNU nano 6.2   install_prometheus.yml *

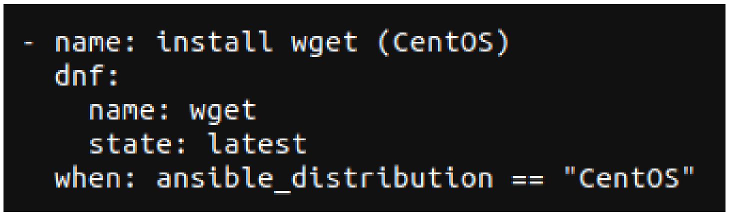
```yaml
---

- hosts: all
  become: true
  pre_tasks:

  - name: install updates (CentOS)
    package:
      update_only: yes
      update_cache: yes
    when: ansible_distribution == "CentOS"

  - name: install wget (CentOS)
    package:
      name: wget
      state: latest
    when: ansible_distribution == "CentOS"

  - name: install updates (Ubuntu)
    apt:
      upgrade: dist
      update_cache: yes
    when: ansible_distribution == "Ubuntu"

- hosts: ubuntu_prometheus
  become: true
  roles:
    - ubuntu_prometheus

- hosts: centos_prometheus
  become: true
  roles:
    - centos_prometheus
```

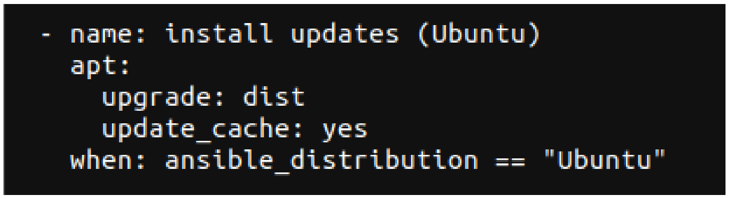
Code explanation:

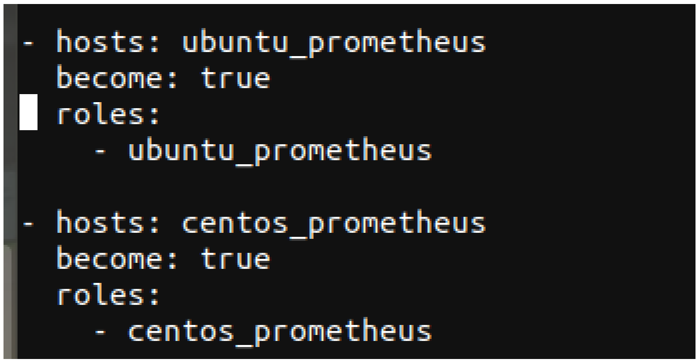
It refreshes the package cache (update_cache) as well as updtes only the installed packages (update_only). This task runs when the trget system is CentOS in order to make sure thatCentOS servers stay updated wth the latest package updates.



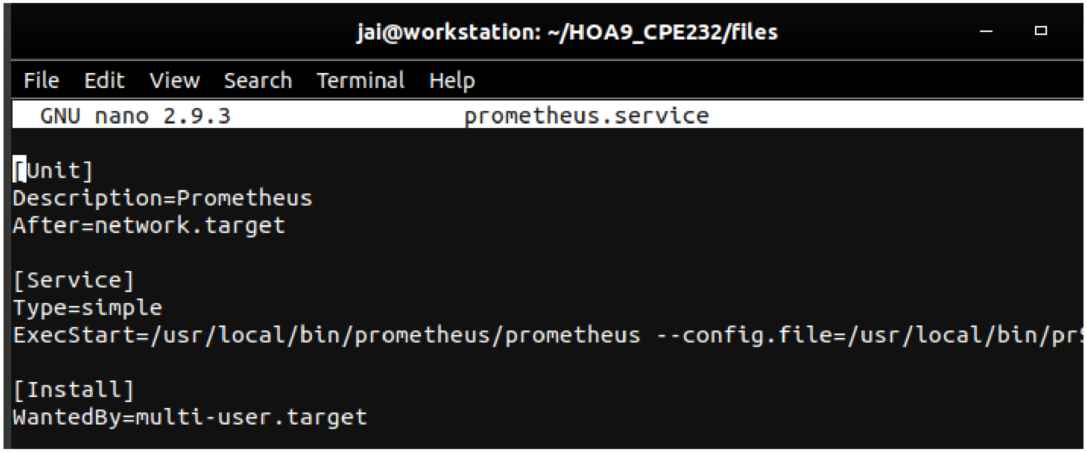
```yaml
  - name: install updates (CentOS)
    dnf:
      update_only: yes
      update_cache: yes
    when: ansible_distribution == "CentOS"
```

This code installs the 'wget' package on CentOS systems using Ansible. It checks if the target system is running CentOS and, if so, ensures that 'wget' is up to date, allowing users to easily download files from the internet with the 'wget' command.	
	`- name: install wget (CentOS)`
	`  dnf:`
	`    name: wget`
	`    state: latest`
	`  when: ansible_distribution == "CentOS"`

It upgrades all packages to their latest versions (upgrade: dist) and refreshes the package cache (update_cache). This task runs only when the target system is Ubuntu in order to make sure tht Ubuntu servers are kept updated with the latest package updates.	
	`  - name: install updates (Ubuntu)`
	`    apt:`
	`      upgrade: dist`
	`      update_cache: yes`
	`    when: ansible_distribution == "Ubuntu"`

It uses roles and the playbook first installs in Ubuntu and then in CentOS which allws Nagios monitoring on both. The "become: true" option grants administrative privileges to execute tasks.	
	`- hosts: ubuntu_prometheus`
	`  become: true`
	`  roles:`
	`    - ubuntu_prometheus`
	
	`- hosts: centos_prometheus`
	`  become: true`
	`  roles:`
	`    - centos_prometheus`

2. Create also a directory called Files and inside of it, create a file called “*prometheus.service*”

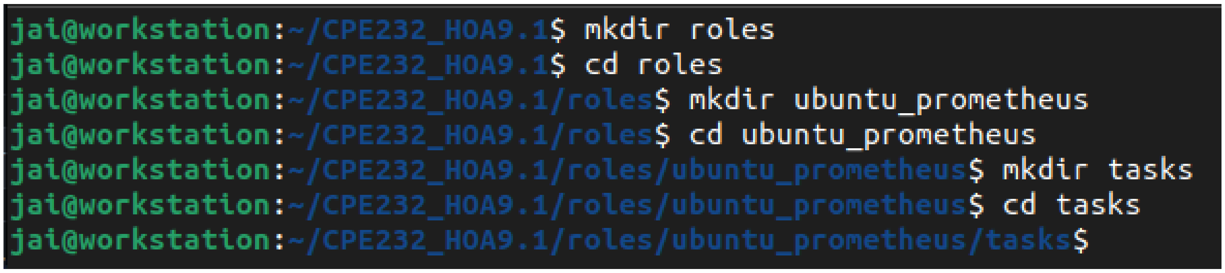

jai@workstation: ~/HOA9_CPE232/files
File Edit View Search Terminal Help

```
  GNU nano 2.9.3                   prometheus.service

[Unit]
Description=Prometheus
After=network.target

[Service]
Type=simple
ExecStart=/usr/local/bin/prometheus/prometheus --config.file=/usr/local/bin/pr$

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

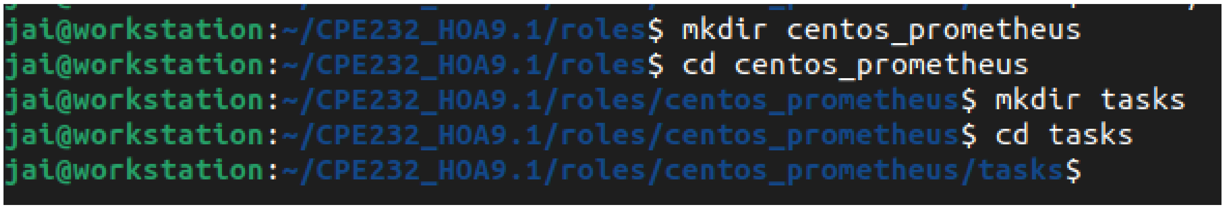
3. Save the file and exit.

Task 3: Create Roles

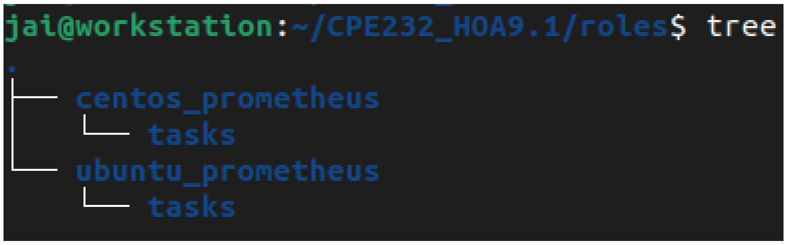
1. Create a new directory and name it roles. Enter the roles directory and create new directories: centos_prometheus and ubuntu_prometheus. For each directory, create a directory and name it tasks.



```
jai@workstation:~/CPE232_HOA9.1$ mkdir roles
jai@workstation:~/CPE232_HOA9.1$ cd roles
jai@workstation:~/CPE232_HOA9.1/roles$ mkdir ubuntu_prometheus
jai@workstation:~/CPE232_HOA9.1/roles$ cd ubuntu_prometheus
jai@workstation:~/CPE232_HOA9.1/roles/ubuntu_prometheus$ mkdir tasks
jai@workstation:~/CPE232_HOA9.1/roles/ubuntu_prometheus$ cd tasks
jai@workstation:~/CPE232_HOA9.1/roles/ubuntu_prometheus/tasks$
```

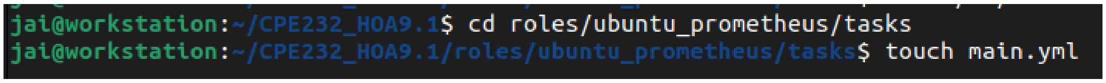


```
jai@workstation:~/CPE232_HOA9.1/roles$ mkdir centos_prometheus
jai@workstation:~/CPE232_HOA9.1/roles$ cd centos_prometheus
jai@workstation:~/CPE232_HOA9.1/roles/centos_prometheus$ mkdir tasks
jai@workstation:~/CPE232_HOA9.1/roles/centos_prometheus$ cd tasks
jai@workstation:~/CPE232_HOA9.1/roles/centos_prometheus/tasks$
```

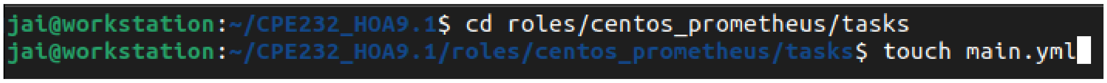


```
jai@workstation:~/CPE232_HOA9.1/roles$ tree
.
├── centos_prometheus
│   └── tasks
└── ubuntu_prometheus
    └── tasks
```

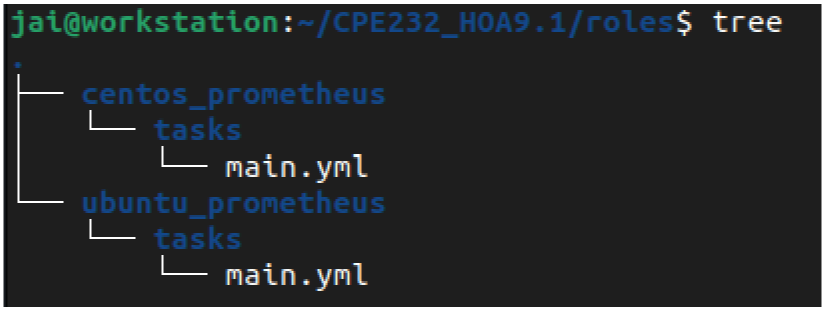
2. In each of the tasks for the two directory (*centos_prometheus andubuntu_prometheus),* create another file and name it main.yml.



```
jai@workstation:~/CPE232_HOA9.1$ cd roles/ubuntu_prometheus/tasks
jai@workstation:~/CPE232_HOA9.1/roles/ubuntu_prometheus/tasks$ touch main.yml
```

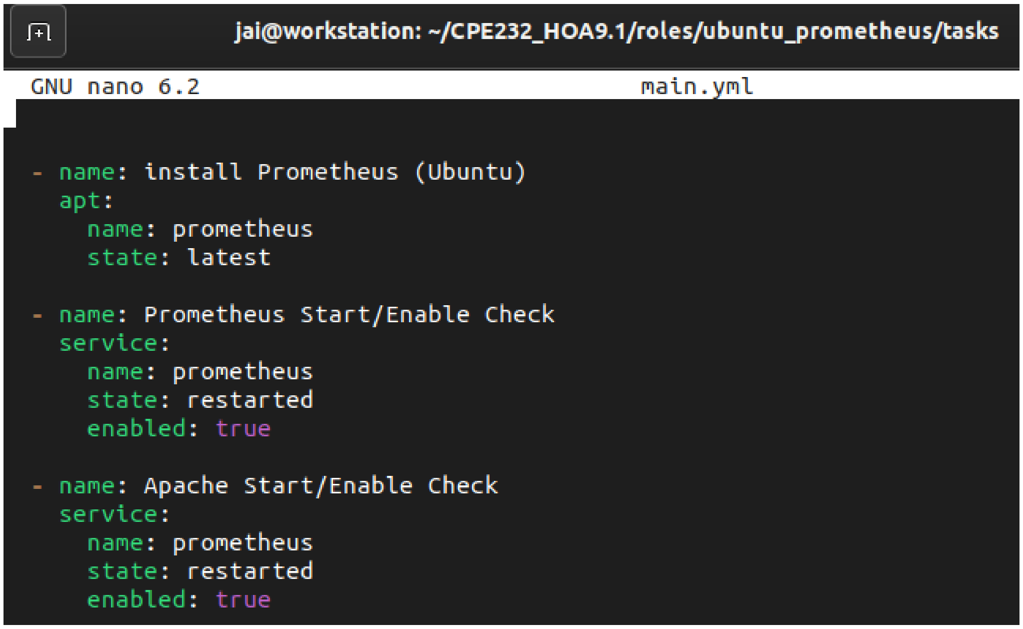


```
jai@workstation:~/CPE232_HOA9.1$ cd roles/centos_prometheus/tasks
jai@workstation:~/CPE232_HOA9.1/roles/centos_prometheus/tasks$ touch main.yml
```



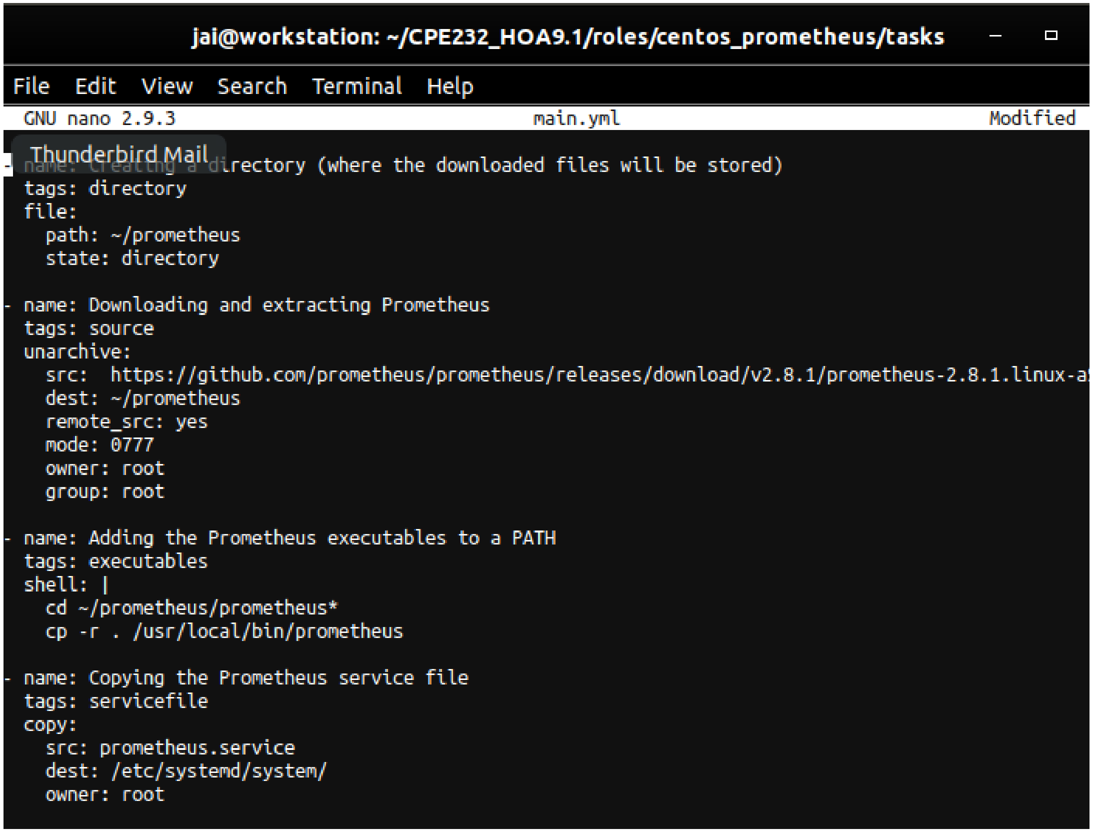
```
jai@workstation:~/CPE232_HOA9.1/roles$ tree
.
├── centos_prometheus
│   └── tasks
│       └── main.yml
└── ubuntu_prometheus
    └── tasks
        └── main.yml
```

3. Copy the code to the main.yml of the Ubuntu subdirectory.

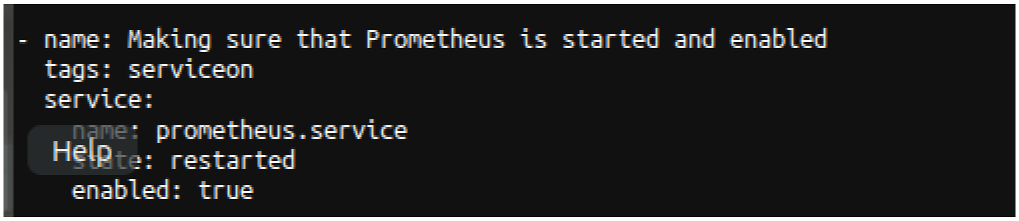


```
jai@workstation: ~/CPE232_HOA9.1/roles/ubuntu_prometheus/tasks

  GNU nano 6.2                                 main.yml


- name: install Prometheus (Ubuntu)
  apt:
    name: prometheus
    state: latest

- name: Prometheus Start/Enable Check
  service:
    name: prometheus
    state: restarted
    enabled: true

- name: Apache Start/Enable Check
  service:
    name: prometheus
    state: restarted
    enabled: true
```

4. Copy the code to the main.yml of the CentOS subdirectory.


jai@workstation: ~/CPE232_HOA9.1/roles/centos_prometheus/tasks
File Edit View Search Terminal Help
Thunderbird Mail

```
  GNU nano 2.9.3                          main.yml                         Modified

- name: Creating a directory (where the downloaded files will be stored)
  tags: directory
  file:
    path: ~/prometheus
    state: directory

- name: Downloading and extracting Prometheus
  tags: source
  unarchive:
    src:  https://github.com/prometheus/prometheus/releases/download/v2.8.1/prometheus-2.8.1.linux-a
    dest: ~/prometheus
    remote_src: yes
    mode: 0777
    owner: root
    group: root

- name: Adding the Prometheus executables to a PATH
  tags: executables
  shell: |
    cd ~/prometheus/prometheus*
    cp -r . /usr/local/bin/prometheus

- name: Copying the Prometheus service file
  tags: servicefile
  copy:
    src: prometheus.service
    dest: /etc/systemd/system/
    owner: root
```

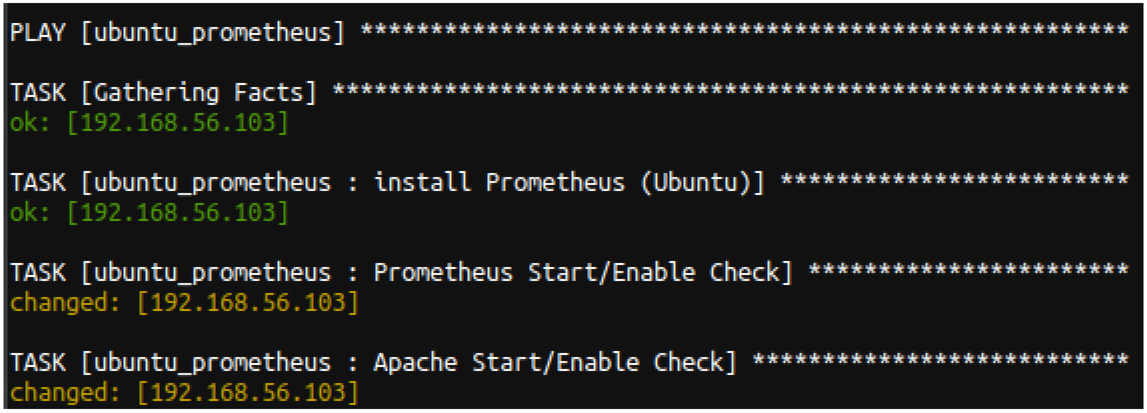


```
- name: Making sure that Prometheus is started and enabled
  tags: serviceon
  service:
    name: prometheus.service
    state: restarted
    enabled: true
```

Task 4: Run and Verify

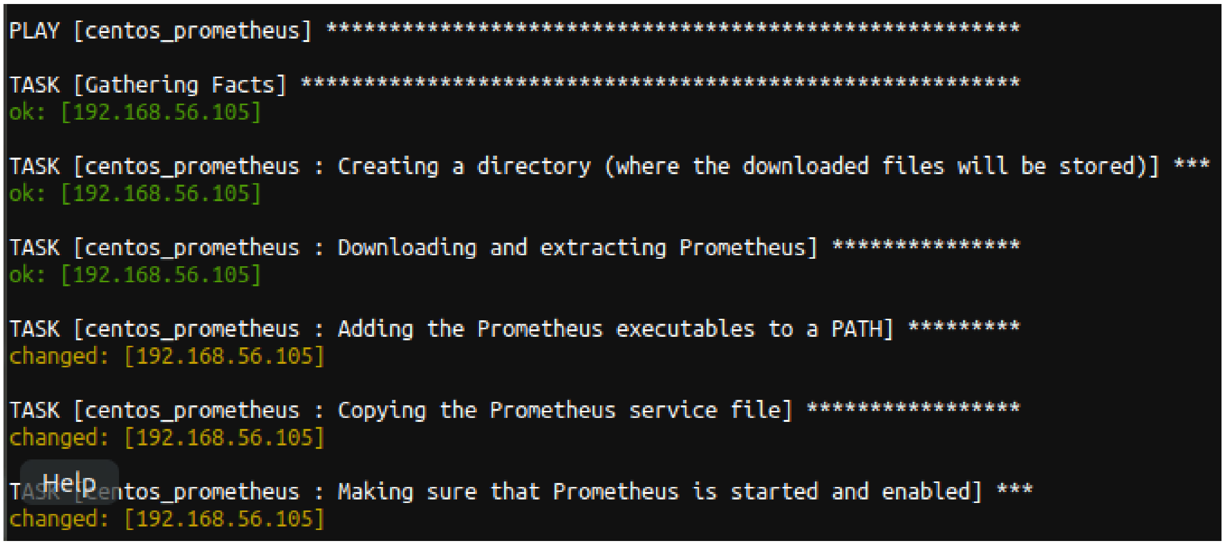
1. Run the command ansible-playbook - - ask-become-pass install_prometheus.yml to completely install prometheus in both Ubuntu server and CentOS.

UBUNTU_PROMETHEUS



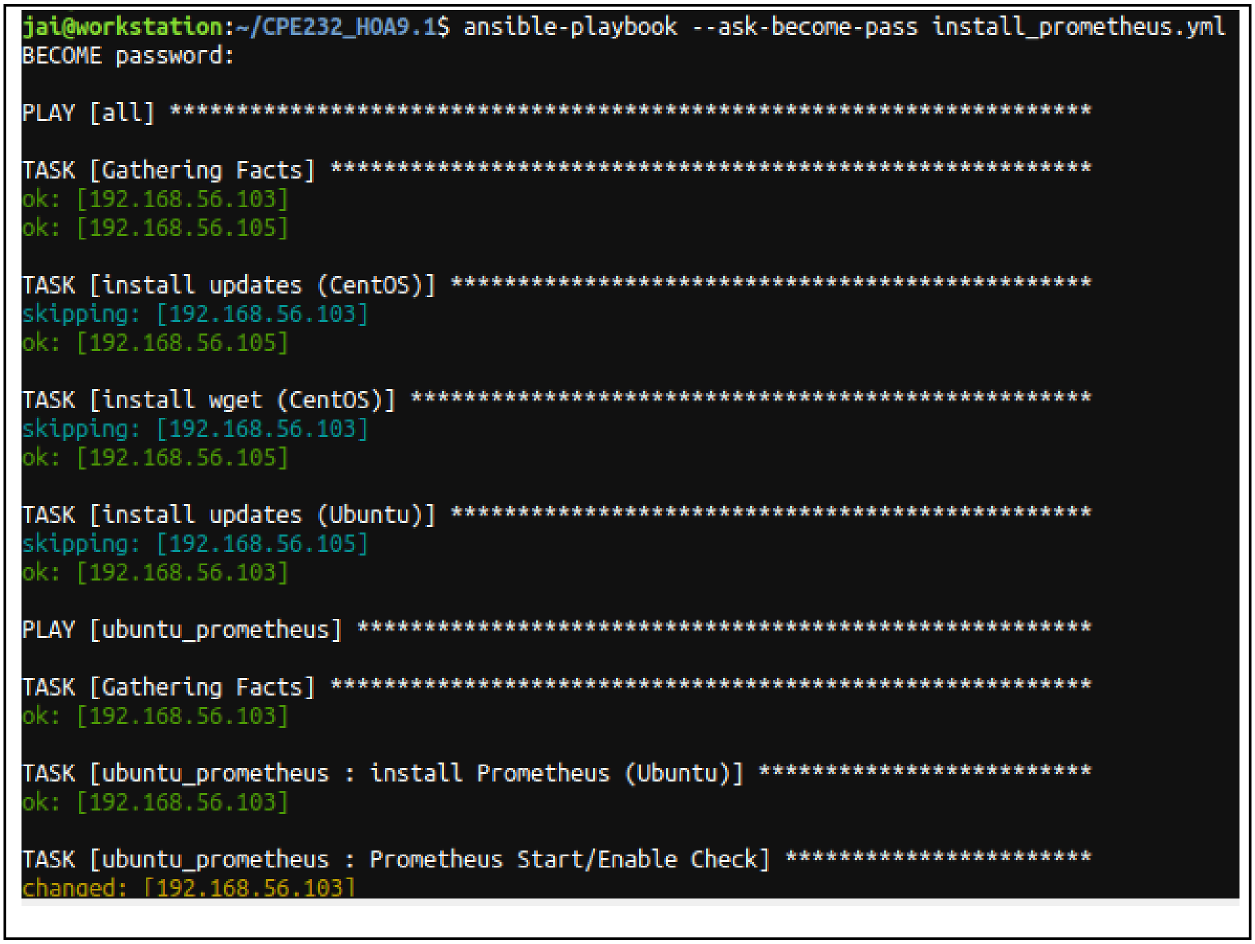
```
PLAY [ubuntu_prometheus] *******************************************************

TASK [Gathering Facts] *********************************************************
ok: [192.168.56.103]

TASK [ubuntu_prometheus : install Prometheus (Ubuntu)] *************************
ok: [192.168.56.103]

TASK [ubuntu_prometheus : Prometheus Start/Enable Check] ***********************
changed: [192.168.56.103]

TASK [ubuntu_prometheus : Apache Start/Enable Check] ***************************
changed: [192.168.56.103]
```

CENTOS_PROMETHEUS

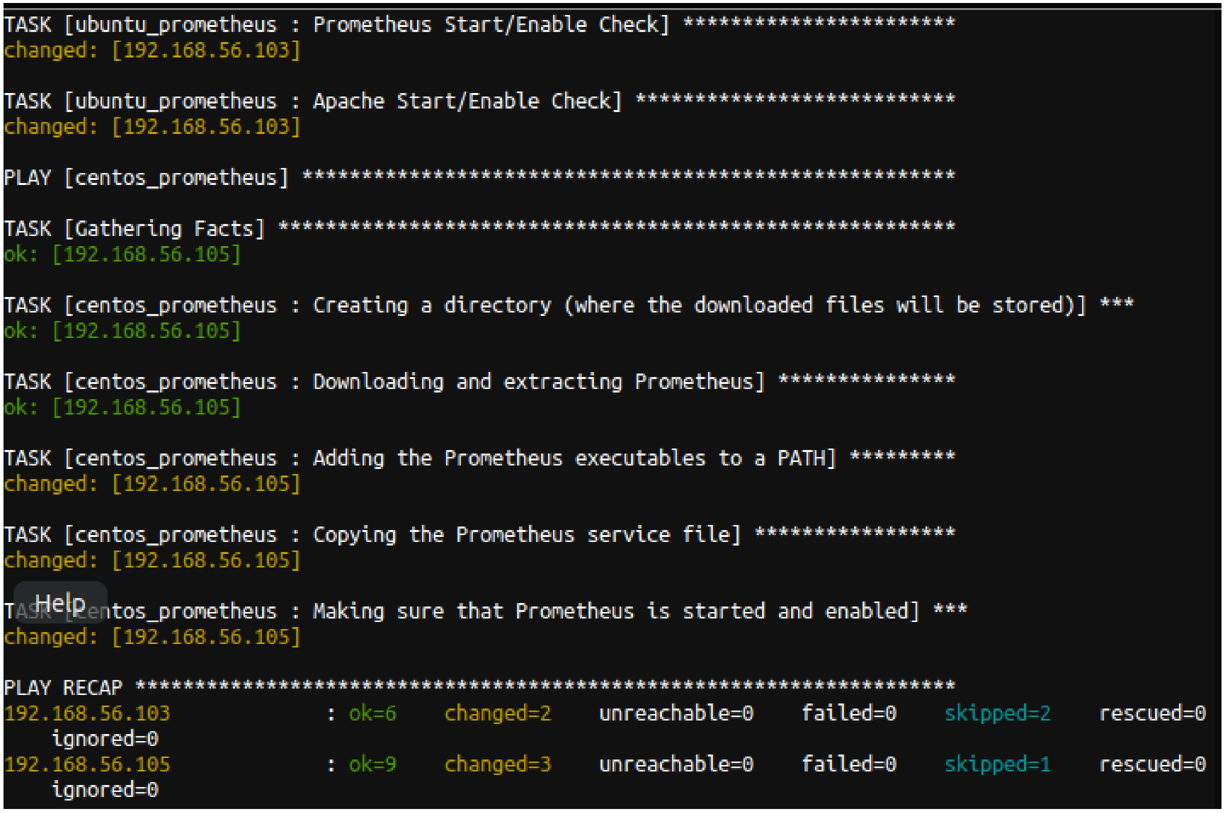


```
PLAY [centos_prometheus] *******************************************************

TASK [Gathering Facts] *********************************************************
ok: [192.168.56.105]

TASK [centos_prometheus : Creating a directory (where the downloaded files will be stored)] ***
ok: [192.168.56.105]

TASK [centos_prometheus : Downloading and extracting Prometheus] ***************
ok: [192.168.56.105]

TASK [centos_prometheus : Adding the Prometheus executables to a PATH] *********
changed: [192.168.56.105]

TASK [centos_prometheus : Copying the Prometheus service file] *****************
changed: [192.168.56.105]

TASK [centos_prometheus : Making sure that Prometheus is started and enabled] ***
changed: [192.168.56.105]
```

ENTIRE ansible-playbook



```
jai@workstation:~/CPE232_HOA9.1$ ansible-playbook --ask-become-pass install_prometheus.yml
BECOME password:

PLAY [all] **********************************************************************

TASK [Gathering Facts] **********************************************************
ok: [192.168.56.103]
ok: [192.168.56.105]

TASK [install updates (CentOS)] *************************************************
skipping: [192.168.56.103]
ok: [192.168.56.105]

TASK [install wget (CentOS)] ****************************************************
skipping: [192.168.56.103]
ok: [192.168.56.105]

TASK [install updates (Ubuntu)] *************************************************
skipping: [192.168.56.105]
ok: [192.168.56.103]

PLAY [ubuntu_prometheus] ********************************************************

TASK [Gathering Facts] **********************************************************
ok: [192.168.56.103]

TASK [ubuntu_prometheus : install Prometheus (Ubuntu)] **************************
ok: [192.168.56.103]

TASK [ubuntu_prometheus : Prometheus Start/Enable Check] ************************
changed: [192.168.56.103]
```

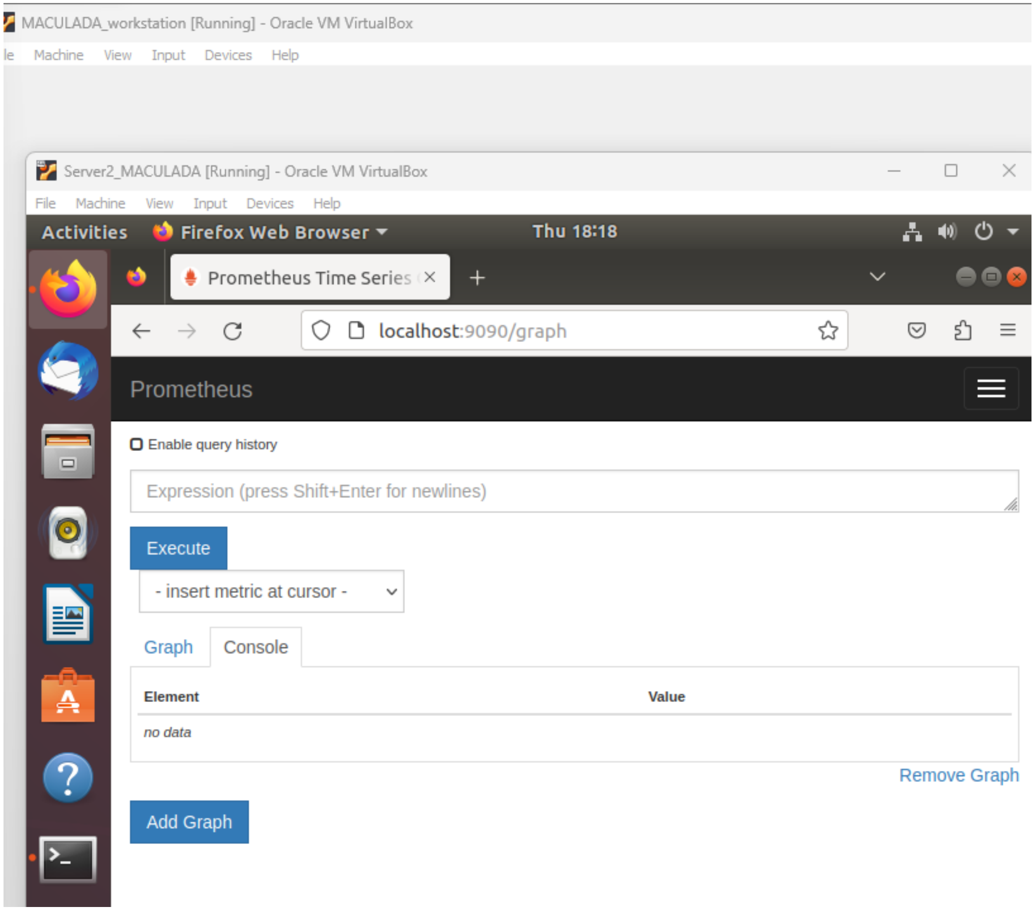


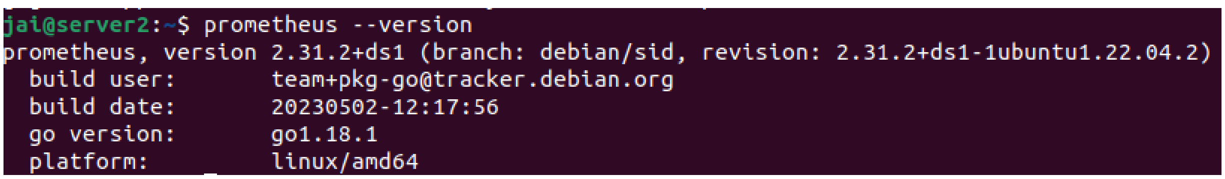
```
TASK [ubuntu_prometheus : Prometheus Start/Enable Check] ***********************
changed: [192.168.56.103]

TASK [ubuntu_prometheus : Apache Start/Enable Check] ***************************
changed: [192.168.56.103]

PLAY [centos_prometheus] *******************************************************

TASK [Gathering Facts] *********************************************************
ok: [192.168.56.105]

TASK [centos_prometheus : Creating a directory (where the downloaded files will be stored)] ***
ok: [192.168.56.105]

TASK [centos_prometheus : Downloading and extracting Prometheus] ***************
ok: [192.168.56.105]

TASK [centos_prometheus : Adding the Prometheus executables to a PATH] *********
changed: [192.168.56.105]

TASK [centos_prometheus : Copying the Prometheus service file] *****************
changed: [192.168.56.105]

TASK [centos_prometheus : Making sure that Prometheus is started and enabled] ***
changed: [192.168.56.105]

PLAY RECAP *********************************************************************
192.168.56.103             : ok=6    changed=2    unreachable=0    failed=0    skipped=2    rescued=0
    ignored=0
192.168.56.105             : ok=9    changed=3    unreachable=0    failed=0    skipped=1    rescued=0
    ignored=0
```

2. Show the screenshot of the prometheus in both Server 2 and CentOS by simply typing localhost:9090 in the web browser.

OUTPUT:

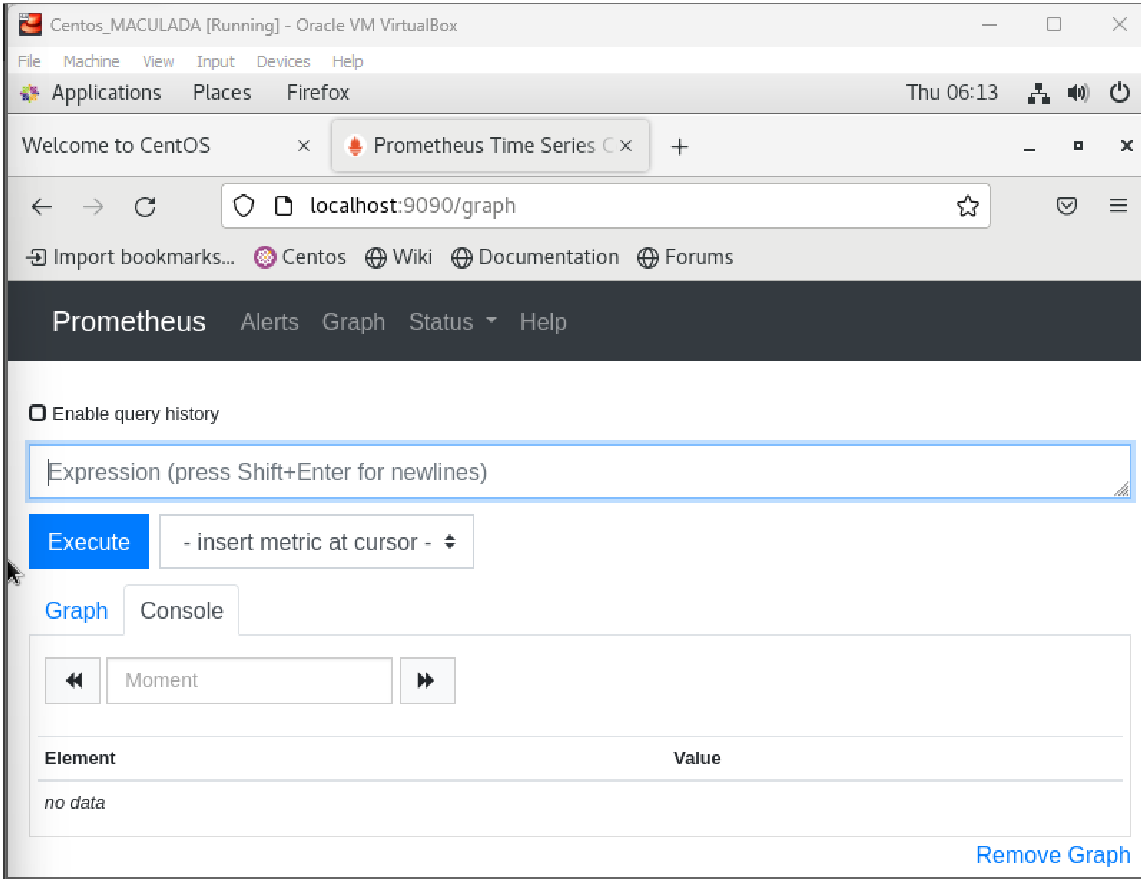
SERVER2:


MACULADA_workstation [Running] - Oracle VM VirtualBox
le Machine View Input Devices Help
Server2_MACULADA [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Activities
Firefox Web Browser
Thu 18:18
Prometheus Time Series
localhost:9090/graph
Prometheus
Enable query history
Expression (press Shift+Enter for newlines)
Execute
- insert metric at cursor -
Graph
Console
Element
Value
no data
Remove Graph
Add Graph

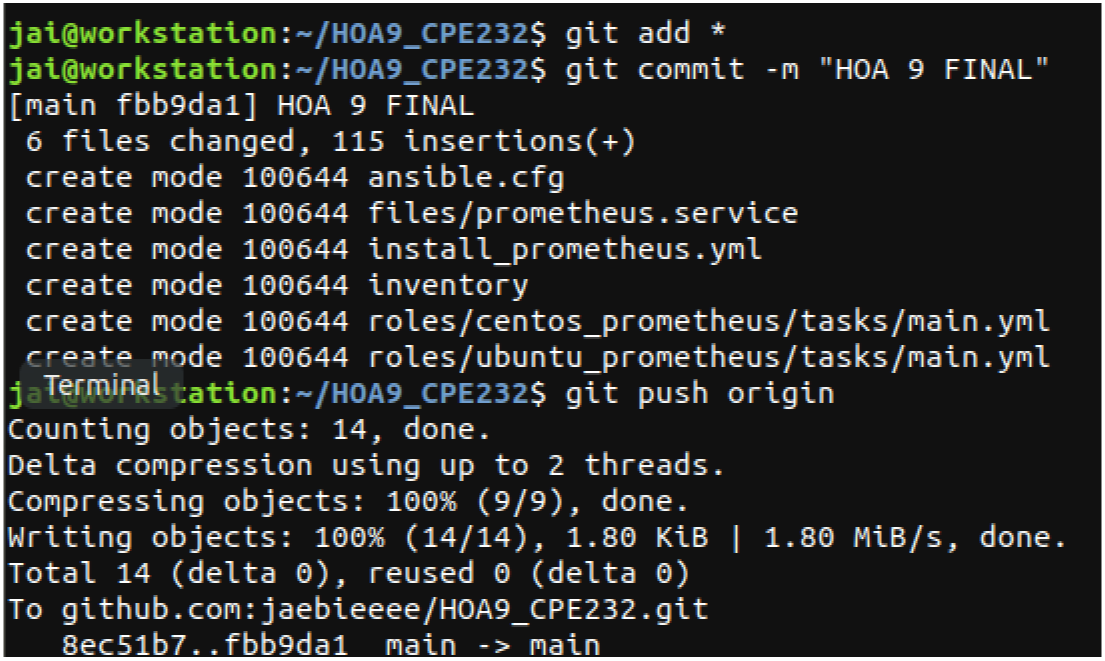


```
jai@server2:~$ prometheus --version
prometheus, version 2.31.2+ds1 (branch: debian/sid, revision: 2.31.2+ds1-1ubuntu1.22.04.2)
  build user:       team+pkg-go@tracker.debian.org
  build date:       20230502-12:17:56
  go version:       go1.18.1
  platform:         linux/amd64
```

CENTOS


Centos_MACULADA [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Applications Places Firefox
Thu 06:13
Welcome to CentOS
Prometheus Time Series C
localhost:9090/graph
Import bookmarks... Centos Wiki Documentation Forums
Prometheus Alerts Graph Status Help
Enable query history
Expression (press Shift+Enter for newlines)
Execute
- insert metric at cursor -
Graph Console
Moment
Element Value
no data
Remove Graph

3. Upload it in the github.



```
jai@workstation:~/HOA9_CPE232$ git add *
jai@workstation:~/HOA9_CPE232$ git commit -m "HOA 9 FINAL"
[main fbb9da1] HOA 9 FINAL
 6 files changed, 115 insertions(+)
 create mode 100644 ansible.cfg
 create mode 100644 files/prometheus.service
 create mode 100644 install_prometheus.yml
 create mode 100644 inventory
 create mode 100644 roles/centos_prometheus/tasks/main.yml
 create mode 100644 roles/ubuntu_prometheus/tasks/main.yml
jai@workstation:~/HOA9_CPE232$ git push origin
Counting objects: 14, done.
Delta compression using up to 2 threads.
Compressing objects: 100% (9/9), done.
Writing objects: 100% (14/14), 1.80 KiB | 1.80 MiB/s, done.
Total 14 (delta 0), reused 0 (delta 0)
To github.com:jaebieeee/HOA9_CPE232.git
   8ec51b7..fbb9da1  main -> main
```

GITHUB: https://github.com/jaebieeee/HOA9_CPE232.git

Reflections:

Answer the following:

1. What are the benefits of having a performance monitoring tool?
   - Performance monitoring tools help keep your system healthy by promptly spotting and fixing issues. They also assist in efficient resource management, ensuring your system runs smoothly and avoiding downtime, which ultimately means happier users and a more reliable experience.

Conclusions:

In this activity, I was able to encounter the prometheus. I haven't heard that before. I learned in this activity with Prometheus on both Ubuntu and CentOS, I've discovered its remarkable versatility in monitoring system performance. Regardless of the Linux distribution, Prometheus excels at ensuring our systems run smoothly. Additionally, configuring and managing enterprise performance tools using Ansible has been a pivotal lesson. Automation is the backbone of maintaining efficient, secure, and dependable IT infrastructures, promoting seamless enterprise system operations. Overall, I had fun working on this activity.