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<b>Course/Section:</b> CPE212 - CPE31S2	<b>Date Submitted:</b> 10 / 10 / 2025
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### Midterm Skills Exam: Install, Configure, and Manage Log Monitoring tools

#### 1. Objectives

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

#### 2. Instructions

1. Create a repository in your GitHub account and label it CPE\_MIDEXAM\_SURNAME.
2. Clone the repository and do the following:
  - 2.1. Create an Ansible playbook that does the following with an input of a config.yaml file and arranged Inventory file:
  - 2.2. Install and configure Elastic Stack in separate hosts (Elastic Search, Kibana, Logstash) • Install Nagios in one host
  - 2.3. Install Grafana, Prometheus and Influxdb in separate hosts (Influxdb, Grafana, Prometheus)
  - 2.4. Install Lamp Stack in separate hosts (Httpd + Php, Mariadb)
3. Document all your tasks using this document. Provide proofs of all the ansible playbooks codes and successful installations.
4. Document the push and commit from the local repository to GitHub.
5. Finally, paste also the link of your GitHub repository in the documentation.

#### 3. Output (screenshots and explanations)

ansible.cfg file:

```
ansible.cfg U X config.yaml U inventory.ini U
ansible.cfg
[defaults]
inventory = inventory.ini
private_key_file = ~/.ssh/ansible
```

inventory.ini file:

```
ansible.cfg U config.yaml U inventory.ini U
[UbuntuServer]
192.168.56.112
[CentOSServer]
192.168.56.107 ansible_user=roallos-centos
[Lampstack:children]
UbuntuServer
CentOSServer
[monitorstack:children]
UbuntuServer
CentOSServer
```

## roles/monitorstack/tasks/main.yaml

```
ansible.cfg  config.yaml  inventory.ini  main.yaml .../lampstack/...  main.yaml .../monitorstack/...
roles > monitorstack > tasks > main.yaml
  1  ---
  2  - name: Install InfluxDB (Ubuntu)
  3    apt:
  4      name: influxdb
  5      state: latest
  6      when: ansible_distribution == "Ubuntu"
  7
  8  - name: Install Prometheus (Ubuntu)
  9    apt:
 10      name: prometheus
 11      state: latest
 12      when: ansible_distribution == "Ubuntu"
 13
 14  - name: Download Grafana GPG key (Ubuntu)
 15    shell:
 16      cmd: wget -q -O - https://apt.grafana.com/gpg.key | apt-key add -
 17    args:
 18      warn: false
 19      when: ansible_distribution == "Ubuntu"
 20
 21  - name: Add Grafana APT repository (Ubuntu)
 22    apt_repository:
 23      repo: deb https://apt.grafana.com stable main
 24      state: present
 25      filename: grafana
 26      when: ansible_distribution == "Ubuntu"
 27
 28  - name: Install Grafana
 29    apt:
 30      name: grafana
 31      state: latest
 32      when: ansible_distribution == "Ubuntu"
 33
 34  - name: Start Grafana service
 35    service:
 36      name: grafana-server
 37      state: started
 38      enabled: true
 39      when: ansible_distribution == "Ubuntu"
```

Installing monitorstack:

```

PLAY [monitorstack] ****
TASK [Gathering Facts] ****
ok: [192.168.56.112]
ok: [192.168.56.107]

TASK [monitorstack : Install InfluxDB (Ubuntu)] ****
skipping: [192.168.56.107]
ok: [192.168.56.112]

TASK [monitorstack : Install Prometheus (Ubuntu)] ****
skipping: [192.168.56.107]
ok: [192.168.56.112]

TASK [monitorstack : Download Grafana GPG key (Ubuntu)] ****
skipping: [192.168.56.107]
changed: [192.168.56.112]

TASK [monitorstack : Add Grafana APT repository (Ubuntu)] ****
skipping: [192.168.56.107]
ok: [192.168.56.112]

TASK [monitorstack : Install Grafana] ****
skipping: [192.168.56.107]
ok: [192.168.56.112]

TASK [monitorstack : Start Grafana service] ****
skipping: [192.168.56.107]
changed: [192.168.56.112]

PLAY RECAP ****
192.168.56.107      : ok=7    changed=1    unreachable=0    failed=0    skipped=8    rescued=0    ignored=0
192.168.56.112      : ok=12   changed=3    unreachable=0    failed=0    skipped=3    rescued=0    ignored=0

```

## Proof of Installed Services:

```

roallos-ubuntu@server1:~$ systemctl status influxdb
● influxdb.service - InfluxDB is an open-source, distributed, time series database
  Loaded: loaded (/lib/systemd/system/influxdb.service; enabled; vendor preset: enabled)
  Active: active (running) since Fri 2025-10-10 19:04:22 +08; 7min ago
    Docs: man:influxd(1)
    Main PID: 11866 (influxd)
       Tasks: 11 (limit: 4624)
      Memory: 5.7M
         CPU: 11866 /usr/bin/influxd -config /etc/influxdb/influxdb.conf
            CGroup: /system.slice/influxdb.service
                       └─11866 /usr/bin/influxd -config /etc/influxdb/influxdb.conf
roallos-ubuntu@server1:~$ systemctl status prometheus
● prometheus.service - Monitoring system and time series database
  Loaded: loaded (/lib/systemd/system/prometheus.service; enabled; vendor preset: enabled)
  Active: active (running) since Fri 2025-10-10 19:04:53 +08; 6min ago
    Docs: https://prometheus.io/docs/introduction/overview/
    Main PID: 14082 (prometheus)
       Tasks: 10 (limit: 4624)
      Memory: 22.5M
         CPU: 14082 /usr/bin/prometheus
            CGroup: /system.slice/prometheus.service
                       └─14082 /usr/bin/prometheus
roallos-ubuntu@server1:~$ systemctl status grafana-server
● grafana-server.service - Grafana instance
  Loaded: loaded (/usr/lib/systemd/system/grafana-server.service; enabled; vendor preset: enabled)
  Active: active (running) since Fri 2025-10-10 19:09:02 +08; 2min 46s ago
    Docs: http://docs.grafana.org
    Main PID: 22143 (grafana)
       Tasks: 14 (limit: 4624)
      Memory: 132.9M
         CPU: 22143 /usr/share/grafana/bin/grafana server --config=/etc/grafana/grafana.ini --pidfile=/run/grafana
            CGroup: /system.slice/grafana-server.service
                       └─22143 /usr/share/grafana/bin/grafana server --config=/etc/grafana/grafana.ini --pidfile=/run/grafana
roallos-ubuntu@server1:~$
```

*I have installed the required services in the monitorstack (influxdb, prometheus, grafana/grafana-server), although only in the Ubuntu system because I had trouble working with the CentOS dependencies (GPG key and additional repositories).*

roles/lampstack/tasks/main.yaml:

The screenshot shows a code editor with three tabs at the top: 'config.yaml u', 'inventory.ini u', and 'main.yaml u'. The 'main.yaml' tab is active, showing the following Ansible YAML code:

```
roles > lampstack > tasks > main.yaml
1  ---
2  - name: Install Apache2 (httpd), PHP, and MariaDB for Ubuntu Servers
3    tags: apache,apache2,ubuntu
4    apt:
5      name:
6        - apache2
7        - libapache2-mod-php
8        - mariadb-server
9      state: latest
10     update_cache: yes
11     when: ansible_distribution == "Ubuntu"
12
13 - name: Install Apache2 (httpd), PHP, and MariaDB for CentOS Servers
14   tags: apache,centos,httpd
15   dnf:
16     name:
17       - httpd
18       - php
19       - mariadb-server
20     state: latest
21     update_cache: yes
22     when: ansible_distribution == "CentOS"
23
24 - name: Start httpd (CentOS)
25   tags: apache, centos, httpd
26   service:
27     name: httpd
28     state: started
29     when: ansible_distribution == "CentOS"
30
31 - name: MariaDB Restarting/Enabling
32   service:
33     name: mariadb
34     state: restarted
35     enabled: true
36
```

*This Ansible playbook installs the required services for the lamp stack group (httpd/apache, php, mariadb). I made sure to install the latest version by declaring the ‘state: latest’ during install. Because CentOS defaults to not starting installed services (httpd and mariadb), there were extra plays to start and restart specific services, making sure that they are enabled and up.*

## Installing Lampstack:

```
rallos-ubuntu@workstation:~/CPE MIDEXAM ROALLOS$ ansible-playbook config.yaml -K
information. This feature will be removed in version 2.12. Deprecation warnings can be disabled by setting deprecation_warnings=False in ansible.cfg.
ok: [192.168.56.112]
[DEPRECATION WARNING]: Distribution centos 9 on host 192.168.56.107 should use /usr/libexec/platform-python, but is using /usr/bin/python for backward compatibility with prior Ansible releases. A future Ansible release will default to using the discovered platform python for this host. See
https://docs.ansible.com/ansible/2.9/reference_appendices/interpreter_discovery.html for more information. This feature will be removed in version 2.12. Deprecation warnings can be disabled by setting deprecation_warnings=False in ansible.cfg.
ok: [192.168.56.107]

TASK [Install Updates (CentOS)] *****
skipping: [192.168.56.112]
ok: [192.168.56.107]

TASK [Install Updates (Ubuntu)] *****
skipping: [192.168.56.107]
ok: [192.168.56.112]

PLAY [lampstack] *****
TASK [Gathering Facts] *****
ok: [192.168.56.112]
ok: [192.168.56.107]

TASK [lampstack : Install Apache2 (httpd), PHP, and MariaDB for Ubuntu Servers] *****
skipping: [192.168.56.107]
ok: [192.168.56.112]

TASK [lampstack : Install Apache2 (httpd), PHP, and MariaDB for CentOS Servers] *****
skipping: [192.168.56.112]
changed: [192.168.56.107]

TASK [lampstack : Start httpd (CentOS)] *****
skipping: [192.168.56.112]
changed: [192.168.56.107]

TASK [lampstack : MariaDB Restarting/Enabling] *****
changed: [192.168.56.107]
changed: [192.168.56.112]

PLAY RECAP *****
192.168.56.107      : ok=6    changed=3    unreachable=0    failed=0    skipped=2    rescued=0    ignored=0
192.168.56.112      : ok=5    changed=1    unreachable=0    failed=0    skipped=3    rescued=0    ignored=0

rallos-ubuntu@workstation:~/CPE MIDEXAM ROALLOS$
```

## Proof of Installed Services:

```
roallos-ubuntu@server1:~$ systemctl status mariadb
● mariadb.service - MariaDB 10.3.39 database server
   Loaded: loaded (/lib/systemd/system/mariadb.service; enabled; vendor preset: enabled)
   Active: active (running) since Fri 2025-10-10 17:25:35 +08; 2min 25s ago
     Docs: man:mysqld(8)
           https://mariadb.com/kb/en/library/systemd/
  Process: 6444 ExecStartPre=/usr/bin/install -m 755 -o mysql -g root -d /var/run/mysqld (code=exited, status=0)
  Process: 6453 ExecStartPre=/bin/sh -c systemctl unset-environment _WSREP_START_POSITION (code=exited, status=>
  Process: 6455 ExecStartPre=/bin/sh -c [ ! -e /usr/bin/galera_recovery ] && VAR= || VAR=`cd /usr/bin/..; /us
  Process: 6544 ExecStartPost=/bin/sh -c systemctl unset-environment _WSREP_START_POSITION (code=exited, status=>
  Process: 6546 ExecStartPost=/etc/mysql/debian-start (code=exited, status=0/SUCCESS)
 Main PID: 6513 (mysqld)
   Status: "Taking your SQL requests now..."
      Tasks: 31 (limit: 4624)
     Memory: 63.6M
        CGroup: /system.slice/mariadb.service
                  └─6513 /usr/sbin/mysqld

roallos-ubuntu@server1:~$ systemctl status apache2
● apache2.service - The Apache HTTP Server
   Loaded: loaded (/lib/systemd/system/apache2.service; enabled; vendor preset: enabled)
   Active: active (running) since Fri 2025-10-10 16:33:48 +08; 54min ago
     Docs: https://httpd.apache.org/docs/2.4/
  Process: 870 ExecStart=/usr/sbin/apachectl start (code=exited, status=0/SUCCESS)
 Main PID: 986 (apache2)
   Tasks: 6 (limit: 4624)
     Memory: 16.5M
        CGroup: /system.slice/apache2.service
                  ├─986 /usr/sbin/apache2 -k start
                  ├─1018 /usr/sbin/apache2 -k start
                  ├─1019 /usr/sbin/apache2 -k start
                  ├─1020 /usr/sbin/apache2 -k start
                  ├─1021 /usr/sbin/apache2 -k start
                  ├─1022 /usr/sbin/apache2 -k start

Warning: some journal files were not opened due to insufficient permissions.
roallos-ubuntu@server1:~$ php -v
PHP 7.4.3-4ubuntu2.29 (cli) (built: Mar 25 2025 18:57:03) ( NTS )
Copyright (c) The PHP Group
Zend Engine v3.4.0, Copyright (c) Zend Technologies
    with Zend OPcache v7.4.3-4ubuntu2.29, Copyright (c), by Zend Technologies
roallos-ubuntu@server1:~$
```

```

[roallos-centos@vbox ~]$ systemctl status httpd
● httpd.service - The Apache HTTP Server
   Loaded: loaded (/usr/lib/systemd/system/httpd.service; disabled; preset: disabled)
   Drop-In: /usr/lib/systemd/system/httpd.service.d
     └─php-fpm.conf
     Active: active (running) since Fri 2025-10-10 17:25:32 PST; 4min 11s ago
       Docs: man:httpd.service(8)
     Main PID: 6581 (httpd)
       Status: "Total requests: 0; Idle/Busy workers 100/0;Requests/sec: 0; Bytes served/sec: 0 B/sec"
       Tasks: 177 (limit: 22981)
      Memory: 18.5M (peak: 18.9M)
        CPU: 534ms
      CGroup: /system.slice/httpd.service
              ├─6581 /usr/sbin/httpd -DFOREGROUND
              ├─6588 /usr/sbin/httpd -DFOREGROUND
              ├─6589 /usr/sbin/httpd -DFOREGROUND
              ├─6590 /usr/sbin/httpd -DFOREGROUND
              └─6591 /usr/sbin/httpd -DFOREGROUND

Oct 10 17:25:32 vbox systemd[1]: Starting The Apache HTTP Server...
Oct 10 17:25:32 vbox httpd[6581]: AH00558: httpd: Could not reliably determine the server's fully qualified domain name, using fe80::a00:27ff:fe92:770c%enp0s8
Oct 10 17:25:32 vbox httpd[6581]: Server configured, listening on port 80
Oct 10 17:25:32 vbox systemd[1]: Started The Apache HTTP Server.

[roallos-centos@vbox ~]$ systemctl status mariadb
● mariadb.service - MariaDB 10.5 database server
   Loaded: loaded (/usr/lib/systemd/system/mariadb.service; enabled; preset: disabled)
   Active: active (running) since Fri 2025-10-10 17:25:34 PST; 4min 18s ago
     Docs: man:mariadb(8)
           https://mariadb.com/kb/en/library/systemd/
   Process: 6977 ExecStartPre=/usr/libexec/mariadb-check-socket (code=exited, status=0/SUCCESS)
   Process: 6999 ExecStartPre=/usr/libexec/mariadb-prepare-db-dir mariadb.service (code=exited, status=0/SUCCESS)
   Process: 7051 ExecStartPost=/usr/libexec/mariadb-check-upgrade (code=exited, status=0/SUCCESS)
 Main PID: 7034 (mariadb)
   Status: "Taking your SQL requests now..."
   Tasks: 8 (limit: 22981)
  Memory: 70.1M (peak: 71.2M)
    CPU: 371ms
   CGroup: /system.slice/mariadb.service
           └─7034 /usr/libexec/mariadb --basedir=/usr

Oct 10 17:25:33 vbox systemd[1]: Starting MariaDB 10.5 database server...
Oct 10 17:25:33 vbox mariadb-prepare-db-dir[6999]: Database MariaDB is probably initialized in /var/lib/mysql already, nothing is done.
Oct 10 17:25:33 vbox mariadb-prepare-db-dir[6999]: If this is not the case, make sure the /var/lib/mysql is empty before running mariadb-prepare-db-dir.
Oct 10 17:25:34 vbox systemd[1]: Started MariaDB 10.5 database server.

[roallos-centos@vbox ~]$ php -v
PHP 8.0.30 (cli) (built: Apr 28 2025 09:28:14) ( NTS gcc x86_64 )
Copyright (c) The PHP Group
Zend Engine v4.0.30, Copyright (c) Zend Technologies
  with Zend OPcache v8.0.30, Copyright (c), by Zend Technologies
[roallos-centos@vbox ~]$ 

```

### GitHub link:

[https://github.com/jgvroallos/CPE\\_MIDEXAM\\_ROALLOS/tree/main](https://github.com/jgvroallos/CPE_MIDEXAM_ROALLOS/tree/main)

### Conclusions:

(link your conclusion from the objective)

*In this midterm examination, I have (partially) installed the necessary IaC services to the managed nodes. Although I have some difficulties in setting up and translating the local commands to run through Ansible playbooks especially in the CentOS managed node.*