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Midterm Skills Exam: Install, Configure, and Manage Log Monitoring tools

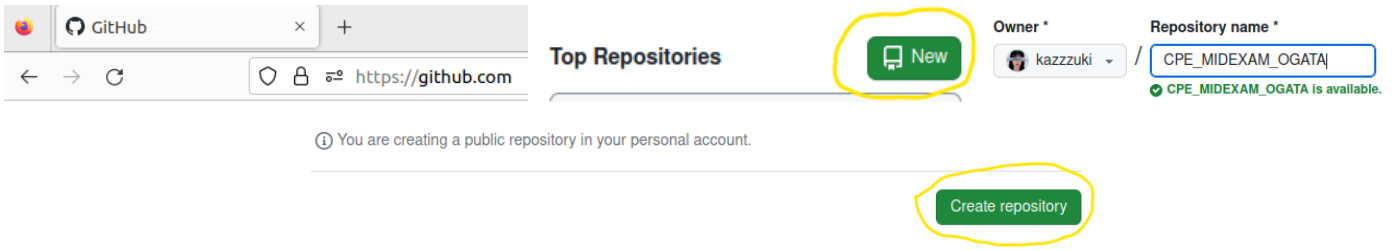
1. Objectives

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.

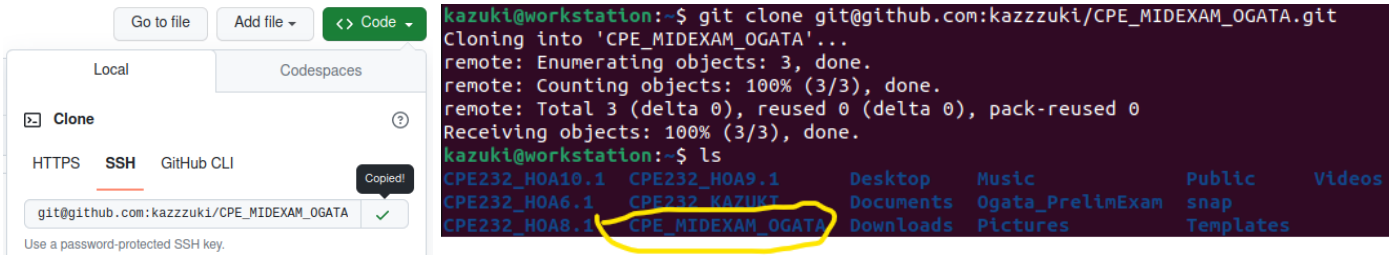
2. Instructions

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)



Before creating a repository in my GitHub account, I checked my control node if it has Git installed to it, after verifying the Git installed in my control node, I then proceed to create a repository, I clicked the “new” button at the upper left part of GitHub the put the repository name “CPE_MIDEXAM_OGATA” then “create repository”. Additionally, I checked the Git installed in my control node so there will be no issue in cloning my GitHub repository in the control node.



In cloning my GitHub repository in my control node, I clicked the “<> Code” in my GitHub then clicked the “SSH” then copied the link there and then used the “git clone <ssh link>” command to clone it. I used the “ls” command to check if the cloning was successful.

```
kazuki@workstation:~$ cd CPE_MIDEXAM_OGATA
kazuki@workstation:~/CPE_MIDEXAM_OGATA$ sudo nano ansible.cfg
kazuki@workstation:~/CPE_MIDEXAM_OGATA$ cat ansible.cfg

[defaults]

inventory = inventory

kazuki@workstation:~/CPE_MIDEXAM_OGATA$ sudo nano inventory
kazuki@workstation:~/CPE_MIDEXAM_OGATA$ cat inventory

[ElasticStack]
192.168.56.123  ansible_connection=ssh
192.168.56.127  ansible_connection=ssh

[nagios]
192.168.56.123  ansible_connection=ssh

# GPI = Grafana, Prometheus, and Influxdb
[GPI]
192.168.56.123  ansible_connection=ssh
192.168.56.127  ansible_connection=ssh

[LampStack]
192.168.56.123  ansible_connection=ssh
192.168.56.127  ansible_connection=ssh
```

I used the command “cd” to go inside the cloned repository, then created ansible.cfg and an inventory file. I put inventory = inventory in my ansible.cfg file so it knows where the default configuration is. In my inventory, I tried using 3 different Ubuntu servers and 1 CentOS server but my PC can’t handle them. So, I only used 1 Ubuntu server and 1 CentOS server for this Midterm Skills Exam.

```
kazuki@workstation:~/CPE_MIDEXAM_OGATA$ ansible all --list-hosts
  hosts (2):
    192.168.56.123
    192.168.56.127
kazuki@workstation:~/CPE_MIDEXAM_OGATA$ ansible all -m ping
192.168.56.123 | SUCCESS => {
    "ansible_facts": {
        "discovered_interpreter_python": "/usr/bin/python3"
    },
    "changed": false,
    "ping": "pong"
}
192.168.56.127 | SUCCESS => {
    "ansible_facts": {
        "discovered_interpreter_python": "/usr/bin/python"
    },
    "changed": false,
    "ping": "pong"
}
```

```
kazuki@workstation:~/CPE_MIDEXAM_OGATA$ ssh kazuki@192.168.56.123
Welcome to Ubuntu 22.04.3 LTS (GNU/Linux 6.2.0-35-generic x86_64)

 * Documentation:  https://help.ubuntu.com
 * Management:     https://landscape.canonical.com
 * Support:        https://ubuntu.com/advantage

Expanded Security Maintenance for Applications is not enabled.

0 updates can be applied immediately.

Enable ESM Apps to receive additional future security updates.
See https://ubuntu.com/esm or run: sudo pro status

Last login: Tue Nov 14 19:44:23 2023 from 192.168.56.121
kazuki@server2:~$
logout
Connection to 192.168.56.123 closed.
kazuki@workstation:~/CPE_MIDEXAM_OGATA$ ssh kazuki@192.168.56.127
Last login: Tue Nov 14 19:44:30 2023 from 192.168.56.121
[kazuki@centos ~]$ logout
Connection to 192.168.56.127 closed.
```

I used the command “ansible all –list-hosts” to list all the hosts in my control node, as we can see it successfully lists the 2 hosts that I will be using. Then to verify its connection, I also used the command “ansible all -m ping” which shows successful output. To further make sure it has connection, we can also use the ssh (2nd picture). Now that I verified all the connections of my hosts, I will now proceed and make a playbook and roles.

```
kazuki@workstation:~/CPE_MIDEXAM_OGATA$ mkdir -p roles/ElasticStack/tasks
kazuki@workstation:~/CPE_MIDEXAM_OGATA$ mkdir -p roles/nagios/tasks
kazuki@workstation:~/CPE_MIDEXAM_OGATA$ mkdir -p roles/GPI/tasks
kazuki@workstation:~/CPE_MIDEXAM_OGATA$ mkdir -p roles/LampStack/tasks
kazuki@workstation:~/CPE_MIDEXAM_OGATA$ ls
ansible.cfg  inventory  README.md  roles
kazuki@workstation:~/CPE_MIDEXAM_OGATA$ cd roles
kazuki@workstation:~/CPE_MIDEXAM_OGATA/roles$ ls
ElasticStack  GPI  LampStack  nagios
kazuki@workstation:~/CPE_MIDEXAM_OGATA/roles$ cd ElasticStack
kazuki@workstation:~/CPE_MIDEXAM_OGATA/roles/ElasticStack$ ls
tasks
kazuki@workstation:~/CPE_MIDEXAM_OGATA/roles/ElasticStack$ cd ../nagios
kazuki@workstation:~/CPE_MIDEXAM_OGATA/roles/nagios$ ls
tasks
kazuki@workstation:~/CPE_MIDEXAM_OGATA/roles/nagios$ cd ../GPI
kazuki@workstation:~/CPE_MIDEXAM_OGATA/roles/GPI$ ls
tasks
kazuki@workstation:~/CPE_MIDEXAM_OGATA/roles/GPI$ cd ../LampStack
kazuki@workstation:~/CPE_MIDEXAM_OGATA/roles/LampStack$ ls
tasks
```

I used the command “mkdir” in creating roles directory, I created separate roles for tasks 2.2-4. I used the command “cd” to go to the created directory then used the command “ls” to verify.

GNU nano 6.2 /home/kazuki/CPE_MIDEXAM_OGATA/roles/ElasticStack/tasks/main.yml

```yaml
- name: Update Ubuntu Package Cache
  apt:
    update_cache: yes
    state: present
  when: ansible_distribution == "Ubuntu"
  async: 3600
  poll: 0

- name: Add APT repository keys on Ubuntu
  apt_key:
    url: "{{ item }}"
  loop:
    - "{{ elasticSearch_ubuntu }}"
    - "{{ kibana_ubuntu }}"
    - "{{ logstash_ubuntu }}"
  when: ansible_distribution == "Ubuntu"
  async: 3600
  poll: 0

- name: Add Elasticsearch, Kibana, Logstash APT repository on Ubuntu
  apt_repository:
    repo: "{{ item }}"
  loop:
    - "{{ elasticSearch_repo }}"
    - "{{ kibana_repo }}"
    - "{{ logstash_repo }}"
  when: ansible_distribution == "Ubuntu"
  async: 3600
  poll: 0
```

```yaml
- name: Install Elasticsearch, Kibana, and Logstash on Ubuntu
  apt:
    name: "{{ item }}"
    state: present
  loop:
    - elasticsearch
    - kibana
    - logstash
  when: ansible_distribution == "Ubuntu"
  async: 3600
  poll: 0

- name: Enable Elasticsearch, Kibana, and Logstash on Ubuntu
  systemd:
    name: "{{ item }}"
    enabled: yes
    state: started
  loop:
    - elasticsearch
    - kibana
    - logstash
  when: ansible_distribution == "Ubuntu"
  async: 3600
  poll: 0

- name: Update CentOS Package Cache
  dnf:
    update_cache: yes
    state: present
    use_backend: dnf
  when: ansible_distribution == "CentOS"
```

```yaml
- name: Add RPM repository keys on CentOS
  command: rpm --import  "{{ item }}"
  loop:
    - "{{ elasticSearch_centos }}"
    - "{{ kibana_centos }}"
    - "{{ logstash_centos }}"
  when: ansible_distribution == "CentOS"
  async: 3600
  poll: 0

- name: Add Elasticsearch DNF repository on CentOS
  yum_repository:
    name: elasticsearch
    description: Elasticsearch Repository
    baseurl: https://artifacts.elastic.co/packages/7.x/yum
    gpgcheck: yes
    gpgkey: https://artifacts.elastic.co/GPG-KEY-elasticsearch
  when: ansible_distribution == "CentOS"
  async: 3600
  poll: 0

- name: Add Kibana DNF repository on CentOS
  yum_repository:
    name: kibana
    description: Kibana Repository
    baseurl: https://artifacts.elastic.co/packages/7.x/yum
    gpgcheck: yes
    gpgkey: https://artifacts.elastic.co/GPG-KEY-elasticsearch
  when: ansible_distribution == "CentOS"
  async: 3600
  poll: 0
```

```yaml
- name: Add Logstash DNF repository on CentOS
  yum_repository:
    name: logstash
    description: Logstash Repository
    baseurl: https://artifacts.elastic.co/packages/7.x/yum
    gpgcheck: yes
    gpgkey: https://artifacts.elastic.co/GPG-KEY-elasticsearch
  when: ansible_distribution == "CentOS"
  async: 3600
  poll: 0

- name: Install Elasticsearch, Kibana, and Logstash on CentOS
  dnf:
    name: "{{ item }}"
    use_backend: dnf
    state: present
  loop:
    - elasticsearch
    - kibana
    - logstash
  when: ansible_distribution == "CentOS"
  async: 3600
  poll: 0
```

```yaml
- name: Enable Elasticsearch, Kibana, and Logstash on CentOS
  systemd:
    name: "{{ item }}"
    enabled: yes
    state: started
  loop:
    - elasticsearch
    - kibana
    - logstash
  when: ansible_distribution == "CentOS"
  async: 3600
  poll: 0

- name: File destination verification
  file:
    path: "{{ item.path }}"
    state: directory
    mode: "{{ item.mode }}"
  loop:
    - { path: /etc/elasticsearch,mode: "0755" }
    - { path: /etc/kibana,mode: "0755" }
    - { path: /etc/logstash,mode: "0755" }
  async: 3600
  poll: 0

- name: Copy Elasticsearch config.yml file
  copy:
    src: /home/kazuki/CPE_MIDEXAM_OGATA/elasticsearch.yml
    dest: /etc/elasticsearch/elasticsearch.yml
    owner: root
    group: root
    mode: 0644
```

```yaml
- name: Copy Kibana config.yml file
  copy:
    src: /home/kazuki/CPE_MIDEXAM_OGATA/configurations/kibana.yml
    dest: /etc/kibana/kibana.yml
    owner: root
    group: root
    mode: 0644

- name: Copy Logstash config.yml file
  copy:
    src: /home/kazuki/CPE_MIDEXAM_OGATA/configurations/logstash.yml
    dest: /etc/logstash/logstash.yml
    owner: root
    group: root
    mode: 0644

- name: Restart Elasticsearch, Kibana, and Logstash
  systemd:
    name: "{{ item }}"
    state: restarted
  loop:
    - elasticsearch
    - kibana
    - logstash
  async: 3600
  poll: 0
```

I created an Ansible playbook for Elastic Stack (ElasticSearch, Kibana, and Logstash) . I already did the installation of this in the last activity so I just copied the codes there and added configuration codes. I created a separate configuration per Elastic Stack and then used the task to copy that file to the target hosts. Additionally, I started by updating the packages then created a repository then installed and configured Elastic Stack, I also added a restart task to the end to restart the services.

```
GNU nano 6.2                    /home/kazuki/CPE_MIDEXAM_OGATA/roles/nagios/tasks/main.yml

- name: Update Ubuntu Package Cache
  apt:
    update_cache: yes
    state: present
  when: ansible_distribution == "Ubuntu"

- name: Install Nagios in Ubuntu
  apt:
    name: nagios4-core
    state: present
  when: ansible_distribution == "Ubuntu"
  async: 3600
  poll: 0
```

I created an ansible playbook role with 2 tasks, 1 is for updating the 1 host and then install the Nagios. I already did Nagios installation from the previous activity, so I just applied it here but in one host only. I used “nagios4-core” since it is the available package that my Ubuntu supports.

```
GNU nano 6.2                    /home/kazuki/CPE_MIDEXAM_OGATA/roles/GPI/tasks/main.yml *

- name: Install prerequisites
  apt:
    name:
      - software-properties-common
      - apt-transport-https
      - ca-certificates
      - curl
    state: present
  when: ansible_distribution == "Ubuntu"
  async: 3600
  poll: 0

- name: Add Grafana APT repository key
  apt_key:
    url: "{{ grafana_ubuntu }}"
    state: present
  when: ansible_distribution == "Ubuntu"
  async: 3600
  poll: 0

- name: Add Grafana APT repository
  apt_repository:
    repo: "{{ grafana_repo }}"
    state: present
  when: ansible_distribution == "Ubuntu"
  async: 3600
  poll: 0
```

```
- name: Update Ubuntu Package Cache
  apt:
    update_cache: yes
    state: present
  when: ansible_distribution == "Ubuntu"
  async: 3600
  poll: 0

- name: Install Grafana, Prometheus, and Influxdb on Ubuntu
  apt:
    name:
      - grafana
      - prometheus
      - influxdb
    state: present
    update_cache: yes
  when: ansible_distribution == "Ubuntu"
  async: 3600
  poll: 0

- name: Update CentOS Package Cache
  dnf:
    update_cache: yes
    state: present
    use_backend: dnf
  when: ansible_distribution == "CentOS"
  async: 3600
  poll: 0
```

```
- name: Install Grafana, Prometheus, and Influxdb on CentOS
  dnf:
    name:
      - grafana
      - prometheus
      - influxdb
    state: present
    update_cache: yes
    use_backend: dnf
  when: ansible_distribution == "CentOS"
  async: 3600
  poll: 0
```

I created an Ansible playbook that installs Grafana, Prometheus, and Influxdb on separate hosts (Ubuntu and CentOS). Since my Ubuntu does not have the Grafana module/package available on it, I installed some prerequisite libraries and then added a repository then proceeded installing them.

GNU nano 6.2 /home/kazuki/CPE_MIDEXAM_OGATA/roles/LampStack/tasks/main.yml *

```yaml
- name: Update Ubuntu Package Cache
  apt:
    update_cache: yes
    state: present
  when: ansible_distribution == "Ubuntu"
  async: 3600
  poll: 0

- name: Update CentOS Package Cache
  dnf:
    update_cache: yes
    state: present
    use_backend: dnf
  when: ansible_distribution == "CentOS"
  async: 3600
  poll: 0

- name: Install Httpd, PHP, and MariaDB on Ubuntu
  apt:
    name:
      - apache2
      - php
      - libapache2-mod-php
      - mariadb-server
    state: latest
  when: ansible_distribution == "Ubuntu"
  async: 3600
  poll: 0
```

```yaml
- name: Install Httpd, PHP, and MariaDB on CentOS
  dnf:
    name:
      - httpd
      - php
      - php-mysql
      - mariadb-server
    use_backend: dnf
    state: latest
  when: ansible_distribution == "CentOS"
  async: 3600
  poll: 0
```

```yaml
- name: Start httpd and mariadb on Ubuntu
  apt:
    name: "{{ item }}"
    state: started
    enabled: yes
  loop:
    - apache2
    - mariadb
  when: ansible_distribution == "Ubuntu"
  async: 3600
  poll: 0

- name: Start httpd and mariadb on CentOS
  dnf:
    name: "{{ item }}"
    use_backend: dnf
    state: started
    enabled: yes
  loop:
    - httpd
    - mariadb
  when: ansible_distribution == "CentOS"
  async: 3600
  poll: 0
```

I created an Ansible playbook that installs httpd, php, and mariadb on Ubuntu and CentOS. In my Ubuntu, I used apache2 and libapache2-mod-php modules in installing httpd server with php support. The httpd and php in my CentOS. The libapache2-mod-php is a module that integrates PHP with “apache” web server. While in CentOS, the httpd is the package for apache http web server.

```
 GNU nano 6.2                                                midterm_exam.yml
---
- hosts: ElasticStack
  become: true

  vars_files:
    - /home/kazuki/CPE_MIDEXAM_OGATA/config.yaml

  roles:
    - ElasticStack

- hosts: nagios
  become: true
  roles:
    - nagios

- hosts: GPI
  become: true

  vars_files:
    - /home/kazuki/CPE_MIDEXAM_OGATA/config.yaml

  roles:
    - GPI

- hosts: LampStack
  become: true
  roles:
    - LampStack
```

```
kazuki@workstation:~/CPE_MIDEXAM_OGATA$ ansible-playbook --ask-become-pass midterm_exam.yml
BECOME password:

PLAY [ElasticStack] ************************************************************************************************

TASK [Gathering Facts] *********************************************************************************************
ok: [192.168.56.123]
ok: [192.168.56.127]

TASK [ElasticStack : Update Ubuntu Package Cache] ******************************************************************
skipping: [192.168.56.127]
changed: [192.168.56.123]

TASK [ElasticStack : Add APT repository keys on Ubuntu] ************************************************************
skipping: [192.168.56.127] => (item=https://artifacts.elastic.co/GPG-KEY-elasticsearch)
skipping: [192.168.56.127] => (item=https://artifacts.elastic.co/GPG-KEY-elasticsearch)
skipping: [192.168.56.127] => (item=https://packages.elasticsearch.org/GPG-KEY-elasticsearch)
skipping: [192.168.56.127]
changed: [192.168.56.123] => (item=https://artifacts.elastic.co/GPG-KEY-elasticsearch)
changed: [192.168.56.123] => (item=https://artifacts.elastic.co/GPG-KEY-elasticsearch)
changed: [192.168.56.123] => (item=https://packages.elasticsearch.org/GPG-KEY-elasticsearch)

TASK [ElasticStack : Add Elasticsearch, Kibana, Logstash APT repository on Ubuntu] *********************************
skipping: [192.168.56.127] => (item=deb https://artifacts.elastic.co/packages/7.x/apt stable main)
skipping: [192.168.56.127] => (item=deb https://artifacts.elastic.co/packages/7.x/apt stable main)
skipping: [192.168.56.127] => (item=deb https://artifacts.elastic.co/packages/7.x/apt stable main)
skipping: [192.168.56.127]
changed: [192.168.56.123] => (item=deb https://artifacts.elastic.co/packages/7.x/apt stable main)
changed: [192.168.56.123] => (item=deb https://artifacts.elastic.co/packages/7.x/apt stable main)
changed: [192.168.56.123] => (item=deb https://artifacts.elastic.co/packages/7.x/apt stable main)

TASK [ElasticStack : Install Elasticsearch, Kibana, and Logstash on Ubuntu] ****************************************
skipping: [192.168.56.127] => (item=elasticsearch)
skipping: [192.168.56.127] => (item=kibana)
skipping: [192.168.56.127] => (item=logstash)
skipping: [192.168.56.127]
changed: [192.168.56.123] => (item=elasticsearch)
changed: [192.168.56.123] => (item=kibana)
changed: [192.168.56.123] => (item=logstash)

TASK [ElasticStack : Enable Elasticsearch, Kibana, and Logstash on Ubuntu] *****************************************
skipping: [192.168.56.127] => (item=elasticsearch)
skipping: [192.168.56.127] => (item=kibana)
skipping: [192.168.56.127] => (item=logstash)
skipping: [192.168.56.127]
changed: [192.168.56.123] => (item=elasticsearch)
changed: [192.168.56.123] => (item=kibana)
changed: [192.168.56.123] => (item=logstash)

TASK [ElasticStack : Update CentOS Package Cache] ******************************************************************
skipping: [192.168.56.123]
changed: [192.168.56.127]

TASK [ElasticStack : Add RPM repository keys on CentOS] ************************************************************
skipping: [192.168.56.123] => (item=https://artifacts.elastic.co/GPG-KEY-elasticsearch)
skipping: [192.168.56.123] => (item=https://artifacts.elastic.co/GPG-KEY-elasticsearch)
skipping: [192.168.56.123] => (item=https://artifacts.elastic.co/GPG-KEY-elasticsearch)
skipping: [192.168.56.123]
changed: [192.168.56.127] => (item=https://artifacts.elastic.co/GPG-KEY-elasticsearch)
changed: [192.168.56.127] => (item=https://artifacts.elastic.co/GPG-KEY-elasticsearch)
changed: [192.168.56.127] => (item=https://artifacts.elastic.co/GPG-KEY-elasticsearch)

TASK [ElasticStack : Add Elasticsearch DNF repository on CentOS] ***************************************************
skipping: [192.168.56.123]
changed: [192.168.56.127]

TASK [ElasticStack : Add Kibana DNF repository on CentOS] **********************************************************
skipping: [192.168.56.123]
changed: [192.168.56.127]

TASK [ElasticStack : Add Logstash DNF repository on CentOS] ********************************************************
skipping: [192.168.56.123]
changed: [192.168.56.127]

TASK [ElasticStack : Install Elasticsearch, Kibana, and Logstash on CentOS] ****************************************
skipping: [192.168.56.123] => (item=elasticsearch)
skipping: [192.168.56.123] => (item=kibana)
skipping: [192.168.56.123] => (item=logstash)
skipping: [192.168.56.123]
changed: [192.168.56.127] => (item=elasticsearch)
changed: [192.168.56.127] => (item=kibana)
changed: [192.168.56.127] => (item=logstash)

TASK [ElasticStack : Enable Elasticsearch, Kibana, and Logstash on CentOS] *****************************************
skipping: [192.168.56.123] => (item=elasticsearch)
skipping: [192.168.56.123] => (item=kibana)
skipping: [192.168.56.123] => (item=logstash)
skipping: [192.168.56.123]
changed: [192.168.56.127] => (item=elasticsearch)
changed: [192.168.56.127] => (item=kibana)
changed: [192.168.56.127] => (item=logstash)

TASK [ElasticStack : File destination verification] ****************************************************************
changed: [192.168.56.123] => (item={'path': '/etc/elasticsearch', 'mode': '0755'})
changed: [192.168.56.123] => (item={'path': '/etc/kibana', 'mode': '0755'})
changed: [192.168.56.123] => (item={'path': '/etc/logstash', 'mode': '0755'})
changed: [192.168.56.127] => (item={'path': '/etc/elasticsearch', 'mode': '0755'})
changed: [192.168.56.127] => (item={'path': '/etc/kibana', 'mode': '0755'})
changed: [192.168.56.127] => (item={'path': '/etc/logstash', 'mode': '0755'})

TASK [ElasticStack : Copy Elasticsearch config.yml file] ***********************************************************
changed: [192.168.56.123]
changed: [192.168.56.127]

TASK [ElasticStack : Copy Kibana config.yml file] ******************************************************************
changed: [192.168.56.123]
changed: [192.168.56.127]

TASK [ElasticStack : Copy Logstash config.yml file] ****************************************************************
changed: [192.168.56.123]
changed: [192.168.56.127]

TASK [ElasticStack : Restart Elasticsearch, Kibana, and Logstash] **************************************************
changed: [192.168.56.123] => (item=elasticsearch)
changed: [192.168.56.123] => (item=kibana)
changed: [192.168.56.127] => (item=elasticsearch)
changed: [192.168.56.123] => (item=logstash)
changed: [192.168.56.127] => (item=kibana)
changed: [192.168.56.127] => (item=logstash)
```

```
PLAY [naglos] ******************************************************************************************************

TASK [Gathering Facts] *********************************************************************************************
ok: [192.168.56.123]

TASK [naglos : Update Ubuntu Package Cache] ************************************************************************
changed: [192.168.56.123]

TASK [naglos : Install Nagios in Ubuntu] ***************************************************************************
changed: [192.168.56.123]

PLAY [GPI] *********************************************************************************************************

TASK [Gathering Facts] *********************************************************************************************
ok: [192.168.56.123]
ok: [192.168.56.127]
```

```
PLAY [GPI] *********************************************************************************************************

TASK [Gathering Facts] *********************************************************************************************
ok: [192.168.56.123]
ok: [192.168.56.127]

TASK [GPI : Install prerequisites] *********************************************************************************
skipping: [192.168.56.127]
changed: [192.168.56.123]

TASK [GPI : Add Grafana APT repository key] ************************************************************************
skipping: [192.168.56.127]
changed: [192.168.56.123]

TASK [GPI : Add Grafana APT repository] ****************************************************************************
skipping: [192.168.56.127]
changed: [192.168.56.123]

TASK [GPI : Update Ubuntu Package Cache] ***************************************************************************
skipping: [192.168.56.127]
changed: [192.168.56.123]

TASK [GPI : Install Grafana, Prometheus, and Influxdb on Ubuntu] ***************************************************
skipping: [192.168.56.127]
changed: [192.168.56.123]

TASK [GPI : Update CentOS Package Cache] ***************************************************************************
skipping: [192.168.56.123]
changed: [192.168.56.127]

TASK [GPI : Install Grafana, Prometheus, and Influxdb on CentOS] ***************************************************
skipping: [192.168.56.123]
changed: [192.168.56.127]
```

```
PLAY [LampStack] ***************************************************************************************************

TASK [Gathering Facts] *********************************************************************************************
ok: [192.168.56.123]
ok: [192.168.56.127]

TASK [LampStack : Update Ubuntu Package Cache] *********************************************************************
skipping: [192.168.56.127]
changed: [192.168.56.123]

TASK [LampStack : Update CentOS Package Cache] *********************************************************************
skipping: [192.168.56.123]
changed: [192.168.56.127]

TASK [LampStack : Install Httpd, PHP, and MariaDB on Ubuntu] *******************************************************
skipping: [192.168.56.127]
changed: [192.168.56.123]

TASK [LampStack : Install Httpd, PHP, and MariaDB on CentOS] *******************************************************
skipping: [192.168.56.123]
changed: [192.168.56.127]

TASK [LampStack : Start httpd and mariadb on Ubuntu] ***************************************************************
skipping: [192.168.56.127] => (item=apache2)
skipping: [192.168.56.127] => (item=mariadb)
skipping: [192.168.56.127]
changed: [192.168.56.123] => (item=apache2)
changed: [192.168.56.123] => (item=mariadb)

TASK [LampStack : Start httpd and mariadb on CentOS] ***************************************************************
skipping: [192.168.56.123] => (item=httpd)
skipping: [192.168.56.123] => (item=mariadb)
skipping: [192.168.56.123]
changed: [192.168.56.127] => (item=httpd)
changed: [192.168.56.127] => (item=mariadb)
```

```
PLAY RECAP *********************************************************************************************************
192.168.56.123             : ok=24   changed=20   unreachable=0    failed=0    skipped=12   rescued=0    ignored=0
192.168.56.127             : ok=28   changed=17   unreachable=0    failed=0    skipped=13   rescued=0    ignored=0
```

- This is the output of my main playbook. It is all labeled as changed, skipped, and okay, meaning it is all executed successfully.
- The picture at the top is my main playbook, I put the host names, var files (for config.yml input), and roles.

elasticsearch:

```
[kazuki@centos ~]$ sudo systemctl status elasticsearch
● elasticsearch.service - Elasticsearch
   Loaded: loaded (/usr/lib/systemd/system/elasticsearch.service; enabled; vendor prese
t: disabled)
   Active: active (running) since Wed 2023-11-14 21:44:26 PST; 2h 6min ago
     Docs: https://www.elastic.co
 Main PID: 18719 (java)
    Tasks: 61
   Memory: 608.4M
   CGroup: /system.slice/elasticsearch.service
           ├─18719 /usr/share/elasticsearch/jdk/bin/java -Xshare:auto -Des.networkad...
           └─19946 /usr/share/elasticsearch/modules/x-pack-ml/platform/linux-x86_64/...
```

kibana:

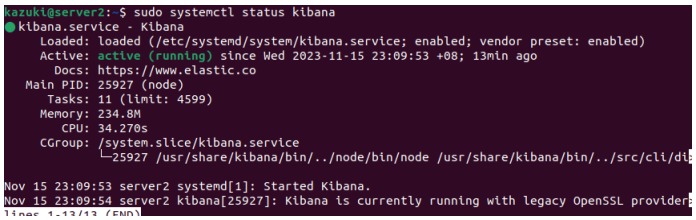
```
[kazuki@centos ~]$ sudo systemctl status kibana
● kibana.service - Kibana
   Loaded: loaded (/etc/systemd/system/kibana.service; enabled; vendor preset: disabled
)
   Active: active (running) since Wed 2023-11-15 23:09:57 PST; 11min ago
     Docs: https://www.elastic.co
 Main PID: 23456 (node)
    Tasks: 11
   Memory: 280.5M
   CGroup: /system.slice/kibana.service
           └─23456 /usr/share/kibana/bin/../node/bin/node /usr/share/kibana/bin/../s...

Nov 15 23:09:57 centos systemd[1]: Stopped Kibana.
Nov 15 23:09:57 centos systemd[1]: Started Kibana.
Nov 15 23:09:58 centos kibana[23456]: Kibana is currently running with legacy Open...er
Hint: Some lines were ellipsized, use -l to show in full.
```

logstash:

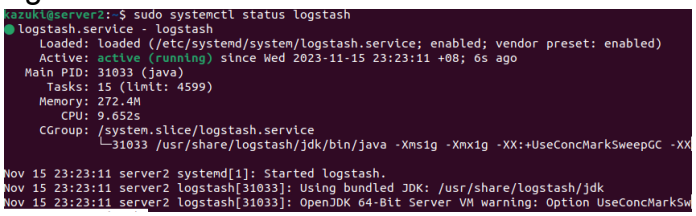
```
[kazuki@centos ~]$ sudo systemctl status logstash
● logstash.service - logstash
   Loaded: loaded (/etc/systemd/system/logstash.service; enabled; vendor preset: disabl
ed)
   Active: active (running) since Wed 2023-11-15 23:21:37 PST; 27s ago
 Main PID: 25952 (java)
    Tasks: 15
   Memory: 460.7M
   CGroup: /system.slice/logstash.service
           └─25952 /usr/share/logstash/jdk/bin/java -Xms1g -Xmx1g -XX:+UseConcMarkSw...

Nov 15 23:21:37 centos systemd[1]: Started logstash.
```

elasticsearch:

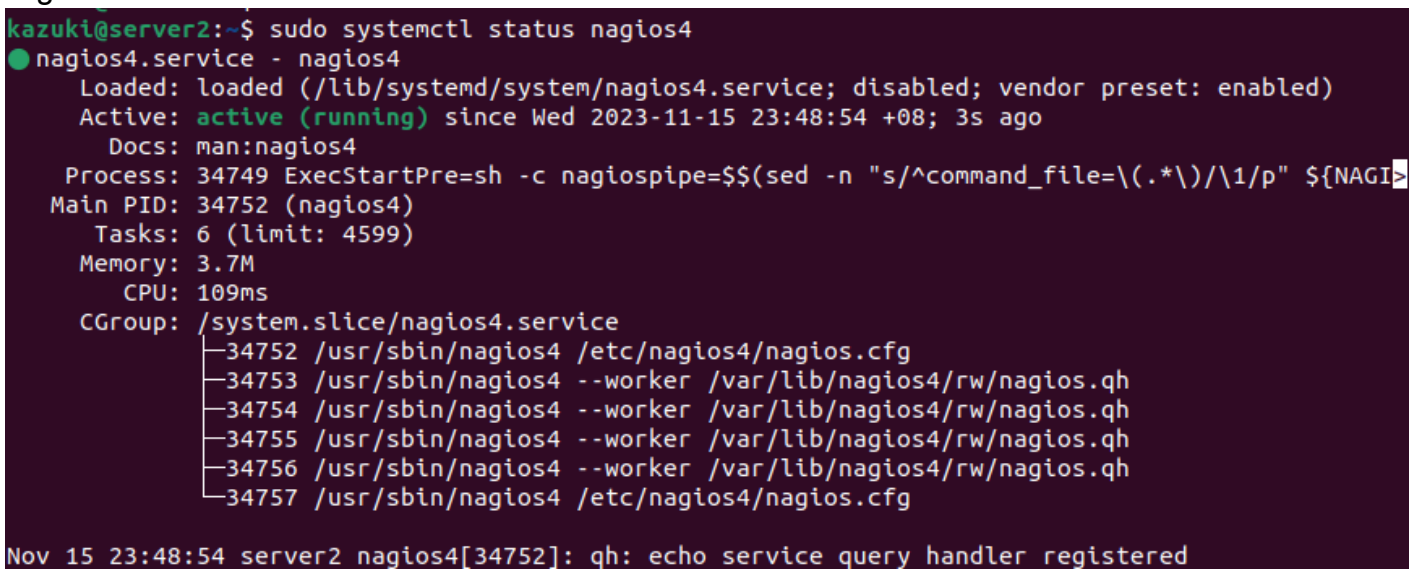
kibana:



logstash:



nagios:



grafana:

prometheus:

```
kazuki@server2:~$ sudo 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 Wed 2023-11-15 22:14:34 +08; 1h 36min ago
       Docs: man:influxd(1)
   Main PID: 895 (influxd)
      Tasks: 8 (limit: 4599)
     Memory: 34.9M
        CPU: 12.768s
     CGroup: /system.slice/influxdb.service
             └─895 /usr/bin/influxd -config /etc/influxdb/influxdb.conf

Nov 15 22:14:43 server2 influxd[895]: ts=2023-11-15T14:14:43.202058Z lvl=info msg="Listening f
Nov 15 22:24:45 server2 influxd[895]: ts=2023-11-15T14:24:45.447106Z lvl=info msg="Cache snaps
Nov 15 22:24:45 server2 influxd[895]: ts=2023-11-15T14:24:45.643914Z lvl=info msg="Snapshot fo
Nov 15 22:24:45 server2 influxd[895]: ts=2023-11-15T14:24:45.647092Z lvl=info msg="Cache snaps
Nov 15 22:44:45 server2 influxd[895]: ts=2023-11-15T14:44:45.536178Z lvl=info msg="Retention p
```

influxdb:

```
kazuki@server2:~$ sudo 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 Wed 2023-11-15 22:14:34 +08; 1h 36min ago
       Docs: man:influxd(1)
   Main PID: 895 (influxd)
      Tasks: 8 (limit: 4599)
     Memory: 34.9M
        CPU: 12.768s
     CGroup: /system.slice/influxdb.service
             └─895 /usr/bin/influxd -config /etc/influxdb/influxdb.conf

Nov 15 22:14:43 server2 influxd[895]: ts=2023-11-15T14:14:43.202058Z lvl=info msg="Listening f
Nov 15 22:24:45 server2 influxd[895]: ts=2023-11-15T14:24:45.447106Z lvl=info msg="Cache snaps
Nov 15 22:24:45 server2 influxd[895]: ts=2023-11-15T14:24:45.643914Z lvl=info msg="Snapshot fo
Nov 15 22:24:45 server2 influxd[895]: ts=2023-11-15T14:24:45.647092Z lvl=info msg="Cache snaps
Nov 15 22:44:45 server2 influxd[895]: ts=2023-11-15T14:44:45.536178Z lvl=info msg="Retention p
```

httpd:

```
[kazuki@centos ~]$ sudo systemctl status httpd
● httpd.service - The Apache HTTP Server
   Loaded: loaded (/usr/lib/systemd/system/httpd.service; disabled; vendor preset: d
bled)
   Active: active (running) since Wed 2023-11-15 23:54:36 PST; 2s ago
     Docs: man:httpd(8)
           man:apachectl(8)
 Main PID: 30373 (httpd)
   Status: "Processing requests..."
    Tasks: 6
   Memory: 21.1M
   CGroup: /system.slice/httpd.service
           ├─30373 /usr/sbin/httpd -DFOREGROUND
           ├─30378 /usr/sbin/httpd -DFOREGROUND
           ├─30379 /usr/sbin/httpd -DFOREGROUND
           ├─30380 /usr/sbin/httpd -DFOREGROUND
           ├─30384 /usr/sbin/httpd -DFOREGROUND
           └─30389 /usr/sbin/httpd -DFOREGROUND

Nov 15 23:54:35 centos systemd[1]: Starting The Apache HTTP Server...
Nov 15 23:54:35 centos httpd[30373]: AH00558: httpd: Could not reliably determine .
```

php:

mariadb:

```
[kazuki@centos ~]$ sudo systemctl status mariadb
● mariadb.service - MariaDB database server
   Loaded: loaded (/usr/lib/systemd/system/mariadb.service; disabled; vendor preset:
sabled)
   Active: active (running) since Wed 2023-11-15 23:55:22 PST; 1s ago
  Process: 30519 ExecStartPost=/usr/libexec/mariadb-wait-ready $MAINPID (code=exited
tatus=0/SUCCESS)
  Process: 30479 ExecStartPre=/usr/libexec/mariadb-prepare-db-dir %n (code=exited, s
us=0/SUCCESS)
 Main PID: 30518 (mysqld_safe)
    Tasks: 20
   Memory: 102.9M
   CGroup: /system.slice/mariadb.service
           ├─30518 /bin/sh /usr/bin/mysqld_safe --basedir=/usr
           └─30683 /usr/libexec/mysqld --basedir=/usr --datadir=/var/lib/mysql --plu

Nov 15 23:55:17 centos systemd[1]: Starting MariaDB database server...
Nov 15 23:55:17 centos mariadb-prepare-db-dir[30479]: Database MariaDB is probably .
```

httpd:

```
kazuki@server2:~$ sudo systemctl status apache2
● apache2.service - The Apache HTTP Server
     Loaded: loaded (/lib/systemd/system/apache2.service; enabled; vendor preset: enabled)
     Active: active (running) since Wed 2023-11-15 22:14:35 +08; 1h 38min ago
       Docs: https://httpd.apache.org/docs/2.4/
   Main PID: 1028 (apache2)
      Tasks: 6 (limit: 4599)
     Memory: 14.0M
        CPU: 534ms
     CGroup: /system.slice/apache2.service
             ├─1028 /usr/sbin/apache2 -k start
             ├─1078 /usr/sbin/apache2 -k start
             ├─1084 /usr/sbin/apache2 -k start
             ├─1085 /usr/sbin/apache2 -k start
             ├─1086 /usr/sbin/apache2 -k start
             └─1087 /usr/sbin/apache2 -k start

Nov 15 22:14:34 server2 systemd[1]: Starting The Apache HTTP Server...
Nov 15 22:14:35 server2 apachectl[937]: AH00558: apache2: Could not reliably determine the se
Nov 15 22:14:35 server2 systemd[1]: Started The Apache HTTP Server.
```

php:

mariadb:

```
kazuki@server2:~$ sudo systemctl status mariadb
● mariadb.service - MariaDB 10.6.12 database server
     Loaded: loaded (/lib/systemd/system/mariadb.service; enabled; vendor preset: enabled)
     Active: active (running) since Wed 2023-11-15 22:14:41 +08; 1h 39min ago
       Docs: man:mariadbd(8)
             https://mariadb.com/kb/en/library/systemd/
   Main PID: 1083 (mariadbd)
     Status: "Taking your SQL requests now..."
      Tasks: 8 (limit: 4599)
     Memory: 76.1M
        CPU: 2.845s
     CGroup: /system.slice/mariadb.service
             └─1083 /usr/sbin/mariadbd

Nov 15 22:14:40 server2 mariadbd[1083]: Version: '10.6.12-MariaDB-0ubuntu0.22.04.1'  socket:
```

```
kazuki@workstation:~/CPE_MIDEXAM_OGATA$ git add .
kazuki@workstation:~/CPE_MIDEXAM_OGATA$ git commit -m "midterm_skills_exam_ogata"
[main 5cbf9e9] midterm_skills_exam_ogata
 12 files changed, 450 insertions(+)
 create mode 100644 .config.yaml.swp
 create mode 100644 ansible.cfg
 create mode 100644 config.yaml
 create mode 100644 elasticsearch.yml
 create mode 100644 inventory
 create mode 100644 kibana.yml
 create mode 100644 logstash.yml
 create mode 100644 midterm_exam.yml
 create mode 100644 roles/ElasticStack/tasks/main.yml
 create mode 100644 roles/GPI/tasks/main.yml
 create mode 100644 roles/LampStack/tasks/main.yml
 create mode 100644 roles/nagios/tasks/main.yml
kazuki@workstation:~/CPE_MIDEXAM_OGATA$ git push
Enumerating objects: 24, done.
Counting objects: 100% (24/24), done.
Delta compression using up to 2 threads
Compressing objects: 100% (14/14), done.
Writing objects: 100% (23/23), 3.39 KiB | 694.00 KiB/s, done.
Total 23 (delta 3), reused 0 (delta 0), pack-reused 0
remote: Resolving deltas: 100% (3/3), done.
To github.com:kazzzuki/CPE_MIDEXAM_OGATA.git
   72f085a..5cbf9e9  main -> main
```

I used “git add .” to add all the files I made for this exam then use the “git commit -m “ command to commit changes and add a message. Then push it to my GitHub repository.

GitHub link: https://github.com/kazzzuki/CPE_MIDEXAM_OGATA

Conclusions: (link your conclusion from the objective)

In conclusion, I was able to successfully create and design a workflow that installs, configures, and manages enterprise availability, performance, and log monitoring tools using Ansible as an Infrastructure as Code (IaC) tool including Elastic Stack, Nagios, Grafana, Prometheus, InfluxDB, and Lamp Stack on separate hosts (Ubuntu and CentOS), I used Ubuntu and CentOS to test the difference in installations and configurations. I applied what I learned from the past activities (using roles in the Ansible playbook), and I was able to run a lot of tasks from many playbooks using the roles. This midterm skills exam made me realize all the mistakes I made from the past activities and I was able to correct them this time.