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Course/Section: CPE31S21	Date Submitted: 12/13/2024
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Hands-on Final Exam

1. Tools Needed:

1. VM with Ubuntu, CentOS and Ansible installed
2. Web browser

2. Procedure

1. Create a repository and label it as "Final_Exam_Surname"
2. Clone your new repository in your VM
3. Create an Ansible playbook that does the following with an input of a config.yaml file and structure inventory file.

   3.1. Install and configure one enterprise service that can be installed in Debian and Centos servers

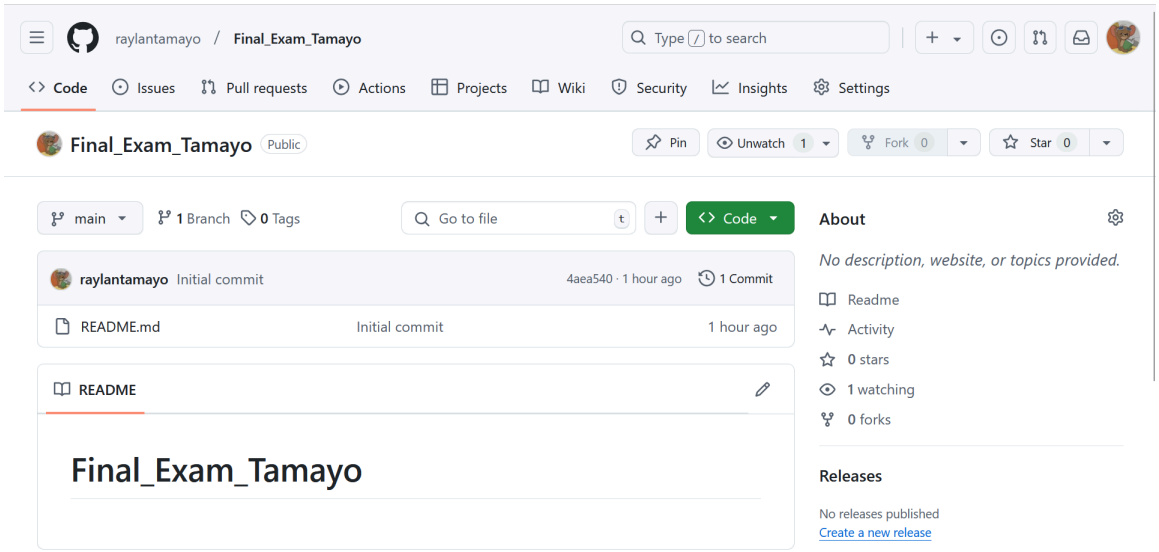
   3.2 Install and configure one monitoring tool that can be installed in Debian and Centos servers (if it is a stack there should be option of different host)

   4.4 Change Motd as "Ansible Managed by <username>"

4. Push and commit your files in GitHub
5. Make sure to show evidence of input (codes) process (codes successfully running) and output (evidence of installation)
6. For your final exam to be counted, please paste your repository link as an answer in this exam.
7. Note: Extra points if you will implement the said services via containerization.

3. Output

CREATE GITHUB REPOSITORY



GIT CLONE GITHUB REPOSITORY

```
tamayo@workstation:~$ git clone git@github.com:raylantamayo/Final_Exam_Tamayo.g
it
Cloning into 'Final_Exam_Tamayo'...
remote: Enumerating objects: 3, done.
remote: Counting objects: 100% (3/3), done.
remote: Total 3 (delta 0), reused 0 (delta 0), pack-reused 0 (from 0)
Receiving objects: 100% (3/3), done.
tamayo@workstation:~$
```

CONFIGURE ANSIBLE.CFG FILE

```
                    tamayo@workstation: ~/Final_Exam_Tamayo
File  Edit  View  Search  Terminal  Help
  GNU nano 2.9.3                    ansible.cfg

[defaults]

inventory = inventory
host_key_checking = false

depracation_warnings = false

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

CONFIGURE INVENTORY FILE

```
tamayo@workstation: ~/Final_Exam_Tamayo
File  Edit  View  Search  Terminal  Help
  GNU nano 2.9.3                        inventory

[all]
192.168.56.101
192.168.56.103

[Ubuntu]
192.168.56.101

[CentOs]
192.168.56.103
```

CONFIGURE ROLES FOR UBUNTU AND CENTOS

```
tamayo@workstation:~/Final_Exam_Tamayo$ tree
.
├── ansible.cfg
├── inventory
├── README.md
└── roles
    ├── CentOS
    │   └── tasks
    └── Ubuntu
        └── tasks

5 directories, 3 files
```

CREATE CONFIG.YML

```
tamayo@workstation: ~/Final_Exam_Tamayo
File  Edit  View  Search  Terminal  Help
  GNU nano 2.9.3                      config.yml

---

- hosts: all
  become: true
  pre_tasks:

  - name: install updates (Ubuntu)
    tags: always
    apt:
      update_cache: yes
    changed_when: False
    when: ansible_distribution == "Ubuntu"

  - name: install updates (CentOS)
    tags: always
    dnf:
      update_cache: yes
    changed_when: False
    when: ansible_distribution == "CentOS"

  - name: Create a banner motd
    copy:
      content: "Ansible Manage by Tamayo\n"
```

```
- hosts: Ubuntu
  become: true
  roles:
    - Ubuntu

- hosts: CentOs
  become: true
  roles:
    - CentOs
```

CREATE MAIN.YML THAT CONTAINS THE TASKS FOR EACH ROLES

UBUNTU

```
tamayo@workstation: ~/Final_Exam_Tamayo/roles/Ubuntu/tasks
File  Edit  View  Search  Terminal  Help
  GNU nano 2.9.3                    main.yml

---

- name: Install apache and php
  apt:
    name:
      - apache2
      - libapache2-mod-php
    state: latest
    update_cache: yes
  when: ansible_distribution == "Ubuntu"

- name: Install Mariadb service
  apt:
    name: mariadb-server
    state: latest
  when: ansible_distribution == "Ubuntu"

- name: Mariadb Restarting/Enabling
  service:
    name: mariadb
    state: restarted
    enabled: true
```

```
- name: Install Nagios Monitoring Tool
  apt:
    name:
      - nagios4
    state: latest
    update_cache: yes
  when: ansible_distribution == "Ubuntu"
```

CENTOS

```
tamayo@workstation: ~/Final_Exam_Tamayo/roles/CentOS/tasks
File  Edit  View  Search  Terminal  Help
  GNU nano 2.9.3                    main.yml

---

- name: Install httpd and php for CentOS
  dnf:
    name:
      - httpd
      - php
    state: latest
  when: ansible_distribution == "CentOS"

- name: httpd Restarting/Enabling
  service:
    name: httpd
    state: restarted
    enabled: true

- name: Install Mariadb service
  dnf:
    name: mariadb-server
    state: latest
  when: ansible_distribution == "CentOS"

- name: madiadb Restarting/Enabling
```

```
  service:
    name: mariadb
    state: restarted
    enabled: true

- name: Install Nagios Monitoring tool
  command: wget https://assets.nagios.com/downloads/nagioscore/releases/nagios$
  when: ansible_distribution == "CentOS"
```

RUN ANSIBLE PLAYBOOK

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

TASK [Gathering Facts] *********************************************************
ok: [192.168.56.103]
[DEPRECATION WARNING]: Distribution centos 9 on host 192.168.56.101 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/2.10/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: [192.168.56.101]

TASK [install updates (Ubuntu)] ************************************************
skipping: [192.168.56.101]
ok: [192.168.56.103]

TASK [install updates (CentOS)] ************************************************
skipping: [192.168.56.103]
ok: [192.168.56.101]

TASK [Create a banner motd] ****************************************************
ok: [192.168.56.103]
ok: [192.168.56.101]
```

```
PLAY [Ubuntu] ******************************************************************

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

TASK [Ubuntu : Install apache and php] *****************************************
ok: [192.168.56.103]

TASK [Ubuntu : Install Mariadb service] ****************************************
changed: [192.168.56.103]

TASK [Ubuntu : Mariadb Restarting/Enabling] ************************************
changed: [192.168.56.103]

TASK [Ubuntu : Install Nagios Monitoring Tool] *********************************
ok: [192.168.56.103]
```

```
PLAY [CentOs] ******************************************************************

TASK [Gathering Facts] *********************************************************
ok: [192.168.56.101]

TASK [CentOs : Install httpd and php for CentOS] *******************************
changed: [192.168.56.101]

TASK [CentOs : httpd Restarting/Enabling] **************************************
changed: [192.168.56.101]

TASK [CentOs : Install Mariadb service] ****************************************
changed: [192.168.56.101]

TASK [CentOs : madiadb Restarting/Enabling] ************************************
changed: [192.168.56.101]

TASK [CentOs : Install Nagios Monitoring tool] *********************************
[WARNING]: Consider using the get_url or uri module rather than running 'wget'.  If
you need to use command because get_url or uri is insufficient you can add 'warn:
false' to this command task or set 'command_warnings=False' in ansible.cfg to get rid
of this message.
changed: [192.168.56.101]

PLAY RECAP *********************************************************************
192.168.56.101             : ok=9    changed=5    unreachable=0    failed=0    skipped=1    rescued=0    ignored=0
192.168.56.103             : ok=8    changed=2    unreachable=0    failed=0    skipped=1    rescued=0    ignored=0
```

PROOF FOR INSTALLATION

UBUNTU

APACHE

```
● apache2.service - The Apache HTTP Server
     Loaded: loaded (/lib/systemd/system/apache2.service; enabled; vendor preset: enabled)
     Active: active (running) since Tue 2023-05-23 20:26:43 +08; 1h 38min ago
       Docs: https://httpd.apache.org/docs/2.4/
   Main PID: 2330 (apache2)
      Tasks: 85 (limit: 2271)
     Memory: 15.6M
        CPU: 3.964s
     CGroup: /system.slice/apache2.service
             ├─2330 /usr/sbin/apache2 -k start
             ├─2527 "(wsgi:cinder-wsgi" -k start
             ├─2529 "(wsgi:cinder-wsgi" -k start
             ├─2530 "(wsgi:cinder-wsgi" -k start
             ├─2531 "(wsgi:cinder-wsgi" -k start
             ├─2532 "(wsgi:cinder-wsgi" -k start
             ├─2533 "(wsgi:horizon)   " -k start
             ├─2534 "(wsgi:horizon)   " -k start
             ├─2535 "(wsgi:horizon)   " -k start
             ├─2536 "(wsgi:keystone-pu" -k start
             ├─2537 "(wsgi:keystone-pu" -k start
             ├─2539 "(wsgi:keystone-pu" -k start
             ├─2541 "(wsgi:keystone-pu" -k start
             ├─2542 "(wsgi:keystone-pu" -k start
             ├─2544 /usr/sbin/apache2 -k start
             ├─2545 /usr/sbin/apache2 -k start
             ├─2547 /usr/sbin/apache2 -k start
             ├─2548 /usr/sbin/apache2 -k start
             └─2549 /usr/sbin/apache2 -k start

Warning: some journal files were not opened due to insufficient permissions.
```

PHP

```
PHP 8.1.2-1ubuntu2.11 (cli) (built: Feb 22 2023 22:56:18) (NTS)
Copyright (c) The PHP Group
Zend Engine v4.1.2, Copyright (c) Zend Technologies
    with Zend OPcache v8.1.2-1ubuntu2.11, Copyright (c), by Zend Technologies
```

MARIADB

```
● mariadb.service - MariaDB 10.6.12 database server
     Loaded: loaded (/lib/systemd/system/mariadb.service; enabled; vendor preset: enabled)
     Active: active (running) since Tue 2023-05-23 21:22:51 +08; 44min ago
       Docs: man:mariadbd(8)
             https://mariadb.com/kb/en/library/systemd/
    Process: 21344 ExecStartPre=/usr/bin/install -m 755 -o mysql -g root -d /var/run/mysqld
    Process: 21345 ExecStartPre=/bin/sh -c systemctl unset-environment _WSREP_START_POSITIO
    Process: 21347 ExecStartPre=/bin/sh -c [ ! -e /usr/bin/galera_recovery ] && VAR= ||   V
    Process: 21388 ExecStartPost=/bin/sh -c systemctl unset-environment _WSREP_START_POSITI
    Process: 21390 ExecStartPost=/etc/mysql/debian-start (code=exited, status=0/SUCCESS)
   Main PID: 21376 (mariadbd)
     Status: "Taking your SQL requests now..."
      Tasks: 8 (limit: 2271)
     Memory: 63.5M
        CPU: 849ms
     CGroup: /system.slice/mariadb.service
             └─21376 /usr/sbin/mariadbd
```

NAGIOS

```
○ nagios4.service - nagios4
     Loaded: loaded (/lib/systemd/system/nagios4.service; enabled; vendor preset: enabled)
     Active: inactive (dead)
       Docs: man:nagios4
```

CENTOS

HTTPD

```
● httpd.service - The Apache HTTP Server
     Loaded: loaded (/usr/lib/systemd/system/httpd.service; enabled; preset: disabled)
    Drop-In: /usr/lib/systemd/system/httpd.service.d
             └─php-fpm.conf
     Active: active (running) since Tue 2023-05-23 21:24:31 PST; 46min ago
       Docs: man:httpd.service(8)
   Main PID: 8226 (httpd)
     Status: "Total requests: 0; Idle/Busy workers 100/0;Requests/sec: 0; Bytes served/sec:   0 B/sec"
      Tasks: 213 (limit: 10992)
     Memory: 24.0M
        CPU: 1.454s
     CGroup: /system.slice/httpd.service
             ├─8226 /usr/sbin/httpd -DFOREGROUND
             ├─8345 /usr/sbin/httpd -DFOREGROUND
             ├─8346 /usr/sbin/httpd -DFOREGROUND
             ├─8347 /usr/sbin/httpd -DFOREGROUND
             └─8348 /usr/sbin/httpd -DFOREGROUND

May 23 21:24:31 server2 systemd[1]: Starting The Apache HTTP Server...
May 23 21:24:31 server2 httpd[8226]: AH00558: httpd: Could not reliably determine the server's fully qu
May 23 21:24:31 server2 httpd[8226]: Server configured, listening on: port 80
May 23 21:24:31 server2 systemd[1]: Started The Apache HTTP Server.
```

PHP

```
PHP 8.0.27 (cli) (built: Jan  3 2023 16:17:26) ( NTS gcc x86_64 )
Copyright (c) The PHP Group
Zend Engine v4.0.27, Copyright (c) Zend Technologies
    with Zend OPcache v8.0.27, Copyright (c), by Zend Technologies
```

MARIADB

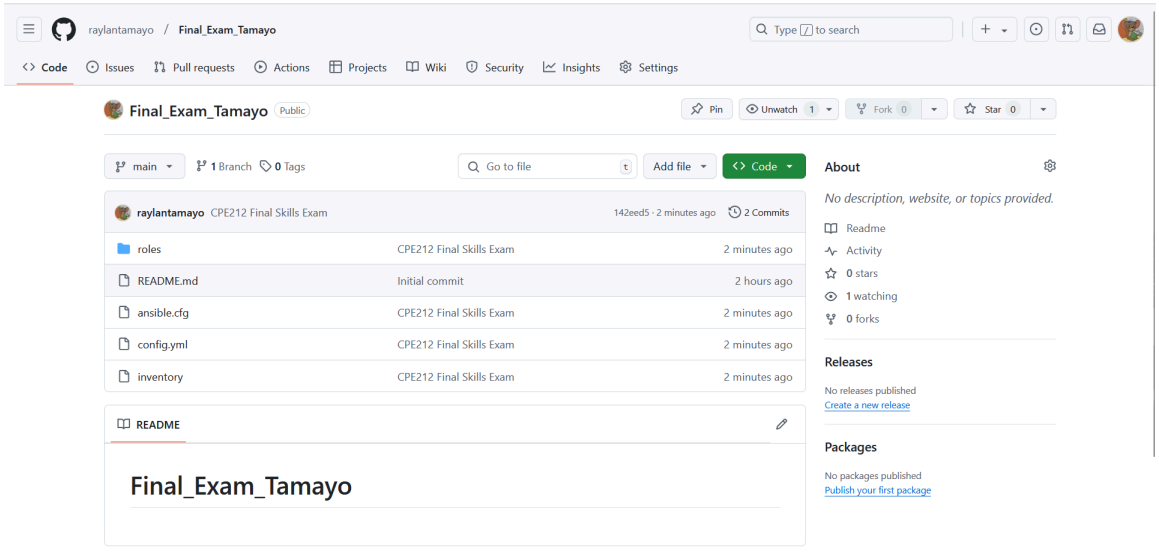
```
● mariadb.service - MariaDB 10.5 database server
     Loaded: loaded (/usr/lib/systemd/system/mariadb.service; enabled; preset: disabled)
     Active: active (running) since Tue 2023-05-23 21:29:57 PST; 42min ago
       Docs: man:mariadbd(8)
             https://mariadb.com/kb/en/library/systemd/
    Process: 38671 ExecStartPre=/usr/libexec/mariadb-check-socket (code=exited, status=0/
    Process: 38693 ExecStartPre=/usr/libexec/mariadb-prepare-db-dir mariadb.service (code
    Process: 38793 ExecStartPost=/usr/libexec/mariadb-check-upgrade (code=exited, status=
   Main PID: 38775 (mariadbd)
     Status: "Taking your SQL requests now..."
      Tasks: 8 (limit: 10992)
     Memory: 76.6M
        CPU: 769ms
     CGroup: /system.slice/mariadb.service
             └─38775 /usr/libexec/mariadbd --basedir=/usr

May 23 21:29:57 server2 mariadb-prepare-db-dir[38732]: you need to be the system 'mysql'
May 23 21:29:57 server2 mariadb-prepare-db-dir[38732]: After connecting you can set the p
May 23 21:29:57 server2 mariadb-prepare-db-dir[38732]: able to connect as any of these us
May 23 21:29:57 server2 mariadb-prepare-db-dir[38732]: See the MariaDB Knowledgebase at h
May 23 21:29:57 server2 mariadb-prepare-db-dir[38732]: Please report any problems at http
May 23 21:29:57 server2 mariadb-prepare-db-dir[38732]: The latest information about Maria
May 23 21:29:57 server2 mariadb-prepare-db-dir[38732]: Consider joining MariaDB's strong
May 23 21:29:57 server2 mariadb-prepare-db-dir[38732]: https://mariadb.org/get-involved/
May 23 21:29:57 server2 mariadbd[38775]: 2023-05-23 21:29:57 0 [Note] /usr/libexec/mariad
May 23 21:29:57 server2 systemd[1]: Started MariaDB 10.5 database server.
```

NAGIOS

```
nagios4.service - nagios4
     Loaded: loaded (/lib/systemd/system/nagios4.service; enabled; vendor preset: enabled)
     Active: active (running)
       Docs: man:nagios4
```

GIT ADD, COMMIT, PUSH

```
tamayo@workstation:~/Final_Exam_Tamayo$ git add .
tamayo@workstation:~/Final_Exam_Tamayo$ git commit -m "CPE212 Final Skills Exam
"
[main 142eed5] CPE212 Final Skills Exam
 5 files changed, 113 insertions(+)
 create mode 100644 ansible.cfg
 create mode 100644 config.yml
 create mode 100644 inventory
 create mode 100644 roles/CentOS/tasks/main.yml
 create mode 100644 roles/Ubuntu/tasks/main.yml
tamayo@workstation:~/Final_Exam_Tamayo$ git push origin
Counting objects: 12, done.
Delta compression using up to 2 threads.
Compressing objects: 100% (8/8), done.
Writing objects: 100% (12/12), 1.45 KiB | 1.45 MiB/s, done.
Total 12 (delta 1), reused 0 (delta 0)
remote: Resolving deltas: 100% (1/1), done.
To github.com:raylantamayo/Final_Exam_Tamayo.git
   4aea540..142eed5  main -> main
tamayo@workstation:~/Final_Exam_Tamayo$
```



GitHub Link: https://github.com/raylantamayo/Final_Exam_Tamayo.git

4. Conclusion

The final skills exam provided a comprehensive opportunity to apply the concepts learned throughout the course. By creating a repository labeled "Final_Exam_Surname", I not only practiced version control with Git but also honed my skills in writing and executing Ansible playbooks. This experience reinforced my understanding of automation in IT, as I was tasked with installing and configuring services on both Debian and CentOS servers, demonstrating the versatility of Ansible across different environments.

Working with the config.yaml and inventory files helped me grasp the significance of structured data in configuration management. This task highlighted the importance of clear organization and documentation when managing server configurations. Additionally, changing the Message of the Day (Motd) to indicate that the server was Ansible-managed illustrated how small customizations can enhance system administration practices. These practical experiences underscored the need for meticulousness and attention to detail in deployment processes.

Lastly, the exam encouraged me to explore containerization as a means to deploy services efficiently. By considering containerized solutions, I learned about the benefits of scalability and resource management in modern IT environments. This aspect of the exam opened my eyes to the future of application deployment and management, emphasizing the relevance of DevOps practices in today's tech landscape. Overall, this final exam was a valuable culmination of my learning journey, equipping me with practical skills that I can apply in real-world scenarios.