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Course/Section: CPE232-CPE31S22 Instructor: Dr. Jonathan V. Taylar

Tools Needed:

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

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). Create a word document report for this final exam. For your final exam to be counted, please paste your repository link as an answer in your report. No point will be given if you forgot to paste your repo link.
- Note: Extra points if you will implement the said services via containerization.

Output:

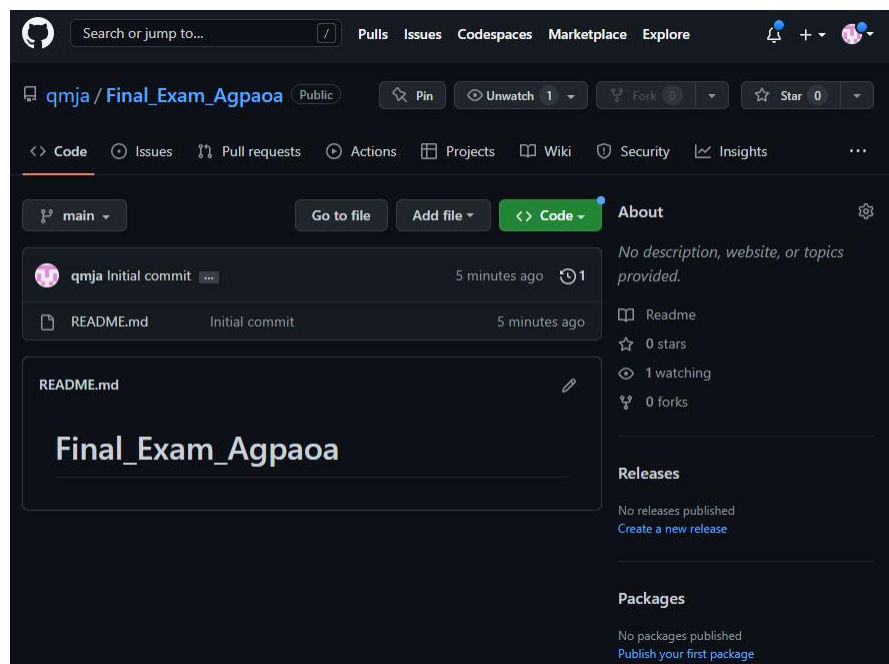


Figure 1 Creating new repository

I created a new repository in GitHub and named it as Final_Exam_Agpaoa.

```
madiane@workstation: $ git clone git@github.com:qmja/Final_Exam_Agpaoa.git
Cloning into 'Final_Exam_Agpaoa'...
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.
```

Figure 2 Cloning the new repository

I cloned the Final_Exam_Agpaoa repository in my workstation by using the command “git clone”.

```
madiane@workstation: ~/Final_Exam_Agpaoa$ mkdir roles
madiane@workstation: ~/Final_Exam_Agpaoa/roles$ mkdir centos ubuntu
```

Figure 3.1 Creating new directories within the roles directory

First I created the roles directory and then I created the centos and ubuntu directory within the roles directory by first changing the directory to roles by using the command “cd” and then using the command “mkdir” I created the centos and ubuntu directory.

```
madiane@workstation: ~/Final_Exam_Agpaoa/roles$ cd centos
madiane@workstation: ~/Final_Exam_Agpaoa/roles/centos$ mkdir tasks
```

Figure 3.2 Creating tasks directory within the centos directory

First I changed the directory to centos by using the command “cd” and then I created the tasks directory by using the command “mkdir”.

```
madiane@workstation: ~/Final_Exam_Agpaoa/roles$ cd centos/tasks
madiane@workstation: ~/Final_Exam_Agpaoa/roles/centos/tasks$ touch main.yml
```

Figure 3.3 Creating main.yml within the tasks directory

I created the main.yml playbook within the tasks directory of centos directory by first changing the directory to tasks directory by using the command “cd” and then using the command “touch” I created the main.yml.

```
madiane@workstation: ~/Final_Exam_Agpaoa/roles$ cd ubuntu
madiane@workstation: ~/Final_Exam_Agpaoa/roles/ubuntu$ mkdir tasks
```

Figure 3.4 Creating tasks directory within the ubuntu directory

First I changed the directory to ubuntu by using the command “cd” and then I created the tasks directory by using the command “mkdir”.

```
madiane@workstation: ~/Final_Exam_Agpaoa/roles/ubuntu$ cd tasks
madiane@workstation: ~/Final_Exam_Agpaoa/roles/ubuntu/tasks$ touch main.yml
```

Figure 3.5 Creating main.yml within the tasks directory

I created the main.yml playbook within the tasks directory of ubuntu directory by first changing the directory to tasks directory by using the command “cd” and then

using the command “touch” I created the main.yml.

```
madiane@workstation:~/Final_Exam_Agpaoa$ tree
.
├── ansible.cfg
├── config.yaml
├── inventory
├── README.md
├── roles
│   ├── centos
│   │   └── tasks
│   │       └── main.yml
│   └── ubuntu
│       └── tasks
│           └── main.yml
└── 5 directories, 6 files
```

Figure 3.6 Contents and structure of files of Final_Exam_Agpaoa

```
madiane@workstation:~/Final_Exam_Agpaoa$ cat inventory
[ubuntu]
192.168.56.105

[centos]
192.168.56.107
```

Figure 3.7 Contents of inventory file

```
GNU nano 6.2                                motd.j2
Ansible Managed node by madiane
```

Figure 3.8 Contents of motd.j2

```

madiane@workstation: ~/Final_Exam_Agpaoa
GNU nano 6.2                                config.yaml
---
- hosts: all
  become: true

  pre_tasks:
  - name: update repository index (CentOS)
    tags: always
    dnf:
      update_cache: yes
      changed_when: false
      when: ansible_distribution == "CentOS"

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

  tasks:
  - name: MOTD
    template:
      src: motd.j2
      dest: /etc/motd
    tags:
      - motd_config

- hosts: ubuntu
  become: true
  roles:
    - ubuntu

- hosts: centos
  become: true
  roles:
    - centos

```

Figure 3.9 Contents of nagios_ins.yml playbook

Inside the playbook, there is a pre-tasks for all the remote servers, tasks for changing the motd of servers, adding users and the plays for remote servers that have an operating system of CentOS and Ubuntu.

```

madiane@workstation: ~/Final_Exam_Agpaoa/roles/centos/tasks
GNU nano 6.2                                main.yml
---
- name: Installing required packages for installing Nagios
  tags: dependencies, libraries
  dnf:
    name:
      - gcc
      - glibc
      - glibc-common
      - perl
      - httpd
      - php
      - wget
      - gd
      - gd-devel
      - openssl-devel
      - gcc
      - glibc
      - glibc-common
      - make
      - gettext
      - automake
      - autoconf
      - wget
      - openssl-devel
      - net-snmp
      - net-snmp-utils
      - python2-pip
      - python3
      - python3-pip
    state: latest

- name: Installing passlib python package
  pip:
    name: passlib

- name: Creating directory for the downloaded files
  file:
    path: ~/nagios
    state: directory

- name: Installing and extracting Nagios
  unarchive:
    src: https://github.com/NagiosEnterprises/nagioscore/archive/nagios-4.4.6.tar.gz
    dest: ~/nagios
    remote_src: yes
    mode: 0777
    owner: root
    group: root

- name: Compiling, installing, and creating users and group for Nagios
  shell: |
    cd ~/nagios/nagioscore-4.4.6
    ./configure
    make all
    make install-groups-users
    usermod -s /bin/bash nagios
    make install
    make install-daemoninit
    make install-commandmode
    make install-config
    make install-webconf

- name: Installing the Nagios plugins and then extracting it
  unarchive:
    src: https://github.com/nagios-plugins/nagios-plugins/archive/release-2.3.3.tar.gz
    dest: ~/nagios
    remote_src: yes
    mode: 0777
    owner: root
    group: root

- name: Compiling and installing the Nagios plugins
  shell: |
    cd ~/nagios/nagios-plugins-2.3.3
    ./tools/setup
    ./configure
    make
    make install

```

```

- name: Adding a user to a password file
  community.general.htpasswd:
    path: /usr/local/nagios/etc/htpasswd.users
    name: agpaoanagi
    password: mad12

- name: Starting/Restarting Nagios
  service:
    name: nagios
    state: restarted
    enabled: true

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

```

Figure 3.10 Contents of main.yml within the centos directory

Inside the main.yml playbook, you could see tasks that will install, compile and configure the packages for installing the Nagios and the installation of the Nagios itself in a remote server with an operating system of CentOS. In addition, the playbook will also create or add a user to a password file for the Nagios. After the installation of Nagios and creating or adding a user to a password file there is a task that will start or restart the Nagios and httpd.

```

GNU nano 6.2 main.yml
- name: Installing required packages for installing Nagios
  tags: dependencies, libraries
  apt:
    name:
      - autoconf
      - gcc
      - libc6
      - make
      - wget
      - unzip
      - apache2
      - php
      - libapache2-mod-php7.4
      - libgd-dev
      - openssl
      - libssl-dev
      - autoconf
      - gcc
      - libc6
      - libncrypt-dev
      - make
      - libssl-dev
      - wget
      - bc
      - gawk
      - dc
      - build-essential
      - snmp
      - libnet-snmp-perl
      - gettext
      - python3-pip
      - python3
    state: latest

- name: Installing passlib python package
  pip:
    name: passlib

- name: Creating directory for the downloaded files
  file:
    path: ~/nagios
    state: directory

- name: Installing and extracting Nagios
  unarchive:
    src: https://github.com/NagiosEnterprises/nagioscore/archive/nagios-4.4.6.tar.gz
    dest: ~/nagios
    remote_src: yes
    mode: 0755
    owner: root
    group: root

- name: Compiling, installing, and Creating users and group for Nagios
  shell: |
    cd ~/nagios/nagioscore-*
    sudo ./configure --with-httpd-conf=/etc/apache2/sites-enabled
    sudo make all
    sudo make install-groups-users
    sudo usermod -a -G nagios www-data
    sudo make install
    sudo make install-demoninit
    sudo make install-commandnode
    sudo make install-config
    sudo make install-webconf
    sudo a2enmod rewrite
    sudo a2enmod cgi

- name: Installing the Nagios plugins and then extracting it
  unarchive:
    src: https://github.com/nagios-plugins/nagios-plugins/archive/release-2.3.3.tar.gz
    dest: ~/nagios
    remote_src: yes
    mode: 0755
    owner: root
    group: root

```

```
- name: Compiling and installing the Nagios
  shell: |
    cd ~/nagios/nagios-plugins*
    ./tools/setup
    ./configure
    make
    make install

- name: Adding a user to a password file
  community.general.htpasswd:
    path: /usr/local/nagios/etc/htpasswd.users
    name: agpaoanagi
    password: mad12

- name: Starting/Restarting Nagios
  service:
    name: nagios
    state: restarted
    enabled: true

- name: Starting/Restarting httpd
  service:
    name: apache2
    state: restarted
    enabled: true
```

Figure 3.11 Contents of main.yml within the ubuntu directory

Inside the main.yml playbook, you could see tasks that will install, compile and configure the packages for installing the Nagios and the installation of the Nagios itself in a remote server with an operating system of Ubuntu. In addition, the playbook will also create or add a user to a password file for the Nagios. After the installation of Nagios and creating or adding a user to a password file there is a task that will start or restart the Nagios and apache2.


```

madiane@workstation:~/Final_Exam_Agpa0a$ ansible-playbook --ask-become-pass config.yaml
BECOME password:

PLAY [all] *****

TASK [Gathering Facts] *****
ok: [192.168.56.107]
ok: [192.168.56.105]

TASK [update repository index (CentOS)] *****
skipping: [192.168.56.105]
ok: [192.168.56.107]

TASK [install updates (Ubuntu)] *****
skipping: [192.168.56.107]
ok: [192.168.56.105]

TASK [MOTD] *****
ok: [192.168.56.107]
ok: [192.168.56.105]

PLAY [ubuntu] *****

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

TASK [ubuntu : Installing required packages for installing Nagios] *****
ok: [192.168.56.105]

TASK [ubuntu : Installing passlib python package] *****
ok: [192.168.56.105]

TASK [ubuntu : Creating directory for the downloaded files] *****
ok: [192.168.56.105]

TASK [ubuntu : Installing and extracting Nagios] *****
ok: [192.168.56.105]

TASK [ubuntu : Compiling, installing, and Creating users and group for Nagios] *****
changed: [192.168.56.105]

TASK [ubuntu : Installing the Nagios plugins and then extracting it] *****
ok: [192.168.56.105]

TASK [ubuntu : Compiling and installing the Nagios] *****
changed: [192.168.56.105]

TASK [ubuntu : Adding a user to a password file] *****
ok: [192.168.56.105]

TASK [ubuntu : Starting/Restarting Nagios] *****
changed: [192.168.56.105]

TASK [ubuntu : Starting/Restarting httpd] *****
changed: [192.168.56.105]

PLAY [centos] *****

TASK [Gathering Facts] *****
ok: [192.168.56.107]

TASK [centos : Installing required packages for installing Nagios] *****
ok: [192.168.56.107]

TASK [centos : Installing passlib python package] *****
ok: [192.168.56.107]

TASK [centos : Creating directory for the downloaded files] *****
ok: [192.168.56.107]

TASK [centos : Installing and extracting Nagios] *****
ok: [192.168.56.107]
Help [centos : Compiling, installing, and creating users and group for Nagios] *****
changed: [192.168.56.107]

TASK [centos : Installing the Nagios plugins and then extracting it] *****
ok: [192.168.56.107]

TASK [centos : Compiling and installing the Nagios plugins] *****
changed: [192.168.56.107]

TASK [centos : Adding a user to a password file] *****
ok: [192.168.56.107]

TASK [centos : Starting/Restarting Nagios] *****
changed: [192.168.56.107]

```

```

TASK [centos : Starting/Restarting httpd] *****
changed: [192.168.56.107]

PLAY RECAP *****
192.168.56.105      : ok=14   changed=4    unreachable=0    failed=0    skipped=1    rescued=0    ignored=0
192.168.56.107      : ok=14   changed=4    unreachable=0    failed=0    skipped=1    rescued=0    ignored=0

```

Figure 3.12 Running the config.yaml playbook

After completing all of the playbook (config.yaml, main.yml for CentOS and Ubuntu remote servers), I execute the playbook by entering the command “ansible-playbook –ask-become-pass config.yaml”. First, it plays the pre-tasks assigned to all of the remote servers. After that, it runs the play for the ubuntu group and centos group consecutively that consists of tasks that would change the motd and add users for Ubuntu and Centos server, install the packages for installing the Nagios, Nagios, Nagios plugins, creation or addition of a user to a password file and then the starting/restarting of the nagios, apache in Ubuntu and httpd in CentOS.

```

madiane@workstation:~/Final_Exam_Agpaoa$ git add *
madiane@workstation:~/Final_Exam_Agpaoa$ git commit -m "Final Exam"
[main ab4cecf] Final Exam
6 files changed, 251 insertions(+)
create mode 100644 ansible.cfg
create mode 100644 config.yaml
create mode 100644 inventory
create mode 100644 motd.j2
create mode 100644 roles/centos/tasks/main.yml
create mode 100644 roles/ubuntu/tasks/main.yml
madiane@workstation:~/Final_Exam_Agpaoa$ git push
Enumerating objects: 14, done.
Counting objects: 100% (14/14), done.
Compressing objects: 100% (8/8), done.
Writing objects: 100% (13/13), 2.14 KiB | 1.07 MiB/s, done.
Total 13 (delta 1), reused 0 (delta 0), pack-reused 0
remote: Resolving deltas: 100% (1/1), done.
To github.com:qmja/Final_Exam_Agpaoa.git
b4d0b6a..ab4cecf main -> main

```

Figure 4 Saving the files to my Github repository

First I add the all files within the Final_Exam_Agpaoa directory by using the command “git add *”. Next, I commit the changes by using the command “git commit -m” and then I pushed the changes to my repository by using the command “git push”.

GitHub Link: https://github.com/qmja/Final_Exam_Agpaoa.git

```

madiane@workstation:~$ ssh madiane@192.168.56.105
Welcome to Ubuntu 22.04.1 LTS (GNU/Linux 5.15.0-56-generic x86_64)

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

7 updates can be applied immediately.
6 of these updates are standard security updates.
To see these additional updates run: apt list --upgradable

Ansible Manged node by madiane
Last login: Tue Dec 13 08:37:16 2022 from 192.168.56.103
madiane@server1:~$ exit
logout
Connection to 192.168.56.105 closed.

```

Figure 5.1 Changed Motd of Ubuntu server

I established an ssh connection to verify that the Motd was changed to “Ansible Managed by madiane”. Based on the image above it was confirmed that the motd was changed by “Ansible Managed node by madiane”.

```
madiane@workstation:~$ ssh madiane@192.168.56.107
Last login: Mon Dec 12 19:39:04 2022 from 192.168.56.103
Ansible Manged node by madiane
[madiane@localhost ~]$ exit
logout
Connection to 192.168.56.107 closed.
```

Figure 5.2 Changed Motd of CentOS server

I established an ssh connection to verify that the Motd was changed to “Ansible Managed by madiane”. Based on the image above it was confirmed that the motd was changed by “Ansible Managed node by madiane”

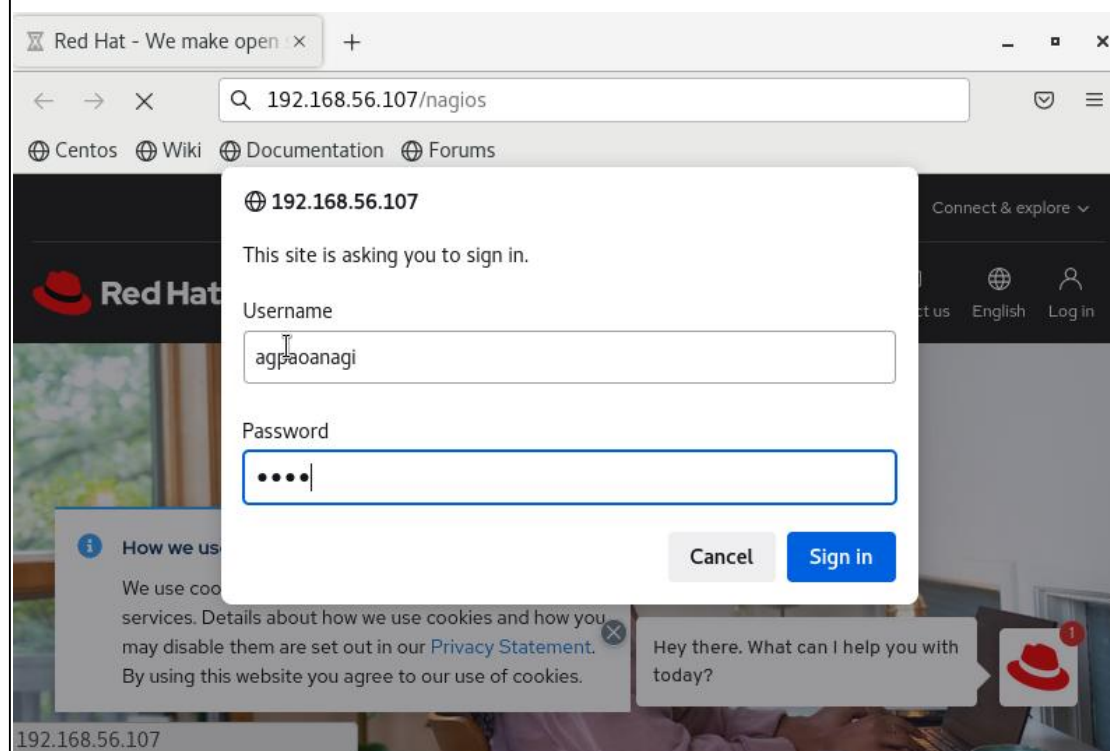


Figure 5.3 Accessing and Signing-in to the Nagios Core in the CentOS

In order to access the Nagios Core, I went to the web browser and typed “192.168.56.107/nagios” the syntax is http://IP address/nagios. I typed the username I added in the password file and entered the password.



Figure 5.4 Successfully Signing-in Nagios Core

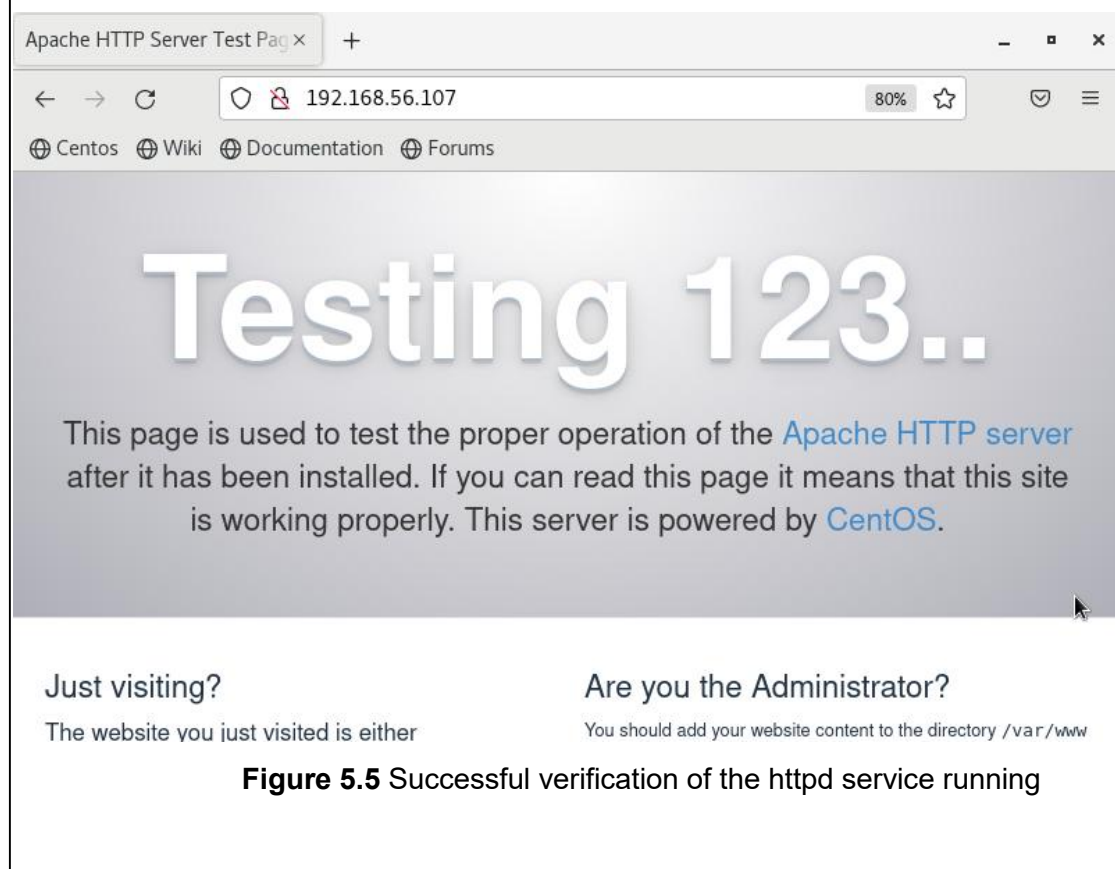


Figure 5.5 Successful verification of the httpd service running

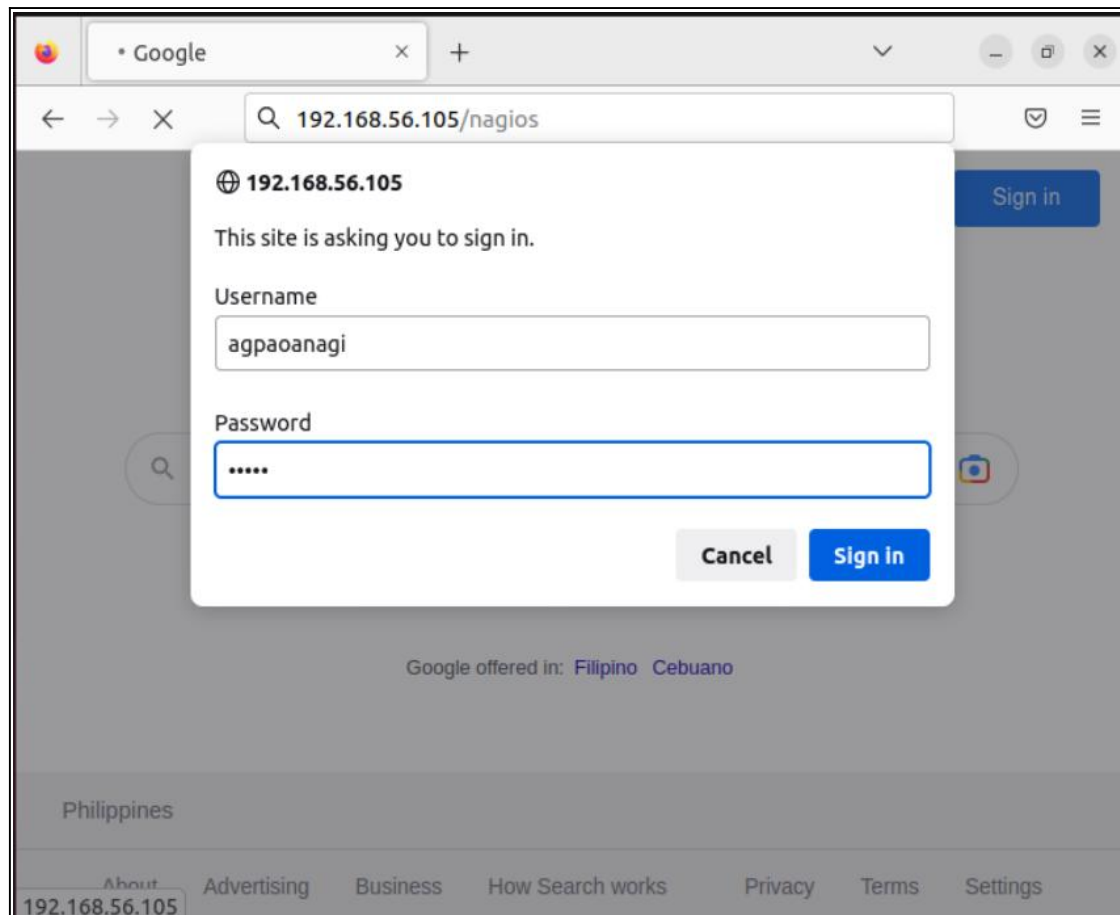


Figure 5.6 Accessing and Signing-in to the Nagios Core in Ubuntu

In order to access the Nagios Core, I went to the web browser and typed "192.168.56.105/nagios" the syntax is http://IP address/nagios. I typed the username I added in the password file and entered the password.

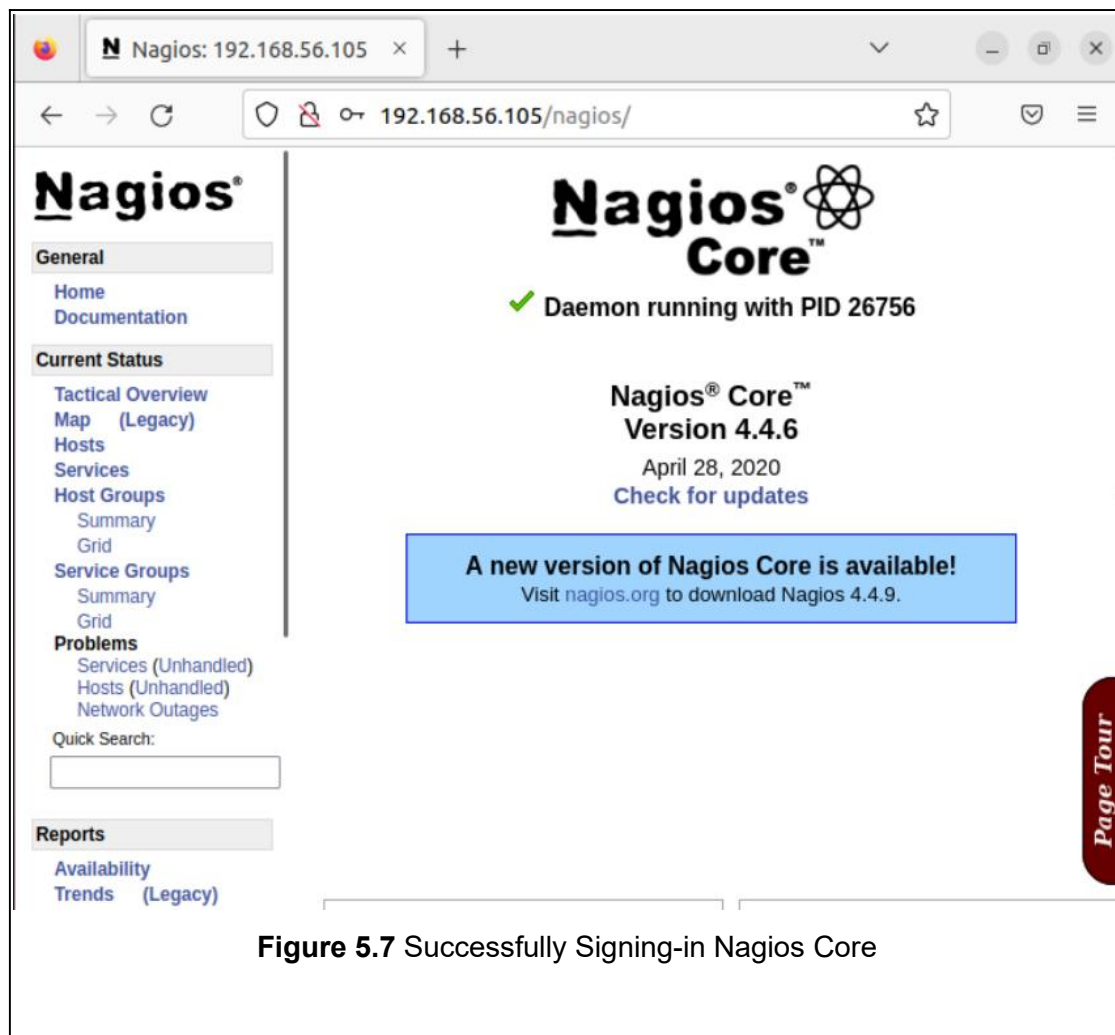


Figure 5.7 Successfully Signing-in Nagios Core

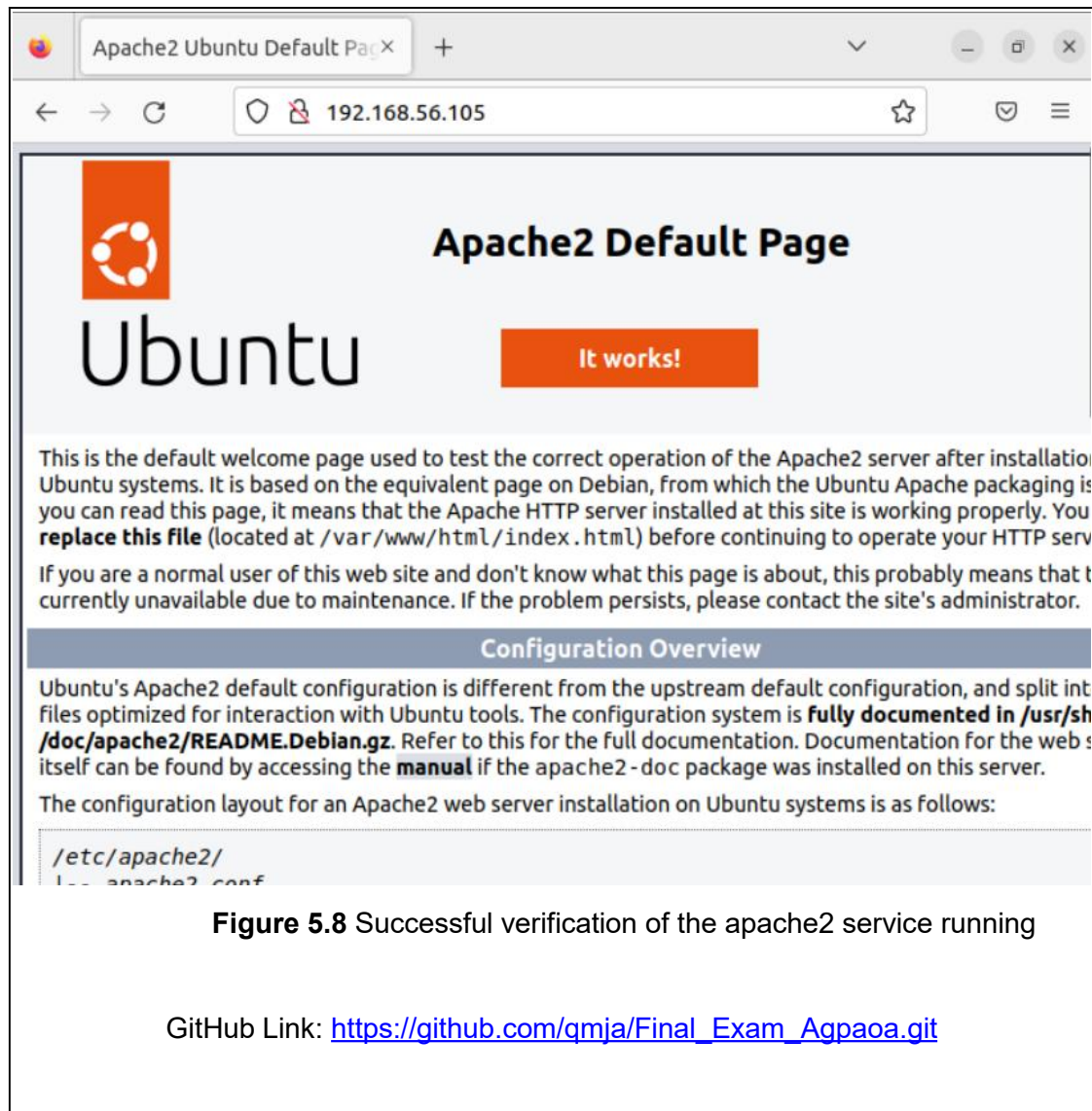


Figure 5.8 Successful verification of the apache2 service running

GitHub Link: https://github.com/qmjia/Final_Exam_Agpaoa.git