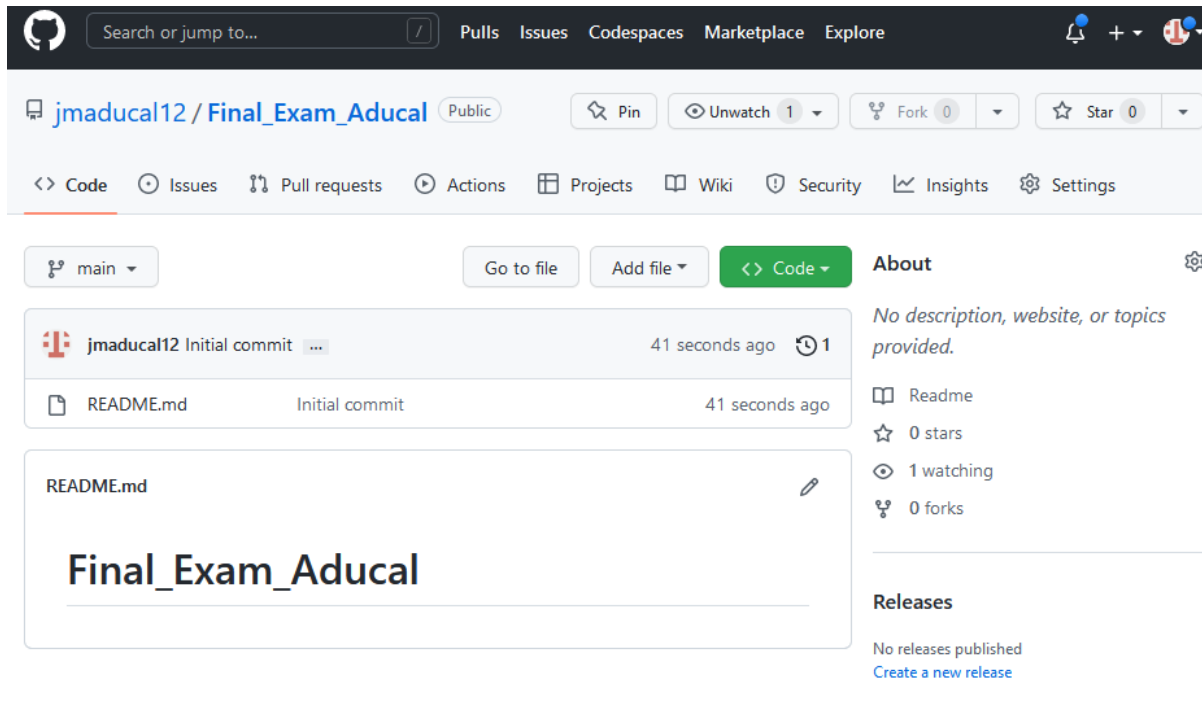


<b>Name:</b> Aducal, John Mark S.	<b>Date:</b> 12 / 10 / 2022
<b>Course and Section:</b> CPE232 - CPE31S24	<b>Instructor:</b> Engr. Jonathan V. Taylar
<b>Final Skills Exam</b>	
<b>Tools Needed:</b>	
<ol style="list-style-type: none"><li>1. VM with Ubuntu, CentOS and Ansible installed</li><li>2. Web browser.</li></ol>	
<b>Procedure:</b>	
<ol style="list-style-type: none"><li>1. Create a repository and label it as "Final_Exam_Surname".</li><li>2. Clone your new repository in your VM</li><li>3. Create an Ansible playbook that does the following with an input of a config.yaml file and structure inventory file.<ol style="list-style-type: none"><li>3.1 Install and configure one enterprise service that can be installed in Debian and Centos servers</li><li>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)</li><li>4.4 Change Motd as "Ansible Managed by &lt;username&gt;"</li></ol></li><li>4. Push and commit your files in GitHub</li><li>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.</li></ol> <p><u>Note: Extra points if you will implement the said services via containerization.</u></p>	
<b>Output:</b>	

## Task 1: Create a new Repository



I created a new repository named Final\_Exam\_Aducal.

## Task 2: Clone your new repository in your VM.

```
jmaducal@workstation: ~/Final_Exam_Aducal
jmaducal@workstation:~$ git clone git@github.com:jmaducal12/Final_Exam_Aducal.git
Cloning into 'Final_Exam_Aducal'...
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.
jmaducal@workstation:~$ ls
AducalJM_PrelimExam  Desktop      Downloads    Pictures     Templates
cpe                  dockerfile   Final_Exam_Aducal  Public      Videos
CPE232_John-Mark-Aducal  Documents    Music        snap
jmaducal@workstation:~$ cd Final_Exam_Aducal
jmaducal@workstation:~/Final_Exam_Aducal$
```

The new repository I created, I cloned it to my workstation.

```
jmaducal@workstation: ~/Final_Exam_Aducal
GNU nano 6.2 inventory
[Debian_Server]
localhost ansible_connection=local

[CentOS_Server]
CentOS ansible_host=192.168.56.106
```

These are the contents of the Inventory file including the Debian and CentOS servers and its respective IP addresses.

```
jmaducal@workstation: ~/Final_Exam_Aducal
GNU nano 6.2 ansible.cfg
[defaults]
inventory = inventory
host_key_checking = False

deprecation_warnings = False

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

This are the configurations inside of Ansible.cfg file

### Task 3: Create a roles

```
jmaducal@workstation: ~/Final_Exam_Aducal
jmaducal@workstation:~/Final_Exam_Aducal$ nano config.yaml
```

I created a new file named config.yaml

```
jmaducal@workstation: ~/Final_Exam_Aduca
GNU nano 6.2 config.yaml
---
- hosts: all
  become: true
  pre_tasks:
    - name: install updates (CentOS)
      tags: always
      dnf:
        update_only: yes
        update_cache: yes
      when: ansible_distribution == "CentOS"
    - name: install updates (Ubuntu)
      tags: always
      apt:
        upgrade: dist
        update_cache: yes
      when: ansible_distribution == "Ubuntu"

- hosts: Debian_Server
  become: true
  roles:
    - Debian_Server

- hosts: CentOS_Server
  become: true
  roles:
    - CentOS_Server
```

Inside the config.yaml file, there are pre\_tasks for installing updates for CentOS and Ubuntu and particular roles for Debian\_server and CentOS\_server.

```
jmaducal@workstation: ~/Final_Exam_Aducal/roles
jmaducal@workstation:~/Final_Exam_Aducal$ mkdir roles
jmaducal@workstation:~/Final_Exam_Aducal$ cd roles
jmaducal@workstation:~/Final_Exam_Aducal/roles$ mkdir Debian_Server
jmaducal@workstation:~/Final_Exam_Aducal/roles$ mkdir CentOS_Server
jmaducal@workstation:~/Final_Exam_Aducal/roles$ ls
CentOS_Server  Debian_Server
jmaducal@workstation:~/Final_Exam_Aducal/roles$ cd Debian_Server
jmaducal@workstation:~/Final_Exam_Aducal/roles/Debian_Server$ mkdir tasks
jmaducal@workstation:~/Final_Exam_Aducal/roles/Debian_Server$ cd tasks
jmaducal@workstation:~/Final_Exam_Aducal/roles/Debian_Server/tasks$ nano main.y
ml
jmaducal@workstation:~/Final_Exam_Aducal/roles/Debian_Server/tasks$ cd ..
jmaducal@workstation:~/Final_Exam_Aducal/roles/Debian_Server$ cd ..
jmaducal@workstation:~/Final_Exam_Aducal/roles$ cd CentOS_Server
jmaducal@workstation:~/Final_Exam_Aducal/roles/CentOS_Server$ mkdir tasks
jmaducal@workstation:~/Final_Exam_Aducal/roles/CentOS_Server$ cd tasks
jmaducal@workstation:~/Final_Exam_Aducal/roles/CentOS_Server/tasks$ nano main.y
ml
```

```
jmaducal@workstation: ~/Final_Exam_Aducal/roles
jmaducal@workstation:~/Final_Exam_Aducal/roles$ tree
.
├── CentOS_Server
│   └── tasks
│       └── main.yml
└── Debian_Server
    └── tasks
        └── main.yml

4 directories, 2 files
jmaducal@workstation:~/Final_Exam_Aducal/roles$
```

I create new directory roles inside the Final\_Exam\_Aducal directory. And then, Inside the roles directory, I created a Debian\_server and CentOS\_Server directory. Inside of both directories I create a new directory named tasks again. Inside the directory tasks for both directories I created a file named main.yml.

#### Task 4.1: Create a tasks for installing enterprise services and Monitoring tool

For Debian

```
jmaducal@workstation: ~/Final_Exam_Aducad/roles/Debian_...  
GNU nano 6.2 main.yml  
- name: Install apache and php for Debian Server  
  apt:  
    name:  
      - apache2  
      - libapache2-mod-php  
    state: latest  
    update_cache: yes  
  when: ansible_distribution == "Ubuntu"  
  
- name: Install Mariadb service to Debian_Server  
  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 to Debian_Server  
  apt:  
    name:  
      - nagios4  
    state: latest  
    update_cache: yes  
  when: ansible_distribution == "Ubuntu"
```

These are the contents inside the main.yml of Debian\_Server directory there are tasks for installing web services such as apache and php also database service mariadb and available tools such as Nagios monitoring tool.

**Task 4.2: Create a tasks for installing enterprise services and Monitoring tool  
For CentOS**

```
jmaducal@workstation: ~/Final_Exam_Aducal/roles/CentOS...
GNU nano 6.2 main.yml
- name: Install httpd and php for CentOS_Server
  apt:
    name:
      - httpd
      - php
    state: latest
  when: ansible_distribution == "CentOS"

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

- name: Install Mariadb service to CentOS_Server
  apt:
    name: mariadb-server
    state: latest
  when: ansible_distribution == "CentOS"

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

- name: Install Nagios Monitoring tool to CentOS_Server
  apt:
    name:
      - nagios
    state: latest
    update_cache: yes
  when: ansible_distribution == "Ubuntu"
```

These are the contents inside the main.yml of CentOS\_Server directory there are tasks for installing web services such as httpd and php also database service mariadb and available tools such as Nagios monitoring tool.

## Task 5: Running the Ansible Playbook

```
jmaducal@workstation: ~/Final_Exam_Aducal/roles/CentOS...
jmaducal@workstation:~/Final_Exam_Aducal$ ansible-playbook --ask-become-pass config.yaml
BECOME password:

PLAY [all] *****
*

TASK [Gathering Facts] *****
*
ok: [CentOS]
ok: [localhost]

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

TASK [install updates (Ubuntu)] *****
*
skipping: [CentOS]
changed: [localhost]
```

```
PLAY [Debian_Server] *****
*

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

TASK [Debian_Server : Install apache and php for Debian Server] *****
*
changed: [localhost]

TASK [Debian_Server : Install Mariadb service to Debian_Server] *****
*
changed: [localhost]

TASK [Debian_Server : mariadb- Restarting/Enabling] *****
*
changed: [localhost]

TASK [Debian_Server : Install Nagios Monitoring tool to Debian_Server] *****
*
changed: [localhost]
```



```

TASK [CentOS_Server : Install httpd and php for CentOS_Server] *****
*
ok: [CentOS]

TASK [CentOS_Server : httpd- Restarting/Enabling] *****
*
changed: [CentOS]

TASK [CentOS_Server : Install Mariadb service to CentOS_Server] *****
*
ok: [CentOS]

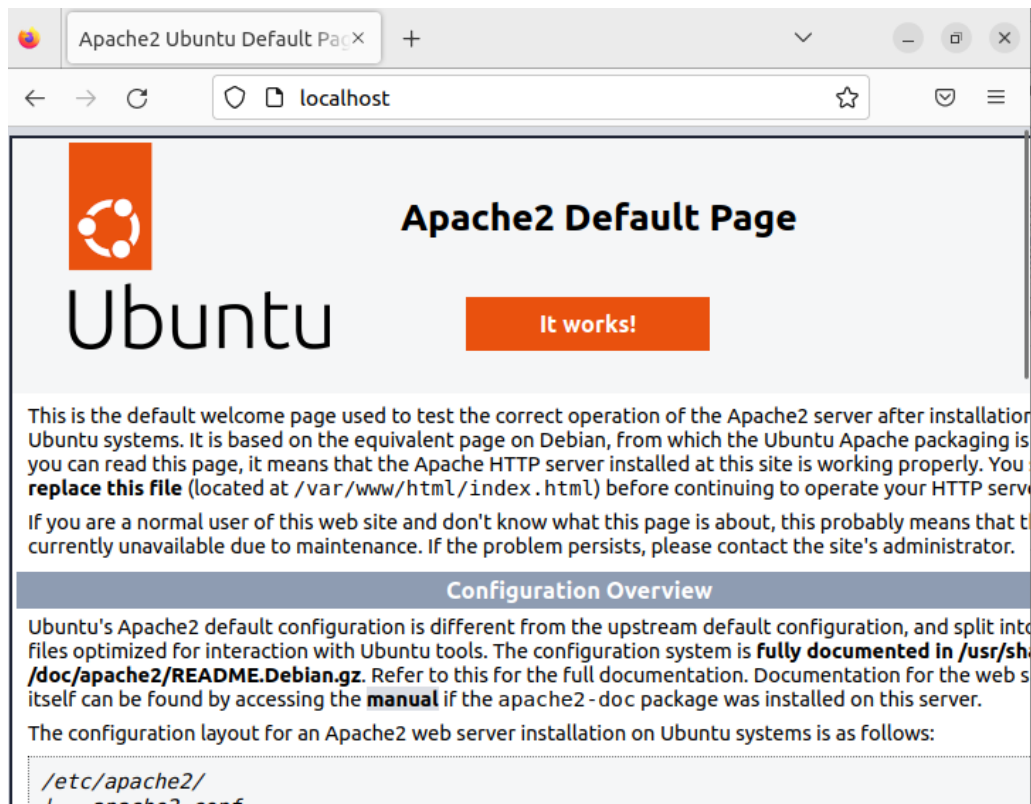
TASK [CentOS_Server : mariadb- Restarting/Enabling] *****
*
changed: [CentOS]

TASK [CentOS_Server : Install Nagios Monitoring tool to CentOS_Server] *****
*
changed: [CentOS]

PLAY RECAP *****
*
CentOS      : ok=8    changed=3    unreachable=0    failed=0
skipped=1   rescued=0   ignored=0
localhost  : ok=7    changed=2    unreachable=0    failed=0
skipped=1   rescued=0   ignored=0

```

After running the config.yaml using ansible, I can say I'd already installed the web services and database service in both Debian(localhost) and CentOS(CentOS) servers.



Debian(localhost) Apache2 page

PHP Version 8.1.2-1ubuntu2.8	
System	Linux workstation 5.15.0-52-generic #58-Ubuntu SMP Thu Oct 13 08:01:42 UTC 2022
Build Date	Nov 2 2022 13:35:25
Build System	Linux
Server API	Apache 2.0 Handler
Virtual Directory Support	disabled
Configuration File (php.ini) Path	/etc/php/8.1/apache2
Loaded Configuration File	/etc/php/8.1/apache2/php.ini
Scan this dir for additional .ini files	/etc/php/8.1/apache2/conf.d
Additional .ini files parsed	/etc/php/8.1/apache2/conf.d/10-opcache.ini, /etc/php/8.1/apache2/conf.d/20-calendar.ini, /etc/php/8.1/apache2/conf.d/20-exif.ini, /etc/php/8.1/apache2/conf.d/20-ffi.ini, /etc/php/8.1/apache2/conf.d/20-ftp.ini, /etc/php/8.1/apache2/conf.d/20-iconv.ini, /etc/php/8.1/apache2/conf.d/20-posix.ini, /etc/php/8.1/apache2/conf.d/20-readline.ini, /etc/php/8.1/apache2/conf.d/20-shmop.ini, /etc/php/8.1/apache2/conf.d/20-sockets.ini, /etc/php/8.1/apache2/conf.d/20-sysvsem.ini, /etc/php/8.1/apache2/conf.d/20-tokenizer.ini
PHP API	20210902
PHP Extension	20210902

### Debian(localhost) PHP page

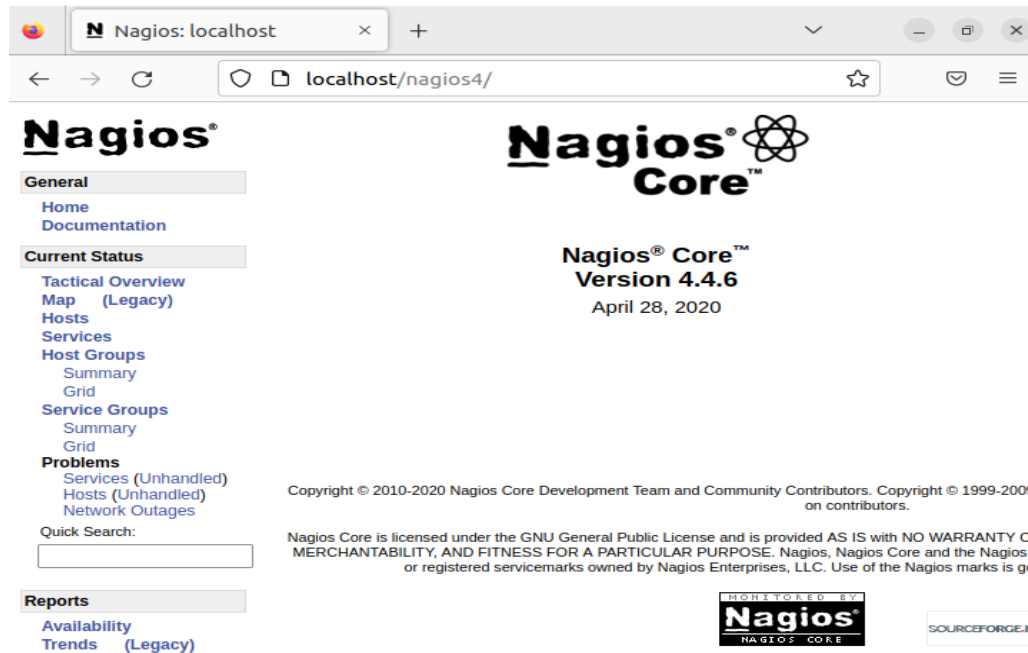
```
jmaducal@workstation: ~
jmaducal@workstation:~$ sudo mariadb
[sudo] password for jmaducal:
Welcome to the MariaDB monitor.  Commands end with ; or \g.
Your MariaDB connection id is 32
Server version: 10.6.11-MariaDB-0ubuntu0.22.04.1 Ubuntu 22.04

Copyright (c) 2000, 2018, Oracle, MariaDB Corporation Ab and others.

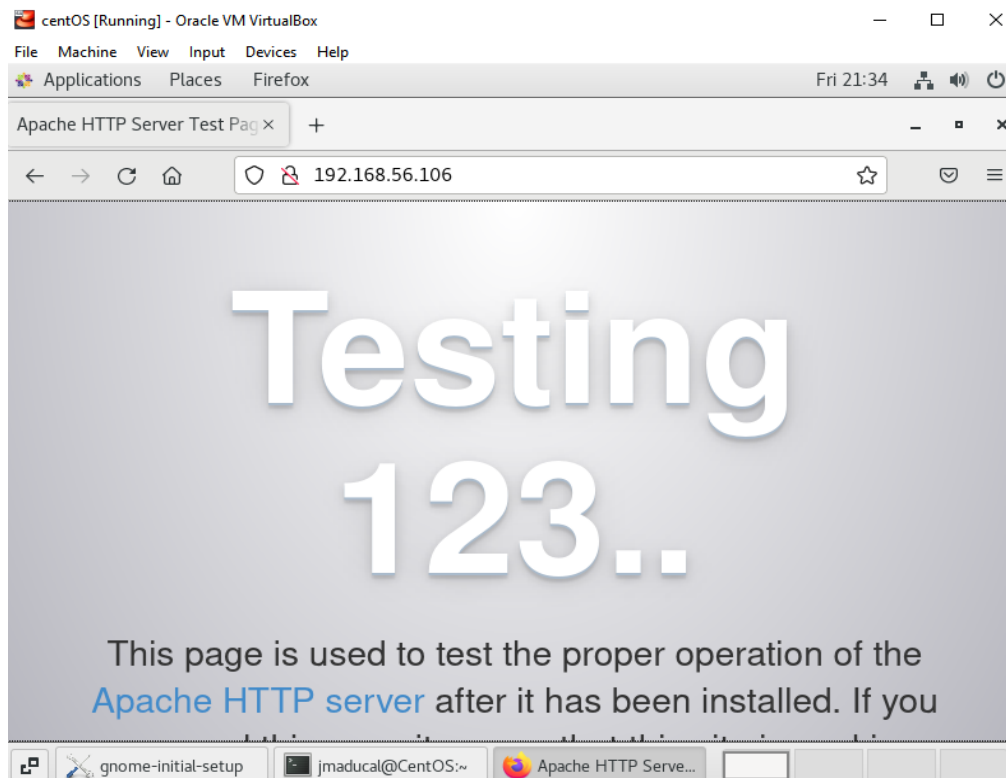
Type 'help;' or '\h' for help. Type '\c' to clear the current input statement.

MariaDB [(none)]> exit
Bye
jmaducal@workstation:~$ mariadb --version
mariadb Ver 15.1 Distrib 10.6.11-MariaDB, for debian-linux-gnu (x86_64) using
EditLine wrapper
jmaducal@workstation:~$
```

### Debian(localhost) Mariadb database service



### Debian(localhost) Nagios Monitoring tool



### CentOS Apache HTTP Web service

centOS [Running] - Oracle VM VirtualBox

File Machine View Input Devices Help

Applications Places Firefox

Fri 21:37

phpinfo()

192.168.56.106/phpinfo.php

**PHP Version 5.4.16**

System	Linux CentOS.localdomain 3.10.0-1160.76.1.el7.x86_64 #1 SMP Wed Aug 10 16:21:17 UTC 2022 x86_64
Build Date	Apr 1 2020 04:08:16
Server API	Apache 2.0 Handler
Virtual Directory Support	disabled
Configuration File (php.ini) Path	/etc
Loaded Configuration File	/etc/php.ini
Scan this dir for additional .ini files	/etc/php.d
Additional .ini files parsed	/etc/php.d/curl.ini, /etc/php.d/fileinfo.ini, /etc/php.d/json.ini, /etc/php.d/phar.ini, /etc/php.d/zip.ini
PHP API	20100412
PHP Extension	20100525
Zend Extension	220100525
Zend Extension Build	API220100525.NTS

gnome-initial-setup jmaducal@CentOS/... phpinfo() - Mozilla...

## CentOS PHP page

centOS [Running] - Oracle VM VirtualBox

File Machine View Input Devices Help

Applications Places Terminal

Fri 21:42

jmaducal@CentOS:~

File Edit View Search Terminal Help

```
[jmaducal@CentOS ~]$ sudo mysql
Welcome to the MariaDB monitor.  Commands end with ; or \g.
Your MariaDB connection id is 3
Server version: 5.5.68-MariaDB MariaDB Server

Copyright (c) 2000, 2018, Oracle, MariaDB Corporation Ab and others.

Type 'help;' or '\h' for help. Type '\c' to clear the current input statement.

MariaDB [(none)]> exit
Bye
[jmaducal@CentOS ~]$ mysql --version
mysql Ver 15.1 Distrib 5.5.68-MariaDB, for Linux (x86_64) using readline 5.1
[jmaducal@CentOS ~]$
```

## CentOS Mariadb database service

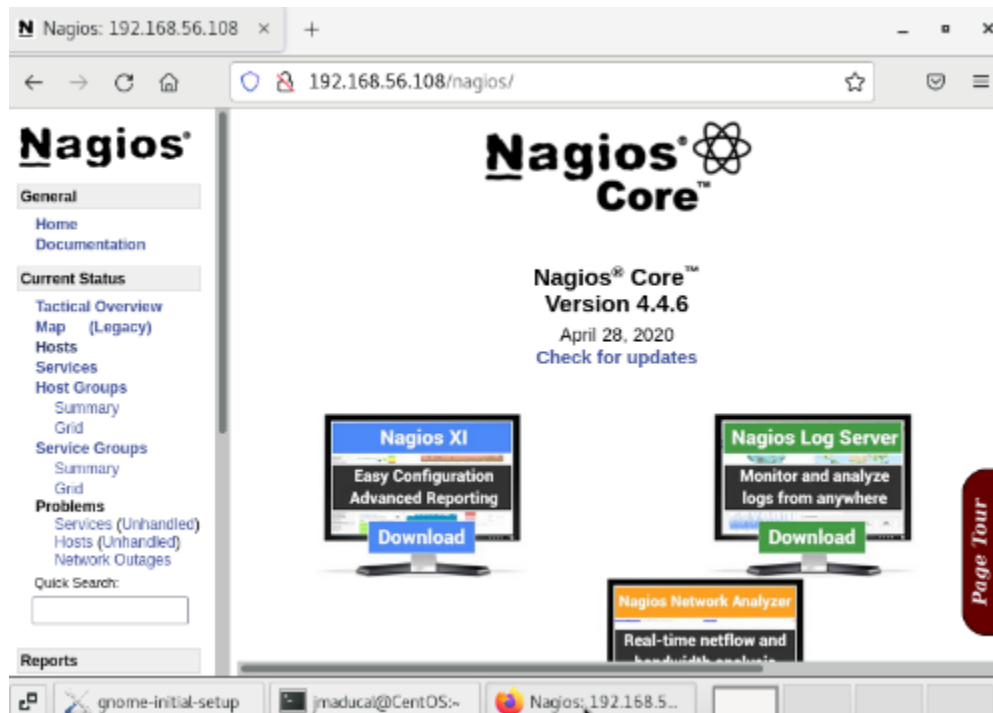
```
centOS [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Applications Places Terminal Fri 21:46
jmaducal@CentOS:~
File Edit View Search Terminal Help
[jmaducal@CentOS ~]$ nagios -V

Nagios Core 4.4.6
Copyright (c) 2009-present Nagios Core Development Team and Community Contributors
Copyright (c) 1999-2009 Ethan Galstad
Last Modified: 2020-04-28
License: GPL

Website: https://www.nagios.org
This program is free software; you can redistribute it and/or modify
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published by the Free Software Foundation.

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but WITHOUT ANY WARRANTY; without even the implied warranty of
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GNU General Public License for more details.

You should have received a copy of the GNU General Public License
along with this program; if not, write to the Free Software
Foundation, Inc., 675 Mass Ave, Cambridge, MA 02139, USA.
```



CentOS Nagios Monitoring Tool

## Task 6: Change Motd as "Ansible Managed by <username>"

```
jmaducal@workstation: ~/Final_Exam_Aducal
GNU nano 6.2 config.yaml
---
- hosts: all
  become: true
  pre_tasks:
    - name: install updates (CentOS)
      tags: always
      dnf:
        update_only: yes
        update_cache: yes
      when: ansible_distribution == "CentOS"
    - name: install updates (Ubuntu)
      tags: always
      apt:
        update_cache: yes
      when: ansible_distribution == "Ubuntu"
    - name: Create a banner motd for remote servers ssh connection
      copy:
        content: "Ansible Manage by jmaducal\n"
        dest: /etc/motd
```

```
TASK [Create a banner motd for remote servers ssh connection] *****
*
changed: [localhost]
changed: [CentOS]
```

```
PLAY RECAP *****
*
CentOS      : ok=9    changed=3    unreachable=0    failed=0
skipped=1   rescued=0   ignored=0
localhost  : ok=8    changed=3    unreachable=0    failed=0
skipped=1   rescued=0   ignored=0
```

```
jmaducal@workstation: ~/Final_Exam_Aducal
jmaducal@workstation:~/Final_Exam_Aducal$ ssh jmaducal@192.168.56.106
Last login: Fri Dec 9 22:03:58 2022 from debian_server
Ansible Manage by jmaducal
[jmaducal@CentOS ~]$ exit
logout
Connection to 192.168.56.106 closed.
jmaducal@workstation:~/Final_Exam_Aducal$ ssh jmaducal@CentOS_Server
Last login: Fri Dec 9 22:04:13 2022 from debian_server
Ansible Manage by jmaducal
[jmaducal@CentOS ~]$ exit
logout
Connection to centos_server closed.
jmaducal@workstation:~/Final_Exam_Aducal$
```

```
jmaducal@workstation: ~
File Edit View Search Terminal Help
[jmaducal@CentOS ~]$ ssh jmaducal@192.168.56.101
The authenticity of host '192.168.56.101 (192.168.56.101)' can't be established.
ECDSA key fingerprint is SHA256:cca0bmq0T2byB6uVWtPMB0uSuaGNU55v6Re47Ploec8.
ECDSA key fingerprint is MD5:2c:96:0a:2f:b7:54:66:38:c9:66:26:ea:a7:ac:02:2d.
Are you sure you want to continue connecting (yes/no)? yes
Warning: Permanently added '192.168.56.101' (ECDSA) to the list of known hosts.
jmaducal@192.168.56.101's password:
welcome to Ubuntu 22.04.1 LTS (GNU/Linux 5.15.0-52-generic x86_64)

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

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

19 updates could not be installed automatically. For more details,
see /var/log/unattended-upgrades/unattended-upgrades.log
Ansible Manage by jmaducal
jmaducal@workstation:~$
```

```
jmaducal@workstation: ~
File Edit View Search Terminal Help
jmaducal@workstation:~$ ssh jmaducal@Debian_Server
The authenticity of host 'debian_server (192.168.56.101)' can't be established.
ED25519 key fingerprint is SHA256:u3MFRwVpnAAH0lgP1MSZz+qr2zb30vfG74d00MsEQM4.
This key is not known by any other names
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added 'debian_server' (ED25519) to the list of known hosts.
jmaducal@debian_server's password:
Welcome to Ubuntu 22.04.1 LTS (GNU/Linux 5.15.0-52-generic x86_64)

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

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

19 updates could not be installed automatically. For more details,
see /var/log/unattended-upgrades/unattended-upgrades.log
Ansible Manage by jmaducal
Last login: Sat Dec 10 11:05:20 2022 from 192.168.56.106
jmaducal@workstation:~$
```

**When connecting to remote server there is Motd “Ansible Manage by jmaducal”**



## Task 7: Add, commit and push the Final\_Exam\_Aducal to GitHub repo

```
jmaducal@workstation: ~/Final_Exam_Aducal
jmaducal@workstation:~/Final_Exam_Aducal$ git status
On branch main
Your branch is up to date with 'origin/main'.

Untracked files:
  (use "git add <file>..." to include in what will be committed)
  ansible.cfg
  config.yaml
  inventory
  roles/

nothing added to commit but untracked files present (use "git add" to track)
jmaducal@workstation:~/Final_Exam_Aducal$ git add ansible.cfg
jmaducal@workstation:~/Final_Exam_Aducal$ git add config.yaml
jmaducal@workstation:~/Final_Exam_Aducal$ git add inventory
jmaducal@workstation:~/Final_Exam_Aducal$ git add roles/
jmaducal@workstation:~/Final_Exam_Aducal$ git commit -m "Final_Exam_Aducal"
[main 7d4dff4] Final_Exam_Aducal
5 files changed, 109 insertions(+)
create mode 100644 ansible.cfg
create mode 100644 config.yaml
create mode 100644 inventory
create mode 100644 roles/CentOS_Server/tasks/main.yml
create mode 100644 roles/Debian_Server/tasks/main.yml
```

```
jmaducal@workstation:~/Final_Exam_Aducal$ git push origin main
Enumerating objects: 13, done.
Counting objects: 100% (13/13), done.
Compressing objects: 100% (8/8), done.
Writing objects: 100% (12/12), 1.47 KiB | 753.00 KiB/s, done.
Total 12 (delta 1), reused 0 (delta 0), pack-reused 0
remote: Resolving deltas: 100% (1/1), done.
To github.com:jmaducal12/Final_Exam_Aducal.git
fae465d..7d4dff4  main -> main
jmaducal@workstation:~/Final_Exam_Aducal$
```

The screenshot shows the GitHub interface for a public repository named 'Final\_Exam\_Aducal' by user 'jmaducal12'. The repository has 0 stars, 0 forks, and 1 watching. The main branch is selected. A table lists the files in the repository: 'roles' (1 minute ago), 'README.md' (3 hours ago), 'ansible.cfg' (1 minute ago), 'config.yaml' (1 minute ago), and 'inventory' (1 minute ago). The 'README.md' file is expanded, showing the title 'Final\_Exam\_Aducal'. On the right, the 'About' section is empty, and the 'Releases' and 'Packages' sections show no published items.

File	Commit	Time
roles	Final_Exam_Aducal	1 minute ago
README.md	Initial commit	3 hours ago
ansible.cfg	Final_Exam_Aducal	1 minute ago
config.yaml	Final_Exam_Aducal	1 minute ago
inventory	Final_Exam_Aducal	1 minute ago

**Final\_Exam\_Aducal**



**GitHub Repository Link:**

[https://github.com/jmaducal12/Final\\_Exam\\_Aducal.git](https://github.com/jmaducal12/Final_Exam_Aducal.git)

**Reflection:**

In this activity, I am able to recall and perform some tasks in regards to installing the workload services that are used for enterprise such as Web and Database services. Also Installing Available monitoring tools such as Nagios in both Debian (localhost) and CentOS servers. All in all, I hope that all the lessons I learned here in managing enterprise servers course I can use it in the industry.

**HONOR PLEDGE:** "I affirm that I will not give or receive any unauthorized help on this activity, and that all work will be my own."



**John Mark Aducal**