Enterprise Software Platform

Homework 1 - Ansible

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Introduction

This document explains the process of setting up virtual machine, downloading and installing Ansible, configuring playbook along with deploying the web server to virtual machine server using Ansible.

Web server development

We have chosen Python Flask web server framework for this assignment because of its simplicity in configuration and deployment.

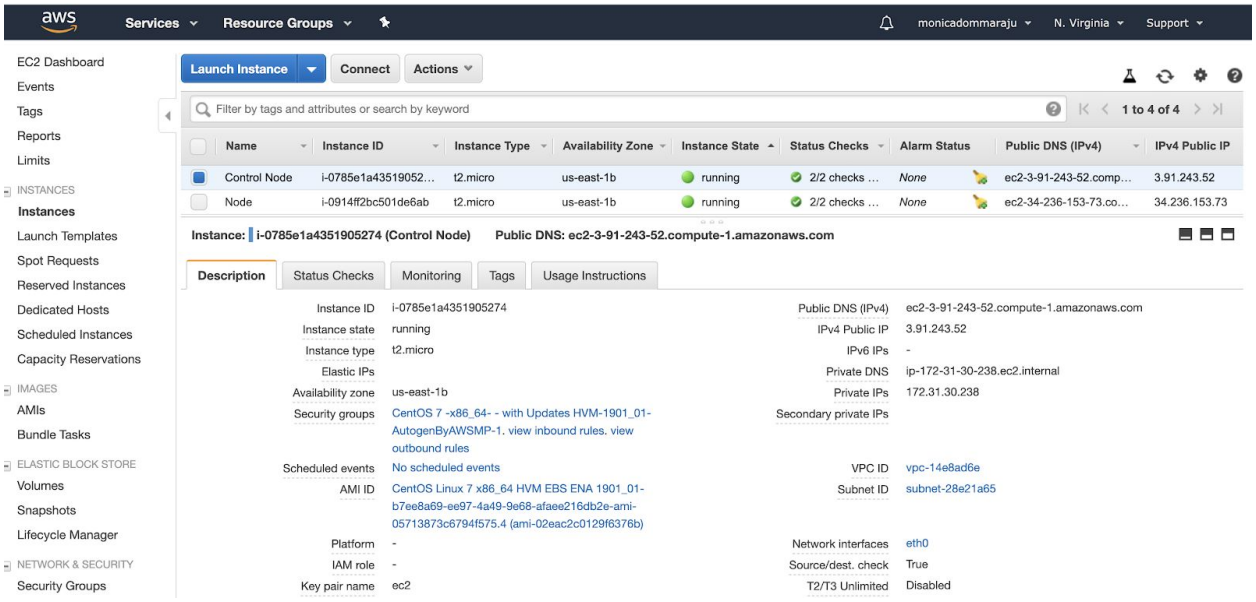
- Created a new Python flask project using PyCharm IDE.
- Added a resource file to accept GET / requests from the user and returns **Hello World!**
- Configured the server to listen on port 8080
- Code sample

```
# app.py
# --------------------------------
from flask import Flask

app = Flask(__name__)

@app.route('/')
def hello():
    return "Hello World!"

if __name__ == '__main__':
    app.run(host="0.0.0.0", port="8080")
```

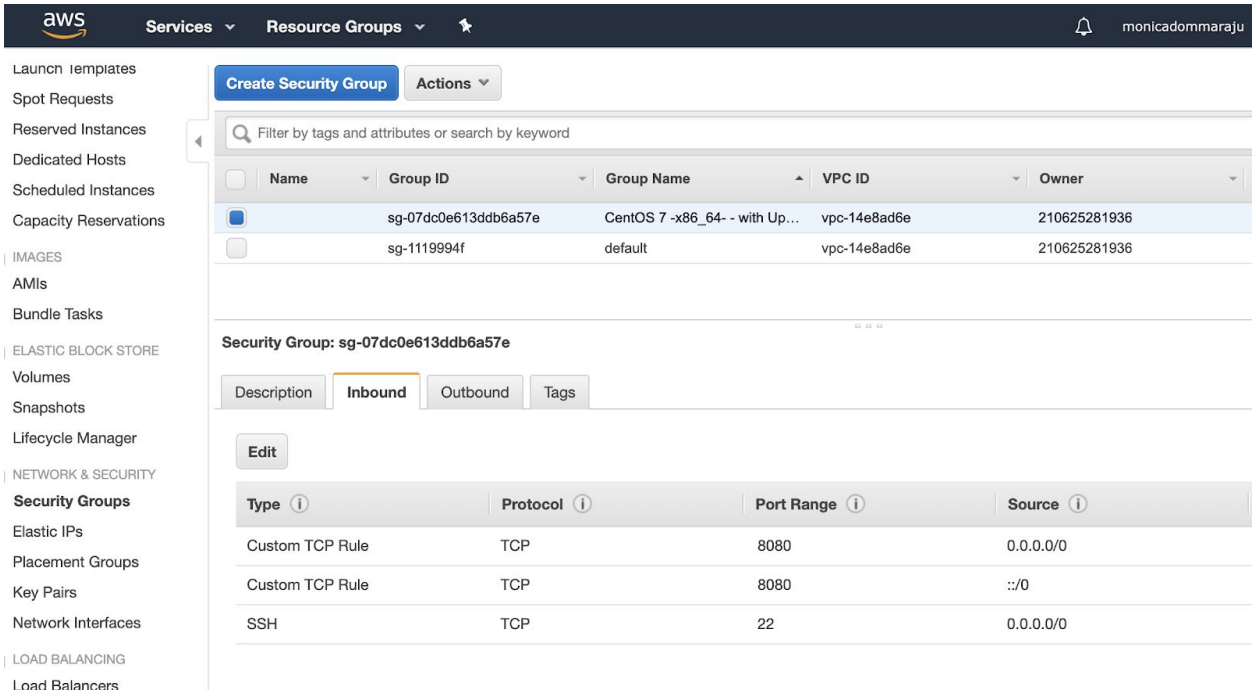
- Ran the flask application and made sure that the server is responding to GET / requests with Hello World!! Response.

Environment setup

- Boot two new amazon ec2 instances and name them as
    - Control Node server
    - Node server



- Edit security group to add TCP traffic on port 8080



- Save the **key pair** to local machine and store it in a secure location.
- Change the permissions of the file using **chmod** so that only admin can read the file.

```
chmod 400  ~/.ssh/ec2.pem
```

- Make sure we can login to instances using **ssh** like this

```
ssh centos@34.236.153.73 -i ~/.ssh/ec2.pem
```

In order to deploy flask app on **Node Server**, **Control Node Server** should be able to ssh into the Node Server. For that we need to make the following changes

- Generate **rsa** public and private key pair on control node server.

```
[centos@ip-172-31-30-238 ~]$ ssh-keygen
Generating public/private rsa key pair.
Enter file in which to save the key (/home/centos/.ssh/id_rsa):
Enter passphrase (empty for no passphrase):
Enter same passphrase again:
Your identification has been saved in /home/centos/.ssh/id_rsa.
Your public key has been saved in /home/centos/.ssh/id_rsa.pub.
The key fingerprint is:
SHA256:jRVeWngGVGjo4brBWne6IjL42uvMOVCKL93UsNw72tI
centos@ip-172-31-30-238.ec2.internal
The key's randomart image is:
+---[RSA 2048]----+
|         o+=+    |
|        o.+=o    |
|       o o+o     |
|  . .   o+       |
|.o . * .S .      |
|+   + B . .      |
| = o + = o       |
|o+*.=.E .        |
|.=O=.+.o..       |
+----[SHA256]-----+
[centos@ip-172-31-30-238 ~]$
```

- Enable **passwordAuthentication** to yes on **Node Server,** so that public key of Control Node can be copied to Node server authorized_keys using **ssh-copy-id**

```
# To disable tunneled clear text passwords, change to no here!
PasswordAuthentication yes
#PermitEmptyPasswords no
#PasswordAuthentication no
```

- Enter new password for centos user

```
[centos@ip-172-31-24-41 ~]$ sudo passwd centos
Changing password for user centos.
New password:
BAD PASSWORD: The password fails the dictionary check - it does not contain
enough DIFFERENT characters
Retype new password:
passwd: all authentication tokens updated successfully.
```

- Restart the sshd service.

```
[centos@ip-172-31-24-41 ~]$ sudo service sshd restart
Redirecting to /bin/systemctl restart sshd.service
```

- Now copy the Control Node server public key to Node server using **ssh-copy-id** and make sure you control node can ssh into the node server without asking for any password.

```
[centos@ip-172-31-30-238 ~]$ ssh-copy-id centos@172.31.24.41
/usr/bin/ssh-copy-id: INFO: Source of key(s) to be installed:
"/home/centos/.ssh/id_rsa.pub"
/usr/bin/ssh-copy-id: INFO: attempting to log in with the new key(s), to
filter out any that are already installed
/usr/bin/ssh-copy-id: INFO: 1 key(s) remain to be installed -- if you are
prompted now it is to install the new keys
centos@172.31.24.41's password:

Number of key(s) added: 1

Now try logging into the machine, with:   "ssh 'centos@172.31.24.41'"
and check to make sure that only the key(s) you wanted were added.

[centos@ip-172-31-30-238 ~]$ ssh centos@172.31.24.41
Last login: Sun Sep 15 19:49:31 2019 from ip-172-31-30-238.ec2.internal
```

Ansible Installation

- Install Ansible on Control Node Server

```
[centos@ip-172-31-24-41 Ansible]$ sudo yum install ansible
```

- Make sure to verify that ansible is able to connect to the Node server by running the **ping** module.

```
[centos@ip-172-31-30-238 Ansible]$ ansible all -m ping -i hosts -k -K
SSH password:
SUDO password[defaults to SSH password]:
172.31.24.41 | SUCCESS => {
    "changed": false,
    "ping": "pong"
}
```

- Now lets clone the playbook script to run from github

```
[centos@ip-172-31-30-238 Ansible]$ git clone
https://github.com/monicasjsu/Ansible.git
Cloning into 'Ansible'...
remote: Enumerating objects: 70, done.
remote: Counting objects: 100% (70/70), done.
remote: Compressing objects: 100% (54/54), done.
remote: Total 70 (delta 29), reused 35 (delta 11), pack-reused 0
Unpacking objects: 100% (70/70), done.
```

Web Server deployment using Ansible

Deploying the flask app

- Run the playbook to deploy the flask app as a **systemd** service.

```
- name: Install flask webserver
  hosts: all
  become: yes
  become_user: root

  tasks:
  - name: Install epel-release
```

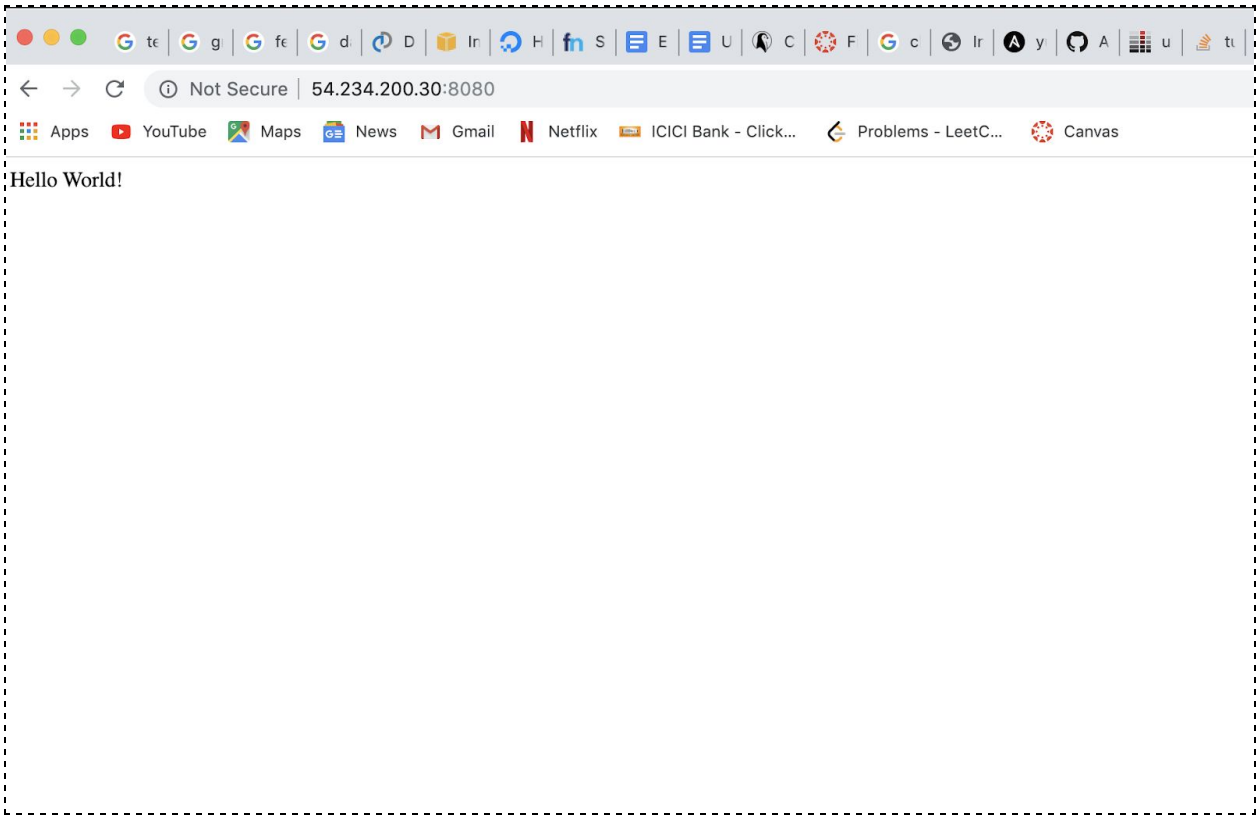
```
  yum:
    name: "{{ packages }}"
    state: present
  vars:
    packages:
      - epel-release

- name: Install pip
  yum:
    name: "{{ packages }}"
  vars:
    packages:
      - python-pip
      - git

- name: Install virtualenv
  pip:
    name: virtualenv

- name: Clone app from Git
  git:
    repo: 'https://github.com/monicasjsu/Ansible.git'
    dest: /home/centos/Ansible/
    force: yes

- name: Install python requirements
  pip:
    requirements: /home/centos/Ansible/flask/requirements.txt
    virtualenv: /home/centos/Ansible/flask/venv
    virtualenv_python: python

- name: Copy service daemon(flaskapp.service) to /etc/service.d/service/
  copy:
    src: "{{ item }}"
    dest: /etc/systemd/system/
  with_fileglob:
    - /home/centos/Ansible/flaskapp.service

- name: Start flask service
  systemd:
    state: started
    name: flaskapp
```

- Output after running the deployment playbook

```
[centos@ip-172-31-30-238 Ansible]$ ansible-playbook flask-playbook.yaml -i
hosts -k -K
SSH password:
SUDO password[defaults to SSH password]:

PLAY [Install flask webserver]
****************************************************

TASK [Gathering Facts]
************************************************************
ok: [172.31.24.41]

TASK [Install epel-release]
************************************************************
ok: [172.31.24.41]

TASK [Install pip]
*****************************************************************
ok: [172.31.24.41]

TASK [Install virtualenv]
************************************************************
ok: [172.31.24.41]

TASK [Clone app from Git]
************************************************************
ok: [172.31.24.41]

TASK [Install python requirements]
************************************************
ok: [172.31.24.41]

TASK [Copy service daemon(flaskapp.service) to /etc/service.d/service/]
***************
ok: [172.31.24.41] => (item=/home/centos/Ansible/flaskapp.service)

TASK [Start flask service]
************************************************************
ok: [172.31.24.41]
```

```
PLAY RECAP
*********************************************************************
**
172.31.24.41               : ok=8    changed=0    unreachable=0    failed=0
```

- Verify that the web server can be accessed using the public ip of the ec2 node server



Undeploying the flask app

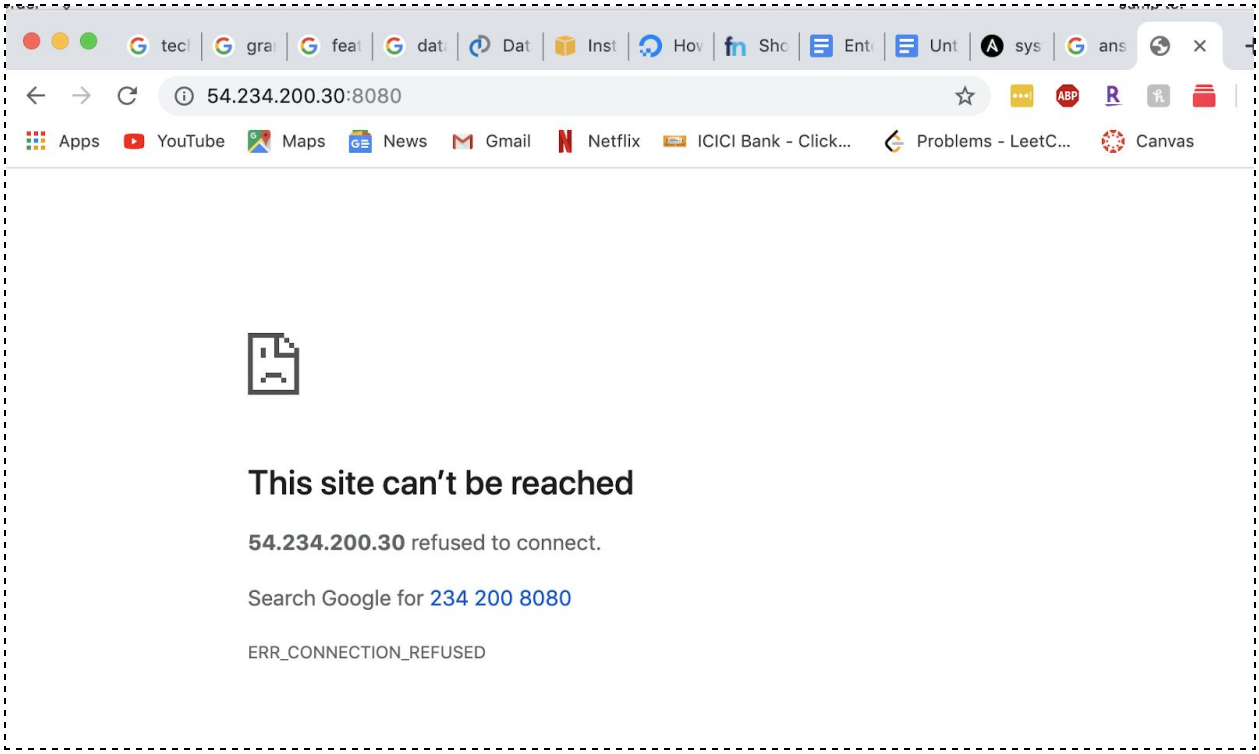
- Running flask application can be stopped and undeployed by running the following playbook.

```
- name: Stop flask webserver
  hosts: all
  become: yes
  become_user: root
```

```
  tasks:
  - name: stop flask service
    systemd:
      state: stopped
      name: flaskapp
```

```
[centos@ip-172-31-30-238 Ansible]$ ansible-playbook
flask-playbook-undeploy.yaml -i hosts -k -K
SSH password:
SUDO password[defaults to SSH password]:

PLAY [Install flask webserver]
*****************************************************

TASK [Gathering Facts]
*************************************************************
ok: [172.31.24.41]

TASK [stop flask service]
*********************************************************
changed: [172.31.24.41]

PLAY RECAP
*********************************************************************
**
172.31.24.41               : ok=2    changed=1    unreachable=0    failed=0
```

- Test to verify that the web server is not available.



Github Repository

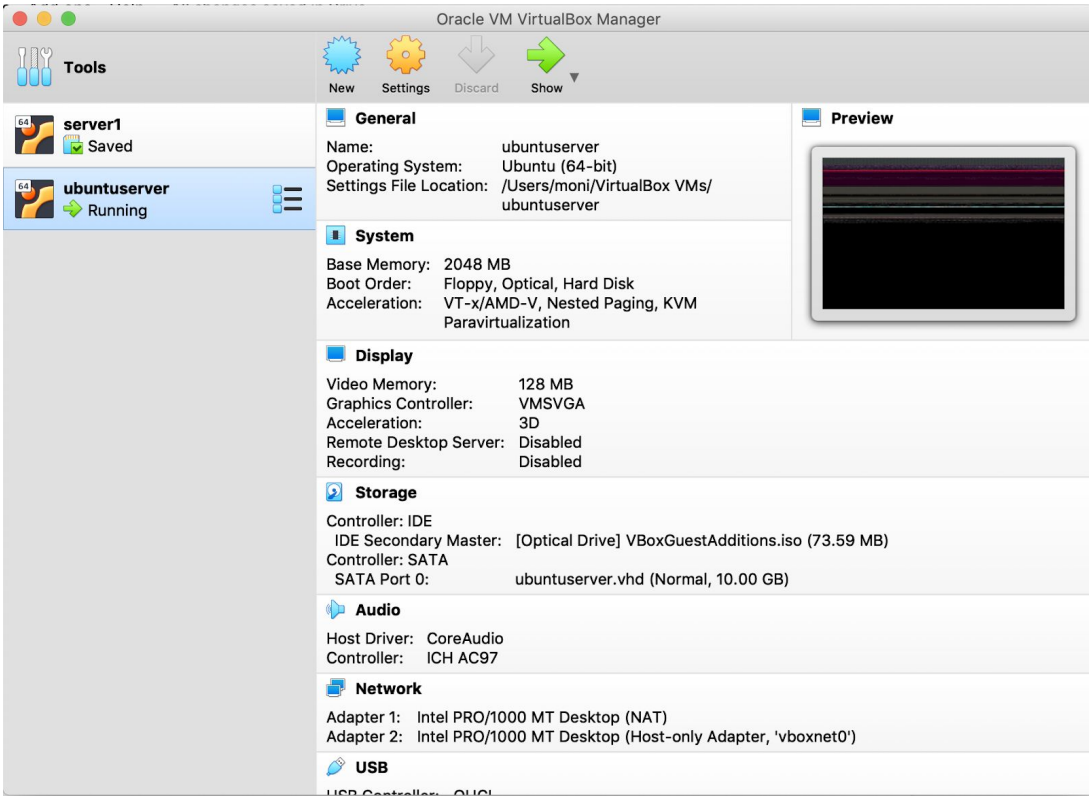
https://github.com/monicasjsu/Ansible

Addendum

Virtual Machine Setup

Ansible was also tested on ubuntu virtual machine installed on Mac. Installation steps are mentioned below.

- Downloaded and installed Oracle Virtual Box.
- Downloaded iso image file of Ubuntu 18.04.
- Created and booted a new virtual machine using the image downloaded.
- Installed VboxGuest additions to support full scale resolution and clipboard.
- Added network adapters to the Virtual machine.
    - NAT network adapter to support Internet
    - Host Only network adapter to support access between host and VM



- Verified that host is able to communicate with VM using Ping command

```
 ~ ping 192.168.56.4

PING 192.168.56.4 (192.168.56.4): 56 data bytes
64 bytes from 192.168.56.4: icmp_seq=0 ttl=64 time=0.316 ms
64 bytes from 192.168.56.4: icmp_seq=1 ttl=64 time=0.312 ms
64 bytes from 192.168.56.4: icmp_seq=2 ttl=64 time=0.422 ms
64 bytes from 192.168.56.4: icmp_seq=3 ttl=64 time=0.426 ms
```

- Installed openssh-server program using apt package manager in the server to accept SSH connections from the host. This will enable the control server (host machine) to run ansible modules.

```
 ~ sudo apt update
 ~ sudo apt install openssh-server
```