CMPE 272 - Enterprise Software Platforms

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Github:https://github.com/gautamthampy/CMPE-272-Enterprise-Software-Platforms/tree/7726b697e6d58857c29013f1712c47515adce05c/Assignment_1/ansible-webserver

Homework #1 - Deployment of Web Server using Ansible on two VMs

Problem Statement:

- Configure two VMs, **VM1** and **VM2** either on your own hardware, or in a cloud environment. Configure Ansible to deploy a web server on ***VM1*** and ***VM2*** on port 8080 with a web page that is accessible from a web browser, and displays the message: “Hello World from SJSU-X” where X is 1 or 2 depending on which web server instance, VM1 or VM2.
- Include in the Ansible playbook, plays to **deploy** and **undeploy** the web server resources
- Submit a Word document, with screenshots showing your work, and a demo, and all ansible code/scripts via github

Solution:

- **Step 1: Setup VMs**
  I have used the gcloud command to setup 2 virtual machines on Google Cloud Platform.
  - VM specifications:
    I have used an e2-micro (2 vCPUs, 1 GB Memory) instance-type for both the virtual machines. Ubuntu is the preferred OS used for this homework.

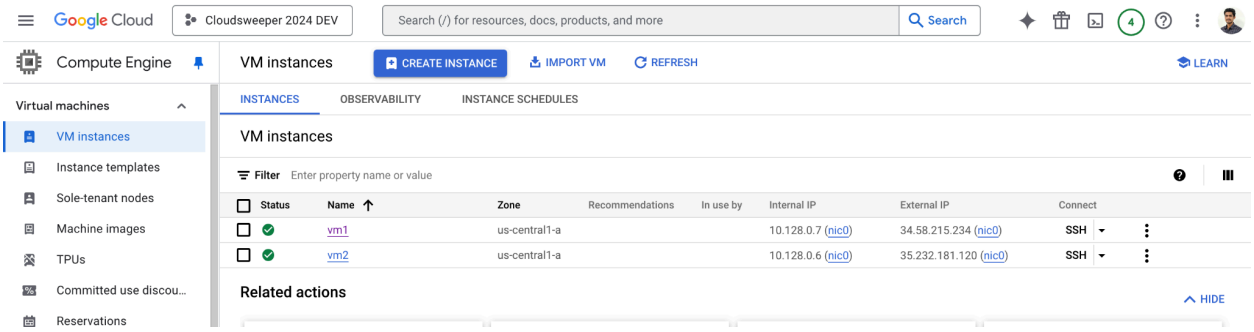


Fig 1: vm1 and vm2 successfully hosted on GCP

Gcloud command for creating 2 VMs

```
gcloud compute instances create vm1 vm2 \
    --machine-type=e2-micro \
    --zone=us-central1-a \
    --image-family=ubuntu-2004-lts \
    --image-project=ubuntu-os-cloud \
    --metadata-from-file ssh-keys=PATH_TO_YOUR_PUBLIC_KEY
```

- Configure SSH for Persistent Access:

Added the SSH key to project-wide metadata in GCP in order to prevent the resetting of ssh keys when the vm is refreshed or reset.

Gcloud command for persistent ssh access

```
gcloud compute project-info add-metadata \
    --metadata-from-file ssh-keys=PATH_TO_YOUR_PUBLIC_KEY
```

- **Step 2: Download and setup ansible on your machine**
  Ansible was installed using Homebrew command: ***brew install ansible***

  - **File setup:**

inventory.ini

```
[webservers]
vm1 ansible_host=34.58.215.234
vm2 ansible_host=35.232.181.120

[all:vars]
ansible_user=<Username>
ansible_ssh_private_key_file=~/.ssh/id_ed25519
ansible_become=yes
ansible_become_method=sudo
ansible_become_pass=NOPASSWD
```

site.yml

```yaml
---
- name: Deploy webservers
  hosts: webservers
  become: yes
  vars:
    http_port: 8080

  tasks:
    - name: Install Python3 and pip
      apt:
        name:
          - python3
          - python3-pip
        state: present
        update_cache: yes

    - name: Install required packages
      apt:
        name:
          - nginx
        state: present

    - name: Create nginx sites-available configuration
      template:
        src: nginx.conf.j2
        dest: /etc/nginx/sites-available/default
      notify: restart nginx

    - name: Create web content directory
      file:
        path: /var/www/html
        state: directory
        mode: '0755'

    - name: Deploy index page
      template:
        src: index.html.j2
```

```
      dest: /var/www/html/index.html
      mode: '0644'
    notify: restart nginx

handlers:
  - name: restart nginx
    service:
      name: nginx
      state: restarted
```

undeploy.yml

```
---
- name: Undeploy webservers
  hosts: webservers
  become: yes

  tasks:
    - name: Stop nginx service
      service:
        name: nginx
        state: stopped

    - name: Remove nginx package
      apt:
        name: nginx
        state: absent
        purge: yes

    - name: Remove web content
      file:
        path: /var/www/html
        state: absent
```

nginx.conf.j2

```
server {
    listen {{ http_port }};
    server_name _;

    root /var/www/html;
    index index.html;

    location / {
        try_files $uri $uri/ =404;
    }
}
```

index.html.j2

```
<!DOCTYPE html>
<html>
<head>
    <title>SJSU Webserver</title>
    <style>
        body {
            font-family: Arial, sans-serif;
            display: flex;
            justify-content: center;
            align-items: center;
            height: 100vh;
            margin: 0;
            background-color: #f0f0f0;
        }
        .container {
            text-align: center;
            padding: 20px;
            background-color: white;
            border-radius: 8px;
            box-shadow: 0 2px 4px rgba(0,0,0,0.1);
        }
        h1 {
```

```
            color: #2c3e50;
        }
    </style>
</head>
<body>
    <div class="container">
        <h1>Hello World from SJSU-{% if inventory_hostname == 'vm1' %}1{%
else %}2{% endif %}</h1>
    </div>
</body>
</html>
```

- **Step 3: Test the connection and deploy the web servers:**

I tested the ansible connection with: ***ansible -i inventory.ini webservers -m ping***

```
(base) gautamthampy@Gautams-Laptop ~ % ansible -i inventory.ini webservers -m ping

[WARNING]: Platform linux on host vm1 is using the discovered Python
interpreter at /usr/bin/python3.10, but future installation of another Python
interpreter could change the meaning of that path. See
https://docs.ansible.com/ansible-
core/2.18/reference_appendices/interpreter_discovery.html for more information.
vm1 | SUCCESS => {
    "ansible_facts": {
        "discovered_interpreter_python": "/usr/bin/python3.10"
    },
    "changed": false,
    "ping": "pong"
}
[WARNING]: Platform linux on host vm2 is using the discovered Python
interpreter at /usr/bin/python3.10, but future installation of another Python
interpreter could change the meaning of that path. See
https://docs.ansible.com/ansible-
core/2.18/reference_appendices/interpreter_discovery.html for more information.
vm2 | SUCCESS => {
    "ansible_facts": {
        "discovered_interpreter_python": "/usr/bin/python3.10"
    },
    "changed": false,
    "ping": "pong"
}
```

Fig 2: Output of connection test

- To deploy the web servers, we run the ansible playbook as follows:
  ansible-playbook -i inventory.ini site.yml

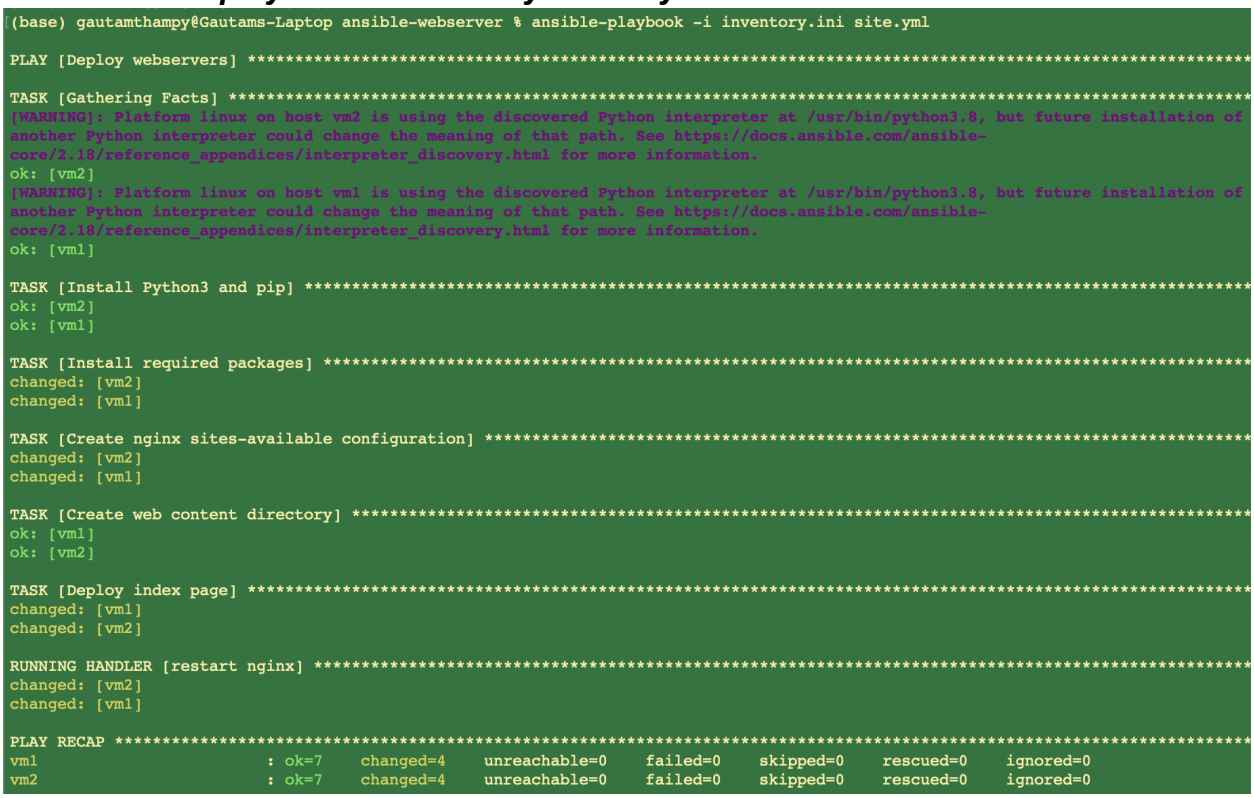


Fig 3: Output of ansible playbook - web server deployment

- To undeploy the web servers, run the command:
  ansible-playbook -i inventory.ini undeploy.yml

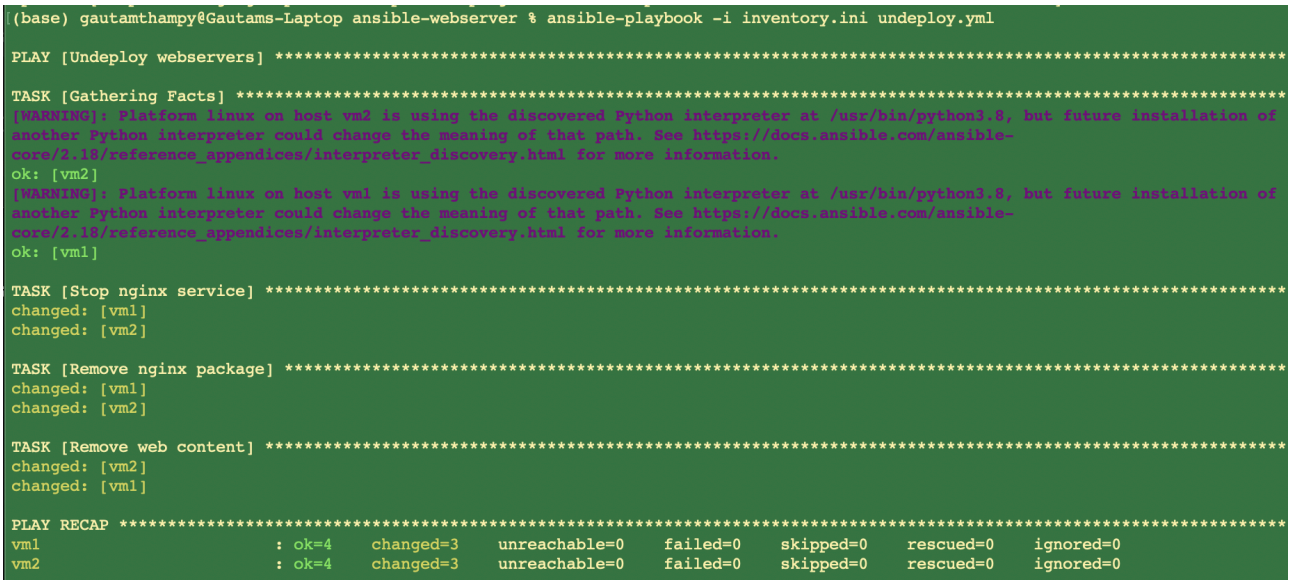
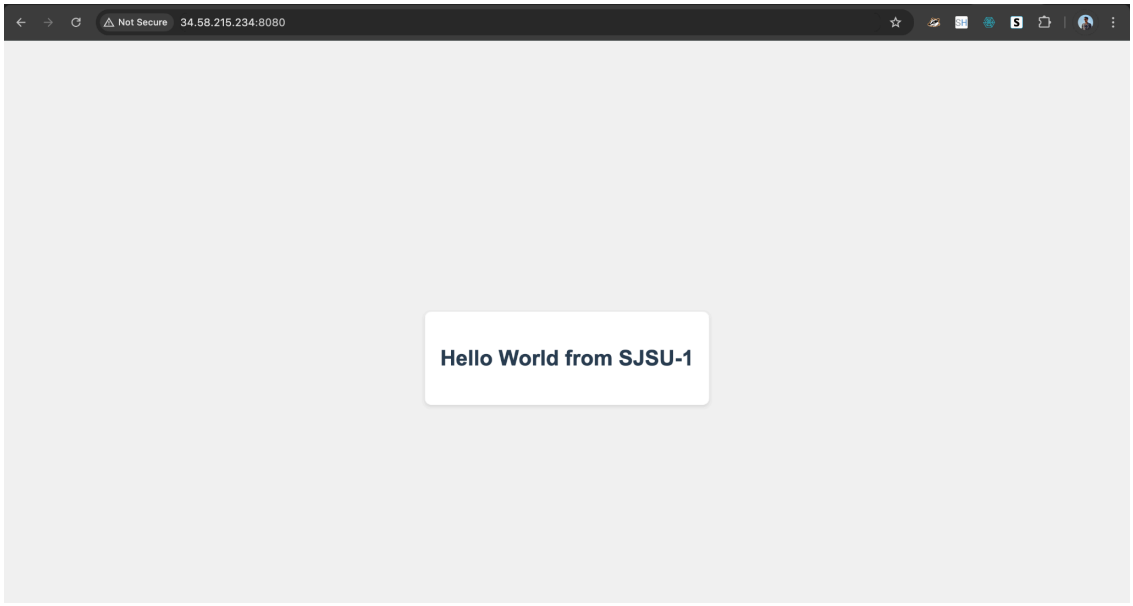


Fig 4: Output of ansible playbook - undeploy

Verification:



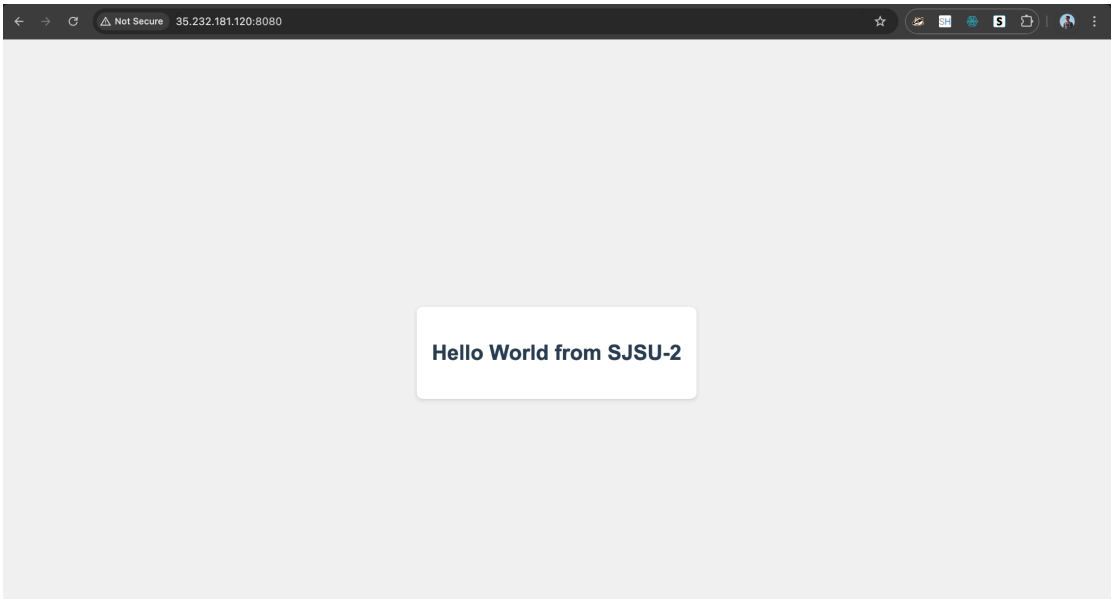


Fig 5 and 6: Web pages when accessing the URL

References:

- Ansible documentation: https://docs.ansible.com/
- Gcloud cli cheatsheet: https://cloud.google.com/sdk/docs/cheatsheet
- Claude by Anthropic: https://claude.ai/chat/b4f39a8b-c6a4-43da-a473-a028f62450cb