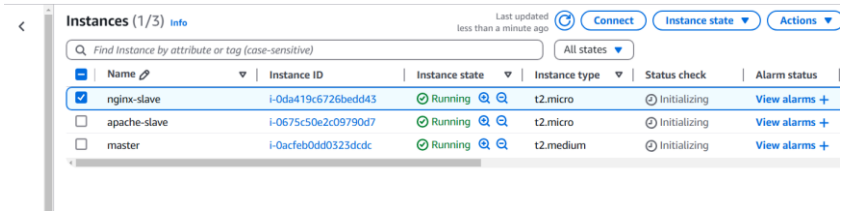
ANSIBLE CASE STUDY

You are a Devops Engineer and the organization you are working on needs to set up two configuration
management server groups. One for Apache another for Nginx. Being a Devops Engineer it is your task
to deal with this configuration management issue.
Let us see the tasks that you need to perform using Ansible.
1. Create two Server Groups. One for Apache and another for Nginx.
2. Push two html files with their server information.
Make sure that you don't forget to start the services once the installation is done. Also send post installation messages for both the server groups.
Using Ansible Roles accomplish the above the tasks.
Also, once the Apache server configuration is done you need to install Java on that server group using
ansible role in a playbook.

Solution:

1) Create 3 servers : master , apache server(slave1) and nginx server(slave2).



2) Update package & install ansible in master.

```
ubuntu@ip-172-31-38-224:~$ ansible --version
ansible [core 2.17.9]
  config file = /etc/ansible/ansible.cfg
  configured module search path = ['/home/ubuntu/
  ansible python module location = /usr/lib/pytho
  ansible collection location = /home/ubuntu/.ans
  executable location = /usr/bin/ansible
  python version = 3.12.3 (main, Nov  6 2024, 18:
  jinja version = 3.1.2
  libyaml = True
ubuntu@ip-172-31-38-224:~$
```

i-0acfeb0dd0323dcdc (master)

PublicIPs: 13.232.47.129 PrivateIPs: 172.31.38.224

3) Generate keygen and paste it in slave servers and add host(private IP of slave) in master server.

```
ubuntu@ip-172-31-38-224:~/.ssh$ ssh-keygen
Generating public/private ed25519 key pair.
Enter file in which to save the key (/home/ubuntu/
Enter passphrase (empty for no passphrase):
Enter same passphrase again:
Your identification has been saved in /home/ubuntu
Your public key has been saved in /home/ubuntu/.ss
The key fingerprint is:
SHA256:3XwXt0rGEEyLiLn+c2jgtsnh63Ge1MpswEXqF/8vry4
The key's randomart image is:
+--[ED25519 256]--+
|          oo     |
|      o.. ..o    |
|     oo. . o   ..|
|     ..o . oo   +|
|    o.. S . o+...|
|    .= ...  o... |
|    .++o...  .   |
|    oo@=oE o     |
|    oB=Bo oo=o   |
+----[SHA256]-----+
ubuntu@ip-172-31-38-224:~/.ssh$
```

i-0acfeb0dd0323dcdc (master)

PublicIPs: 13.232.47.129 PrivateIPs: 172.31.38.224

```
## green.example.com
## blue.example.com
[all]
172.31.0.187
172.31.0.179
[apache]
172.31.0.187
[nginx]
172.31.0.179
-- INSERT --
```

i-0acfeb0dd0323dcdc (master)

PublicIPs: 13.232.47.129 PrivateIPs: 172.31.38.224

4) Connect the master with the slave servers.

```
ubuntu@ip-172-31-38-224:/etc/ansible$ ansible -m ping all
[WARNING]: Platform linux on host 172.31.0.179 is using the disc
interpreter could change the meaning of that path. See https://c
information.
172.31.0.179 | SUCCESS => {
    "ansible_facts": {
        "discovered_interpreter_python": "/usr/bin/python3.12"
    },
    "changed": false,
    "ping": "pong"
}
[WARNING]: Platform linux on host 172.31.0.187 is using the disc
interpreter could change the meaning of that path. See https://c
information.
172.31.0.187 | SUCCESS => {
    "ansible_facts": {
        "discovered_interpreter_python": "/usr/bin/python3.12"
    },
    "changed": false,
    "ping": "pong"
}
ubuntu@ip-172-31-38-224:/etc/ansible$
```

i-0acfeb0dd0323dcdc (master)

PublicIPs: 13.232.47.129 PrivateIPs: 172.31.38.224

5) In master go to cd /etc/ansible > cd roles
6) Create roles : sudo ansible-galaxy init apache2
   sudo ansible-galaxy init nginx

```
ubuntu@ip-172-31-38-224:/etc/ansible$ cd roles
ubuntu@ip-172-31-38-224:/etc/ansible/roles$ ls
ubuntu@ip-172-31-38-224:/etc/ansible/roles$ sudo ansible-galaxy init apache2
- Role apache2 was created successfully
ubuntu@ip-172-31-38-224:/etc/ansible/roles$ sudo ansible-galaxy init nginx
- Role nginx was created successfully
ubuntu@ip-172-31-38-224:/etc/ansible/roles$
```

i-0acfeb0dd0323dcdc (master)

PublicIPs: 13.232.47.129 PrivateIPs: 172.31.38.224

7) Edit the Apache Role:
   In the roles/apache/tasks/main.yml file

```
ubuntu@ip-172-31-38-224:/etc/ansible/roles$ ls
apache2  nginx
ubuntu@ip-172-31-38-224:/etc/ansible/roles$ cd apache2
ubuntu@ip-172-31-38-224:/etc/ansible/roles/apache2$ ls
README.md  defaults  files  handlers  meta  tasks  templates  tests  vars
ubuntu@ip-172-31-38-224:/etc/ansible/roles/apache2$ cd tasks
ubuntu@ip-172-31-38-224:/etc/ansible/roles/apache2/tasks$ ls
main.yml
ubuntu@ip-172-31-38-224:/etc/ansible/roles/apache2/tasks$
```

i-0acfeb0dd0323dcdc (master)

PublicIPs: 13.232.47.129 PrivateIPs: 172.31.38.224

add the tasks to install Apache and copy the index.html file:

```
---
# tasks file for apache2
# roles/apache/tasks/main.yml
- name: Install Apache
  apt:
    name: apache2
    state: present

- name: Copy custom index.html
  copy:
    src: index.html
    dest: /var/www/html/index.html

- name: Start Apache service
  systemd:
    name: apache2
    state: started
    enabled: yes

- name: Post-installation message
  debug:
    msg: "Apache has been installed and started successfully."

~
~
~
~
~
~
-- INSERT --
```

i-0acfeb0dd0323dcdc (master)

PublicIPs: 13.232.47.129 PrivateIPs: 172.31.38.224

8) Place your custom index.html file in the roles/apache/files/ directory.

```
ubuntu@ip-172-31-38-224:/etc/ansible/roles/apache2$ cd files
ubuntu@ip-172-31-38-224:/etc/ansible/roles/apache2/files$ ls
ubuntu@ip-172-31-38-224:/etc/ansible/roles/apache2/files$ sudo vi index.html
ubuntu@ip-172-31-38-224:/etc/ansible/roles/apache2/files$
```

i-0acfeb0dd0323dcdc (master)

PublicIPs: 13.232.47.129 PrivateIPs: 172.31.38.224

```
<!doctype html>
<html>
  <head>
    <title>This is Apache2 webpage!</title>
  </head>
  <body>
    <p>The Apache HTTP Server (/əˈpætʃi/ ə-PATCH-ee) is a free and open-source cro
ed and maintained by a community of developers under the auspices of the Apache So
<strong>p</strong> tag and its contents.</p>
  </body>
</html>
~
~
~
~
~
~
~
~
~
~
~
~
~
~
~
~
~
~
~
~
~
~
-- INSERT (paste) --
```

i-0acfeb0dd0323dcdc (master)

PublicIPs: 13.232.47.129 PrivateIPs: 172.31.38.224

9) Edit the Nginx Role:In the roles/nginx/tasks/main.yml file

```
ubuntu@ip-172-31-38-224:/etc/ansible/roles$ ls
apache2  nginx
ubuntu@ip-172-31-38-224:/etc/ansible/roles$ cd nginx
ubuntu@ip-172-31-38-224:/etc/ansible/roles/nginx$ cd tasks
ubuntu@ip-172-31-38-224:/etc/ansible/roles/nginx/tasks$ sudo vi main.yml
ubuntu@ip-172-31-38-224:/etc/ansible/roles/nginx/tasks$
```

i-0acfeb0dd0323dcdc (master)

PublicIPs: 13.232.47.129 PrivateIPs: 172.31.38.224

10) add the tasks to install Nginx and copy the index.html file:

```
---
# tasks file for nginx
# roles/nginx/tasks/main.yml
- name: Install Nginx
  apt:
    name: nginx
    state: present

- name: Copy custom index.html
  copy:
    src: index.html
    dest: /var/www/html/index.html

- name: Start Nginx service
  systemd:
    name: nginx
    state: started
    enabled: yes

- name: Post-installation message
  debug:
    msg: "Nginx has been installed and started successfully."

~
~
~
~
~
~
-- INSERT --
```

i-0acfeb0dd0323dcdc (master)

PublicIPs: 13.232.47.129 PrivateIPs: 172.31.38.224

11) Place your custom index.html file in the roles/nginx/files/ directory.

```
ubuntu@ip-172-31-38-224:~$ cd /etc/ansible/roles/nginx/
ubuntu@ip-172-31-38-224:/etc/ansible/roles/nginx$ cd files
ubuntu@ip-172-31-38-224:/etc/ansible/roles/nginx/files$ ls
ubuntu@ip-172-31-38-224:/etc/ansible/roles/nginx/files$ sudo vi index.html
ubuntu@ip-172-31-38-224:/etc/ansible/roles/nginx/files$
```

i-0acfeb0dd0323dcdc (master)

PublicIPs: 13.232.47.129 PrivateIPs: 172.31.38.224

```
<!doctype html>
<html>
  <head>
    <title>This is the Nginx  webpage!</title>
  </head>
  <body>
    <p> Nginx (pronounced "engine x"[8] /ˌɛndʒɪnˈɛks/ EN-jin-EKS, s
mail proxy and HTTP cache. The software was created by Russian deve
 under the terms of the 2-clause BSD license. A large fraction of w
page, just like this <strong>p</strong> tag and its contents.</p>
  </body>
</html>
~
~
~
~
~
~
~
~
~
~
~
~
~
~
~
~
~
~
~
~
~
~
~
~
-- INSERT (paste) --
```

i-0acfeb0dd0323dcdc (master)

PublicIPs: 13.232.47.129 PrivateIPs: 172.31.38.224

12) Create a playbook to apply the roles to the respective groups:

```
ubuntu@ip-172-31-38-224:/etc/ansible$ ls
ansible.cfg  hosts  roles
ubuntu@ip-172-31-38-224:/etc/ansible$ sudo vi site.yml
ubuntu@ip-172-31-38-224:/etc/ansible$
```

i-0acfeb0dd0323dcdc (master)

PublicIPs: 13.232.47.129 PrivateIPs: 172.31.38.224

```
---
# site.yml
- name: Setup Apache on apache nodes
  hosts: apache
  become: yes
  roles:
    - apache

- name: Setup Nginx on nginx nodes
  hosts: nginx
  become: yes
  roles:
    - nginx
~
~
~
~
~
~
~
~
~
~
~
~
~
~
~
-- INSERT --
```

i-0acfeb0dd0323dcdc (master)

PublicIPs: 13.232.47.129 PrivateIPs: 172.31.38.224

13) Check for syntax error if any

```
ubuntu@ip-172-31-38-224:/etc/ansible$ ansible-playbook site.yml --syntax -check

playbook: site.yml
ubuntu@ip-172-31-38-224:/etc/ansible$
```

i-0acfeb0dd0323dcdc (master)

PublicIPs: 13.232.47.129 PrivateIPs: 172.31.38.224

14) Create a Role for Installing Java: sudo ansible-galaxy init java

```
ubuntu@ip-172-31-38-224:/etc/ansible/roles$ sudo ansible-galaxy init java
- Role java was created successfully
ubuntu@ip-172-31-38-224:/etc/ansible/roles$
```

i-0acfeb0dd0323dcdc (master)

PublicIPs: 13.232.47.129 PrivateIPs: 172.31.38.224

15) In the roles/java/tasks/main.yml file, add the tasks to install Java:

```
ubuntu@ip-172-31-38-224:/etc/ansible/roles$ ls
apache2  java  nginx
ubuntu@ip-172-31-38-224:/etc/ansible/roles$ cd java
ubuntu@ip-172-31-38-224:/etc/ansible/roles/java$ ls
README.md  defaults  files  handlers  meta  tasks  templates  tests  vars
ubuntu@ip-172-31-38-224:/etc/ansible/roles/java$ cd tasks
ubuntu@ip-172-31-38-224:/etc/ansible/roles/java/tasks$ ls
main.yml
ubuntu@ip-172-31-38-224:/etc/ansible/roles/java/tasks$ sudo vi main.yml
ubuntu@ip-172-31-38-224:/etc/ansible/roles/java/tasks$
```

i-0acfeb0dd0323dcdc (master)

PublicIPs: 13.232.47.129 PrivateIPs: 172.31.38.224

```
---
# tasks file for java
# roles/java/tasks/main.yml
- name: Install Java
  apt:
    name: default-jdk
    state: present

-- INSERT --
```

i-0acfeb0dd0323dcdc (master)

PublicIPs: 13.232.47.129 PrivateIPs: 172.31.38.224

16) Create a playbook to apply the Java role to the apache group:

```
---
# install_java.yml
- name: Install Java on Apache nodes
  hosts: apache
  become: yes
  roles:
    - java
```

i-0acfeb0dd0323dcdc (master)

PublicIPs: 13.232.47.129 PrivateIPs: 172.31.38.224

17) Check the playbook syntax

```
ubuntu@ip-172-31-38-224:/etc/ansible$ ansible-playbook install_java.yml  --syntax -check

playbook: install_java.yml
ubuntu@ip-172-31-38-224:/etc/ansible$
```

i-0acfeb0dd0323dcdc (master)

PublicIPs: 13.232.47.129 PrivateIPs: 172.31.38.224

18) Run the install_java.yml playbook

```
ubuntu@ip-172-31-38-224:/etc/ansible$ ansible-playbook install_java.yml

PLAY [Install Java on Apache nodes] ************************************

TASK [Gathering Facts] *************************************************
[WARNING]: Platform linux on host 172.31.0.187 is using the discovered Pytho
interpreter could change the meaning of that path. See https://docs.ansible.
information.
ok: [172.31.0.187]

TASK [java : Install Java] *********************************************
changed: [172.31.0.187]

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

ubuntu@ip-172-31-38-224:/etc/ansible$
```

i-0acfeb0dd0323dcdc (master)

PublicIPs: 13.232.47.129 PrivateIPs: 172.31.38.224

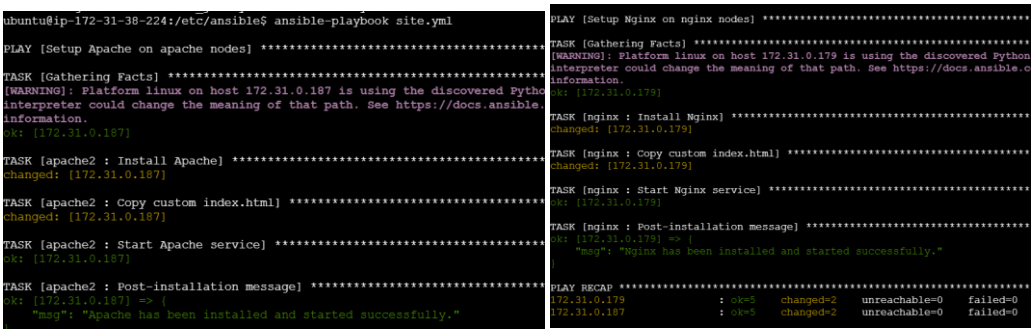
19) Go to the apache slave and we can see java is installed

```
ubuntu@ip-172-31-0-187:~$ cd /etc
ubuntu@ip-172-31-0-187:/etc$ ls
ModemManager            cron.monthly          gnutls
PackageKit              cron.weekly           groff
X11                     cron.yearly           group
acpi                    crontab               group-
adduser.conf            cryptsetup-initramfs  grub.d
alternatives            crypttab              gshadow
apparmor                dbus-1                gshadow-
apparmor.d              dconf                 gss
apport                  debconf.conf          gtk-3.0
apt                     debian_version        hdparm.conf
bash.bashrc             default               hibagent-config.cfg
bash_completion         deluser.conf          hibinit-config.cfg
bash_completion.d       depmod.d              host.conf
bindresvport.blacklist  dhcp                  hostname
binfmt.d                dhcpcd.conf           hosts
byobu                   dpkg                  hosts.allow
ca-certificates         e2scrub.conf          hosts.deny
ca-certificates.conf    ec2_version           init.d
chrony                  environment           initramfs-tools
cloud                   environment.d         inputrc
console-setup           ethertypes            iproute2
credstore               fonts                 iscsi
credstore.encrypted     fstab                 issue
cron.d                  fuse.conf             issue.net
cron.daily              fwupd                 java-21-openjdk
cron.hourly             gai.conf              kernel
ubuntu@ip-172-31-0-187:/etc$
```

i-0675c50e2c09790d7 (apache-slave)

PublicIPs: 13.233.75.5 PrivateIPs: 172.31.0.187

20) Run the site.yml playbook apache and nginx will start in respective slave server



```
ubuntu@ip-172-31-38-224:/etc/ansible$ ansible-playbook site.yml

PLAY [Setup Apache on apache nodes] ********************************************

TASK [Gathering Facts] *********************************************************
[WARNING]: Platform linux on host 172.31.0.187 is using the discovered Python
interpreter could change the meaning of that path. See https://docs.ansible.
information.
ok: [172.31.0.187]

TASK [apache2 : Install Apache] ************************************************
changed: [172.31.0.187]

TASK [apache2 : Copy custom index.html] ****************************************
changed: [172.31.0.187]

TASK [apache2 : Start Apache service] ******************************************
ok: [172.31.0.187]

TASK [apache2 : Post-installation message] *************************************
ok: [172.31.0.187] => {
    "msg": "Apache has been installed and started successfully."
}

PLAY [Setup Nginx on nginx nodes] **********************************************

TASK [Gathering Facts] *********************************************************
[WARNING]: Platform linux on host 172.31.0.179 is using the discovered Python
interpreter could change the meaning of that path. See https://docs.ansible.c
information.
ok: [172.31.0.179]

TASK [nginx : Install Nginx] ***************************************************
changed: [172.31.0.179]

TASK [nginx : Copy custom index.html] ******************************************
changed: [172.31.0.179]

TASK [nginx : Start Nginx service] *********************************************
ok: [172.31.0.179]

TASK [nginx : Post-installation message] ***************************************
ok: [172.31.0.179] => {
    "msg": "Nginx has been installed and started successfully."
}

PLAY RECAP *********************************************************************
172.31.0.179               : ok=5    changed=2    unreachable=0    failed=0
172.31.0.187               : ok=5    changed=2    unreachable=0    failed=0
```

21) Copy the public IP of the slave servers in the browser and check