1. Write a single ansible playbook which will install apache and nginx. Note: Playbook should not be hardcoded and pass the variables from different file.

Create a playbook named as vi web.yml and give this.

```
---
- name: Install web server using external variables
  hosts: all
  become: yes
  vars_files:
    - vars/web_vars.yml

  tasks:
    - name: Install selected web server
      package:
        name: "{{ web_package }}"
        state: present

    - name: Start and enable service
      service:
        name: "{{ web_service }}"
        state: started
```

enabled: yes

```
---
- name: Install web server using external variables
  hosts: all
  become: yes
  vars_files:
    - vars/web_vars.yml

  tasks:
    - name: Install selected web server
      package:
        name: "{{ web_package }}"
        state: present

    - name: Start and enable service
      service:
        name: "{{ web_service }}"
        state: started
        enabled: yes
```

In the playbooks directory create a directory named as vars in that vars directory create a file named as web_vars.yml and like this.

```
[root@ip-172-31-5-223 playbooks]# cd vars/
[root@ip-172-31-5-223 vars]# ls
web_vars.yml
[root@ip-172-31-5-223 vars]#
```

```
web_package: httpd
web_service: httpd
web_package: nginx
web_service: nginx
```

- ansible-playbook web.yml

```
[root@ip-172-31-5-223 playbooks]# ansible-playbook web.yml
[WARNING]: Invalid characters were found in group names but not replaced,
[WARNING]: While constructing a mapping from /root/playbooks/vars/web_var
dict key (web_package). Using last defined value only.
[WARNING]: While constructing a mapping from /root/playbooks/vars/web_var
dict key (web_service). Using last defined value only.

PLAY [Install web server using external variables] **********************

TASK [Gathering Facts] *********************************************
[WARNING]: Platform linux on host 172.31.34.163 is using the discovered P
future installation of another Python interpreter could change the meanin
https://docs.ansible.com/ansible-core/2.15/reference_appendices/interpret
ok: [172.31.34.163]
[WARNING]: Platform linux on host 172.31.102.211 is using the discovered
but future installation of another Python interpreter could change the me
https://docs.ansible.com/ansible-core/2.15/reference_appendices/interpret
ok: [172.31.102.211]

TASK [Install selected web server] **********************************
changed: [172.31.34.163]
changed: [172.31.102.211]

TASK [Start and enable service] *************************************
changed: [172.31.34.163]
changed: [172.31.102.211]

PLAY RECAP *********************************************************************
172.31.102.211             : ok=3    changed=2    unreachable=0    failed
172.31.34.163              : ok=3    changed=2    unreachable=0    failed
```

2. Ansible playbook to create 10 different directories with minimal code and directory names should be passed as variables.

Write a playbook named as directories.yml

- name: Create multiple directories

hosts: all

become: yes

vars:

```
  dir_list:
    - /opt/dir1
    - /opt/dir2
    - /opt/dir3
    - /opt/dir4
    - /opt/dir5
    - /opt/dir6
    - /opt/dir7
    - /opt/dir8
    - /opt/dir9
    - /opt/dir10

tasks:
  - name: Create directories from list
    file:
      path: "{{ item }}"
      state: directory
      mode: '0755'
    loop: "{{ dir_list }}"
```

```yaml
---
- name: Create multiple directories
  hosts: all
  become: yes

  vars:
    dir_list:
      - /opt/dir1
      - /opt/dir2
      - /opt/dir3
      - /opt/dir4
      - /opt/dir5
      - /opt/dir6
      - /opt/dir7
      - /opt/dir8
      - /opt/dir9
      - /opt/dir10

  tasks:
    - name: Create directories from list
      file:
        path: "{{ item }}"
        state: directory
        mode: '0755'
      loop: "{{ dir_list }}"
```

- **ansible-playbook directories.yml**

```
[root@ip-172-31-71-93 playbooks]# vi directories.yml
[root@ip-172-31-71-93 playbooks]# ansible-playbook directories.yml
[WARNING]: Invalid characters were found in group names but not replaced, use

PLAY [Create multiple directories] ********************************************

TASK [Gathering Facts] ********************************************************
[WARNING]: Platform linux on host 172.31.72.83 is using the discovered Python
future installation of another Python interpreter could change the meaning of
https://docs.ansible.com/ansible-core/2.15/reference_appendices/interpreter_di
ok: [172.31.72.83]
[WARNING]: Platform linux on host 172.31.86.242 is using the discovered Python
future installation of another Python interpreter could change the meaning of
https://docs.ansible.com/ansible-core/2.15/reference_appendices/interpreter_di
ok: [172.31.86.242]

TASK [Create directories from list] *******************************************
changed: [172.31.72.83] => (item=/opt/dir1)
changed: [172.31.86.242] => (item=/opt/dir1)
changed: [172.31.72.83] => (item=/opt/dir2)
changed: [172.31.86.242] => (item=/opt/dir2)
changed: [172.31.72.83] => (item=/opt/dir3)
changed: [172.31.86.242] => (item=/opt/dir3)
changed: [172.31.72.83] => (item=/opt/dir4)
changed: [172.31.86.242] => (item=/opt/dir4)
changed: [172.31.72.83] => (item=/opt/dir5)
changed: [172.31.86.242] => (item=/opt/dir5)
changed: [172.31.72.83] => (item=/opt/dir6)
changed: [172.31.86.242] => (item=/opt/dir6)
changed: [172.31.72.83] => (item=/opt/dir7)
changed: [172.31.86.242] => (item=/opt/dir7)
changed: [172.31.72.83] => (item=/opt/dir8)
changed: [172.31.86.242] => (item=/opt/dir8)
changed: [172.31.72.83] => (item=/opt/dir9)
```

Loging to the both servers and change the directories to opt and check the list.

- cd /opt-l


```
[root@ip-172-31-86-242 opt]# ls
aws  dir1  dir10  dir2  dir3  dir4  dir5  dir6  dir7  dir8  dir9
[root@ip-172-31-86-242 opt]#
```


```
[root@ip-172-31-72-83 ~]# cd /opt
[root@ip-172-31-72-83 opt]# ls
aws  dir1  dir10  dir2  dir3  dir4  dir5  dir6  dir7  dir8  dir9
[root@ip-172-31-72-83 opt]#
```

3. Ansible playbook to copy ssh-keygen from master to worker nodes. Note: a)Provision new 3 ec2 machines, one master and two worker nodes. b)Create common user called ansadm and provide sudo priviliges on 3 ec2 instances. c)Create ssh-keygen in master and your playbook should copy the keygen making it password less authentication.

Copy your pem key from local to ec2-instance by using.

- scp -i pem_key_path /pem ec2-user@master_publicip:destination location
- scp-i/c/Users/Ashish/Downloads/red.pem/c/Users/Ashish/Downloads/red.pem ec2user@18.232.158.86:/home/ec2-user/red.pem

```
MUJJU SK@DESKTOP-LU541U4 MINGW64 ~/Downloads
$ scp -i /c/Users/Ashish/Downloads/red.pem /c/Users/Ashish/Downloads/red.pem ec2-user@18.232.158.86:/home/ec2-user/

red.pem                                                                       100% 1678     5.3KB
```

Login with pem key

```
MUJJU SK@DESKTOP-LU541U4 MINGW64 ~/Downloads
$ ssh -i /c/Users/Ashish/Downloads/red.pem ec2-user@18.232.158.86

       #_
       ####_        Amazon Linux 2023
      _#####\
      \###|
        \#/ ___     https://aws.amazon.com/linux/amazon-linux-2023
         V~' '->
          /
        _/
      _/ _/
    _/m/'
```

- sudo mv /home/ec2-user/red.pem /root/
- sudo chmod 400 /root/red.pem

```
[ec2-user@ip-172-31-56-126 ~]$
[ec2-user@ip-172-31-56-126 ~]$ sudo mv /home/ec2-user/red.pem /root/
[ec2-user@ip-172-31-56-126 ~]$ sudo chmod 400 /root/red.pem
```

Create a directory named as playbooks and change to that directory.

- mkdir playbooks
- cd plabooks

create a inventory file in playbooks directory.

- vi hosts.ini

```
[master]
master ansible_host=18.232.158.86 ansible_user=ec2-user ansible_ssh_private_key_file=/root/red.pem

[workers]
worker01 ansible_host=3.92.146.112 ansible_user=ec2-user ansible_ssh_private_key_file=/root/red.pem
worker02 ansible_host=98.80.231.113 ansible_user=ec2-user ansible_ssh_private_key_file=/root/red.pem
```

- vi create-user.yml

- name: Create ansadm user on master and worker nodes

hosts: all

become: yes

tasks:

- name: Create user ansadm

user:

name: ansadm

shell: /bin/bash

create_home: yes

- name: Set sudo privileges for ansadm (passwordless)

copy:

dest: /etc/sudoers.d/ansadm

content: "ansadm ALL=(ALL) NOPASSWD: ALL\n"

mode: '0440'

```
---
- name: Create ansadm user on master and worker nodes
  hosts: all
  become: yes

  tasks:
    - name: Create user ansadm
      user:
        name: ansadm
        shell: /bin/bash
        create_home: yes

    - name: Set sudo privileges for ansadm (passwordless)
      copy:
        dest: /etc/sudoers.d/ansadm
        content: "ansadm ALL=(ALL) NOPASSWD: ALL\n"
        mode: '0440'
```

- ansible all -i hosts.ini -m ping

```
[root@ip-172-31-56-126 playbooks]# ansible all -i hosts.ini -m ping
[WARNING]: Found both group and host with same name: master
The authenticity of host '98.80.231.113 (98.80.231.113)' can't be established.
ED25519 key fingerprint is SHA256:YCOfNdSwU9OWvkliVw+WPM4SoPS2SUAuwACyxqCMOnA.
This host key is known by the following other names/addresses:
    ~/.ssh/known_hosts:1: 172.31.107.149
The authenticity of host '3.92.146.112 (3.92.146.112)' can't be established.
ED25519 key fingerprint is SHA256:jBaQtfJXDbOwGFwu9idKmIMn65wCCLMGqjWRdkUL1ys.
This host key is known by the following other names/addresses:
    ~/.ssh/known_hosts:3: 172.31.64.109
Are you sure you want to continue connecting (yes/no/[fingerprint])? [WARNING]:
ython interpreter at /usr/bin/python3.9, but future installation of
another Python interpreter could change the meaning of that path. See https://do
core/2.15/reference_appendices/interpreter_discovery.html for more information.
master | SUCCESS => {
    "ansible_facts": {
        "discovered_interpreter_python": "/usr/bin/python3.9"
    },
    "changed": false,
    "ping": "pong"
}
yes
[WARNING]: Platform linux on host worker02 is using the discovered Python interp
of another Python interpreter could change the meaning of that path. See https:/
core/2.15/reference_appendices/interpreter_discovery.html for more information.
worker02 | SUCCESS => {
    "ansible_facts": {
        "discovered_interpreter_python": "/usr/bin/python3.9"
    },
    "changed": false,
    "ping": "pong"
}
```

- ansible-playbook -i hosts.ini create-user.yml

```
[root@ip-172-31-56-126 playbooks]# ansible-playbook -i hosts.ini create-user.yml
[WARNING]: Found both group and host with same name: master

PLAY [Create ansadm user on master and worker nodes] ***************************

TASK [Gathering Facts] *********************************************************
The authenticity of host '3.92.146.112 (3.92.146.112)' can't be established.
ED25519 key fingerprint is SHA256:jBaQtfJXDbOwGFwu9idKmIMn65wCCLMGqjWRdkUL1ys.
This host key is known by the following other names/addresses:
    ~/.ssh/known_hosts:3: 172.31.64.109
Are you sure you want to continue connecting (yes/no/[fingerprint])? [WARNING]: Platfo
 Python interpreter at /usr/bin/python3.9, but future installation
of another Python interpreter could change the meaning of that path. See https://docs.
core/2.15/reference_appendices/interpreter_discovery.html for more information.
ok: [worker02]
[WARNING]: Platform linux on host master is using the discovered Python interpreter at
another Python interpreter could change the meaning of that path. See https://docs.ans
core/2.15/reference_appendices/interpreter_discovery.html for more information.
ok: [master]
yes
[WARNING]: Platform linux on host worker01 is using the discovered Python interpreter
of another Python interpreter could change the meaning of that path. See https://docs.
core/2.15/reference_appendices/interpreter_discovery.html for more information.
ok: [worker01]

TASK [Create user ansadm] ******************************************************
changed: [worker02]
changed: [worker01]
changed: [master]

TASK [Set sudo privileges for ansadm (passwordless)] ***************************
changed: [worker02]
changed: [worker01]
changed: [master]

PLAY RECAP *********************************************************************
```

- vi ssh-copy.yml

```
---
- name: Copy master public key to workers
  hosts: workers
  become: yes
  become_user: ansadm
  vars:
    master_pubkey_file: "/home/ansadm/.ssh/id_rsa.pub"
  tasks:
    - name: Fetch master public key
      slurp:
        src: "{{ master_pubkey_file }}"
      delegate_to: master
      run_once: true
      register: master_pubkey

    - name: Add public key to authorized_keys on workers
      authorized_key:
        user: ansadm
        key: "{{ master_pubkey['content'] | b64decode }}"
```

```yaml
---
- name: Copy master public key to workers
  hosts: workers
  become: yes
  become_user: ansadm
  vars:
    master_pubkey_file: "/home/ansadm/.ssh/id_rsa.pub"
  tasks:
    - name: Fetch master public key
      slurp:
        src: "{{ master_pubkey_file }}"
      delegate_to: master
      run_once: true
      register: master_pubkey

    - name: Add public key to authorized_keys on workers
      authorized_key:
        user: ansadm
        key: "{{ master_pubkey['content'] | b64decode }}"
```

- ansible-playbook -i hosts.ini ssh-copy.yml

```
[root@ip-172-31-56-126 playbooks]# vi ssh-copy.yml
[root@ip-172-31-56-126 playbooks]# ansible-playbook -i hosts.ini ssh-copy.yml
[WARNING]: Found both group and host with same name: master

PLAY [Copy master public key to workers] ***********************************************

TASK [Gathering Facts] *****************************************************************
[WARNING]: Platform linux on host worker02 is using the discovered Python interpreter at
of another Python interpreter could change the meaning of that path. See https://docs.an
core/2.15/reference_appendices/interpreter_discovery.html for more information.
ok: [worker02]
[WARNING]: Platform linux on host worker01 is using the discovered Python interpreter at
of another Python interpreter could change the meaning of that path. See https://docs.an
core/2.15/reference_appendices/interpreter_discovery.html for more information.
ok: [worker01]

TASK [Fetch master public key] *********************************************************
ok: [worker01 -> master(18.232.158.86)]

TASK [Add public key to authorized_keys on workers] ************************************
changed: [worker02]
changed: [worker01]

PLAY RECAP *****************************************************************************
worker01                   : ok=3    changed=1    unreachable=0    failed=0    skipped=0
worker02                   : ok=2    changed=1    unreachable=0    failed=0    skipped=0
```

You need to login into your server with your worker ipadresses.

- **sudo su – ansadm**

- **ssh ansadm@3.92.146.112**

```
[root@ip-172-31-56-126 playbooks]# sudo su - ansadm
[ansadm@ip-172-31-56-126 ~]$ ssh worker01
ssh: Could not resolve hostname worker01: Name or service not known
[ansadm@ip-172-31-56-126 ~]$ ssh worker-01
ssh: Could not resolve hostname worker-01: Name or service not known
[ansadm@ip-172-31-56-126 ~]$ ssh ansadm@3.92.146.112
The authenticity of host '3.92.146.112 (3.92.146.112)' can't be established.
ED25519 key fingerprint is SHA256:jBaQtfJXDbOwGFwu9idKmIMn65wCCLMGqjWRdkUL1ys.
This key is not known by any other names
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added '3.92.146.112' (ED25519) to the list of known hosts.
   ,     #_
   ~\_  ####_        Amazon Linux 2023
  ~~  \_#####\
  ~~     \###|
  ~~       \#/ ___   https://aws.amazon.com/linux/amazon-linux-2023
   ~~       V~' '->
    ~~~         /
      ~~._.   _/
         _/ _/
       _/m/'
```

- **ssh ansadm@98.80.231.113**

```
[ansadm@ip-172-31-56-126 ~]$ ssh ansadm@98.80.231.113
The authenticity of host '98.80.231.113 (98.80.231.113)' can't be established.
ED25519 key fingerprint is SHA256:YCOfNdSwU9OWvkliVw+WPM4SoPS2SUAuwACyxqCMOnA.
This key is not known by any other names
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added '98.80.231.113' (ED25519) to the list of known hosts.
   ,     #_
   ~\_  ####_        Amazon Linux 2023
  ~~  \_#####\
  ~~     \###|
  ~~       \#/ ___   https://aws.amazon.com/linux/amazon-linux-2023
   ~~       V~' '->
    ~~~         /
      ~~._.   _/
         _/ _/
       _/m/'
```

4. Ansible playbook to inject ansible vault variables.

Create a vault by using

- **ansible-vault create vault.yml**

it will ask for password.

```
[root@ip-172-31-56-126 playbooks]# ansible-vault create vault.yml
New Vault password:
Confirm New Vault password:
```

After giving password it will open a file you you need to provide your secrets in that.

```
db_user: ansadm
db_password: MySuperSecretPassword
api_key: 12345-ABCDE
```

- vi use-vault.yml

- hosts: all

become: yes

vars_files:

- vault.yml

tasks:

- name: Show DB username

debug:

msg: "Database username is {{ db_user }}"

- name: Show DB password

debug:

msg: "Database password is {{ db_password }}"

- name: Create a user using vault password

user:

name: "{{ db_user }}"

password: "{{ db_password | password_hash('sha512') }}"

```yaml
---
- hosts: all
  become: yes
  vars_files:
    - vault.yml

  tasks:
    - name: Show DB username
      debug:
        msg: "Database username is {{ db_user }}"

    - name: Show DB password
      debug:
        msg: "Database password is {{ db_password }}"

    - name: Create a user using vault password
      user:
        name: "{{ db_user }}"
        password: "{{ db_password | password_hash('sha512') }}"
```

- **ansible-playbook -i hosts.ini use-vault.yml --ask-vault-pass**

```
[root@ip-172-31-56-126 playbooks]# ansible-playbook -i hosts.ini use-vault.yml --ask-vault-pass
Vault password:
[WARNING]: Found both group and host with same name: master

PLAY [all] *********************************************************************************************

TASK [Gathering Facts] *********************************************************************************
[WARNING]: Platform linux on host worker02 is using the discovered Python interpreter at /usr/bin/py
of another Python interpreter could change the meaning of that path. See https://docs.ansible.com/an
core/2.15/reference_appendices/interpreter_discovery.html for more information.
ok: [worker02]
[WARNING]: Platform linux on host worker01 is using the discovered Python interpreter at /usr/bin/py
of another Python interpreter could change the meaning of that path. See https://docs.ansible.com/an
core/2.15/reference_appendices/interpreter_discovery.html for more information.
ok: [worker01]
[WARNING]: Platform linux on host master is using the discovered Python interpreter at /usr/bin/pyth
another Python interpreter could change the meaning of that path. See https://docs.ansible.com/ansib
core/2.15/reference_appendices/interpreter_discovery.html for more information.
ok: [master]

TASK [Show DB username] ********************************************************************************
ok: [master] => {
    "msg": "Database username is ansadm"
}
ok: [worker01] => {
    "msg": "Database username is ansadm"
}
ok: [worker02] => {
    "msg": "Database username is ansadm"
}
```