



Challenge – Ansible Roles (Nginx, HTTPD, Tomcat)

Create the following roles with proper structure, templates,

handlers, and lifecycle tasks:  **Nginx Role**

- **Install and configure Nginx using templates.**
- **Include handlers for: install, start, restart, stop, remove.**
- **Add role dependencies using meta/main.yml.**
- **Add and use tags effectively throughout the role.**
- **Simulate publishing this custom Nginx role to Ansible Galaxy (provide steps or dummy content).**



HTTPD Role

- **Create a full role to configure Apache HTTPD.**
- **Use templates for configuration and virtual hosts.**
- **Include lifecycle actions: install/start/restart/stop/remove.**



Tomcat Role

- **Build a full Tomcat configuration role.**
- **Manage service, ports, and configuration.**
- **Include lifecycle actions: install/start/restart/stop/remove.**



Deliverables

- **A well-structured Ansible role directory for each service.**
- **A working example playbook to test each role.**
- **A short README describing functionality and variables.**

NGINX:

Login into ansible controller instance and create a directory named as roles and execute.

- **mkdir roles**
- **cd roles**
- **ansible-galaxy init nginx**

```

[root@ip-172-31-33-85 ~]# mkdir roles
[root@ip-172-31-33-85 ~]# ls
roles
[root@ip-172-31-33-85 ~]# cd roles
[root@ip-172-31-33-85 roles]# ls
[root@ip-172-31-33-85 roles]# ansible-galaxy init nginx
- Role nginx was created successfully
[root@ip-172-31-33-85 roles]# ls
nginx
[root@ip-172-31-33-85 roles]# ls
nginx
[root@ip-172-31-33-85 roles]# cd nginx
[root@ip-172-31-33-85 nginx]# ll
total 4
-rw-r--r--. 1 root root 1328 Dec 11 09:24 README.md
drwxr-xr-x. 2 root root  22 Dec 11 09:24 defaults
drwxr-xr-x. 2 root root   6 Dec 11 09:24 files
drwxr-xr-x. 2 root root  22 Dec 11 09:24 handlers
drwxr-xr-x. 2 root root  22 Dec 11 09:24 meta
drwxr-xr-x. 2 root root  22 Dec 11 09:24 tasks
drwxr-xr-x. 2 root root   6 Dec 11 09:24 templates
drwxr-xr-x. 2 root root  39 Dec 11 09:24 tests
drwxr-xr-x. 2 root root  22 Dec 11 09:24 vars
[root@ip-172-31-33-85 nginx]# |

```

- cd tasks
- vi main.yml

- name: Install nginx

package:

name: nginx

state: present

notify: restart nginx

- name: Deploy nginx config

template:

src: nginx.conf.j2

dest: /etc/nginx/nginx.conf

notify: restart nginx

- name: Start nginx

service:

name: nginx

state: started

enabled: yes

```
[root@ip-172-31-33-85 tasks]# ls  
main.yml  
[root@ip-172-31-33-85 tasks]#
```

```

---
- name: Install nginx
  package:
    name: nginx
    state: present
  notify: restart nginx

- name: Deploy nginx config
  template:
    src: nginx.conf.j2
    dest: /etc/nginx/nginx.conf
  notify: restart nginx

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

```

- `cd ..`
- `cd handlers`
- `vi main.yml`

```

[root@ip-172-31-33-85 tasks]# cd ..
[root@ip-172-31-33-85 nginx]# cd handlers/
[root@ip-172-31-33-85 handlers]# ls
main.yml
[root@ip-172-31-33-85 handlers]#

```

- name: restart nginx

service:

name: nginx

state: restarted

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

- `cd ..`
- `cd templates`
- `vi nginx.conf.j2`

```
[root@ip-172-31-33-85 handlers]# cd ..  
[root@ip-172-31-33-85 nginx]# cd templates/  
[root@ip-172-31-33-85 templates]# ls  
nginx.conf.j2  
[root@ip-172-31-33-85 templates]# vi nginx.conf.j2
```

`worker_processes auto;`

`events {`

`worker_connections 1024;`

`}`

`http {`

`server {`

`listen 80;`

`server_name localhost;`

`location / {`

```
    root /usr/share/nginx/html;

    index index.html;
}

}

}

worker_processes auto;

events {
    worker_connections 1024;
}

http {
    server {
        listen 80;
        server_name localhost;

        location / {
            root /usr/share/nginx/html;
            index index.html;
        }
    }
}
```

Outside of roles directory create site.yml and give this script.

- hosts: all

become: yes

roles:

- nginx

```

---
- hosts: all
  become: yes
  roles:
    - nginx

```

- **ansible-playbook -i /etc/ansible/hosts site.yml**

```

[root@ip-172-31-33-85 ~]# ansible-playbook -i /etc/ansible/hosts site.yml
[WARNING]: Invalid characters were found in group names but not replaced, use -vvvv to see details

PLAY [all] *****

TASK [Gathering Facts] *****
[WARNING]: Platform linux on host 172.31.54.109 is using the discovered Python interpreter at /usr/bin/p
installation of another Python interpreter could change the meaning of that path. See https://docs.ansib
core/2.15/reference_appendices/interpreter_discovery.html for more information.
ok: [172.31.54.109]
[WARNING]: Platform linux on host 172.31.31.173 is using the discovered Python interpreter at /usr/bin/p
installation of another Python interpreter could change the meaning of that path. See https://docs.ansib
core/2.15/reference_appendices/interpreter_discovery.html for more information.
ok: [172.31.31.173]

TASK [nginx : Install nginx] *****
ok: [172.31.31.173]
ok: [172.31.54.109]

TASK [nginx : Deploy nginx config] *****
ok: [172.31.54.109]
ok: [172.31.31.173]

TASK [nginx : Start nginx] *****
ok: [172.31.54.109]
ok: [172.31.31.173]

PLAY RECAP *****
172.31.31.173      : ok=4    changed=0    unreachable=0    failed=0    skipped=0    rescued=0
172.31.54.109     : ok=4    changed=0    unreachable=0    failed=0    skipped=0    rescued=0

[root@ip-172-31-33-85 ~]# |

```

HTTPD:

Go to roles directory and create

- **ansible-galaxy init httpd**


```
[root@ip-172-31-33-85 roles]# ls
nginx
[root@ip-172-31-33-85 roles]# ansible-galaxy init httpd
- Role httpd was created successfully
[root@ip-172-31-33-85 roles]# ls
httpd nginx
[root@ip-172-31-33-85 roles]# cd httpd/
[root@ip-172-31-33-85 httpd]# ls
README.md defaults files handlers meta tasks templates tests vars
[root@ip-172-31-33-85 httpd]# |
```

- **cd tasks**
- **vi main.yml**

```
[root@ip-172-31-33-85 httpd]# cd tasks/
[root@ip-172-31-33-85 tasks]# ls
main.yml
[root@ip-172-31-33-85 tasks]# |
```

- name: Install httpd

package:

name: httpd

state: present

notify: restart httpd

- name: Ensure document root exists

file:

path: /var/www/html

state: directory

- name: Deploy httpd config

template:

src: httpd.conf.j2

dest: /etc/httpd/conf/httpd.conf

notify: restart httpd

- name: Test Apache config syntax

command: apachectl configtest

register: apache_configtest

failed_when: "'Syntax OK' not in apache_configtest.stdout"

- name: Start httpd

service:

name: httpd

state: started

enabled: yes

```

---
- name: Install httpd
  package:
    name: httpd
    state: present
  notify: restart httpd

- name: Ensure document root exists
  file:
    path: /var/www/html
    state: directory

- name: Deploy httpd config
  template:
    src: httpd.conf.j2
    dest: /etc/httpd/conf/httpd.conf
  notify: restart httpd

- name: Test Apache config syntax
  command: apachectl configtest
  register: apache_configtest
  failed_when: "'Syntax OK' not in apache_configtest.stdout"

- name: Start httpd
  service:
    name: httpd
    state: started
    enabled: yes

```

- `cd ..`
- `cd handlers`
- `vi main.yml`

```

[root@ip-172-31-33-85 templates]# cd ..
[root@ip-172-31-33-85 httpd]# cd handlers/
[root@ip-172-31-33-85 handlers]# ls
main.yml

```

- name: restart httpd

service:

name: httpd

state: restarted

```
--  
- name: restart httpd  
  service:  
    name: httpd  
    state: restarted
```

- `cd ..`
- `cd templates`
- `vi httpd.conf.j2`

```
[root@ip-172-31-33-85 tasks]# cd ..  
[root@ip-172-31-33-85 httpd]# cd templates/  
[root@ip-172-31-33-85 templates]# ls  
httpd.conf.j2  
[root@ip-172-31-33-85 templates]# |
```

ServerRoot "/etc/httpd"

Listen 80

Load required modules

Include conf.modules.d/*.conf

User apache

Group apache

ServerAdmin root@localhost

<Directory />

AllowOverride none

Require all denied

</Directory>

DocumentRoot "/var/www/html"

<Directory "/var/www">

AllowOverride None

Require all granted

</Directory>

<Directory "/var/www/html">

AllowOverride None

Require all granted

</Directory>

LogLevel warn

ErrorLog "logs/error_log"

CustomLog "logs/access_log" combined

Default virtual host

<VirtualHost *:80>

DocumentRoot "/var/www/html"

</VirtualHost>

Include optional configs

IncludeOptional conf.d/*.conf

```
ServerRoot "/etc/httpd"
Listen 80

# Load required modules
Include conf.modules.d/*.conf

User apache
Group apache

ServerAdmin root@localhost

<Directory />
    AllowOverride none
    Require all denied
</Directory>

DocumentRoot "/var/www/html"

<Directory "/var/www">
    AllowOverride None
    Require all granted
</Directory>

<Directory "/var/www/html">
    AllowOverride None
    Require all granted
</Directory>

LogLevel warn

ErrorLog "logs/error_log"
CustomLog "logs/access_log" combined

# Default virtual host
<VirtualHost *:80>
```

out of roles directory

- **vi site.yml**

- **hosts: all**

become: yes

roles:

- **httpd**

```
---
- hosts: all
  become: yes
  roles:
    - httpd
```

- **ansible-playbook -i /etc/ansible/hosts site.yml**

```
bot@ip-172-31-33-85 ~]$ ansible-playbook -i /etc/ansible/hosts site.yml
[WARNING]: Invalid characters were found in group names but not replaced, use
vvvv to see details

PLAY [all] *****

TASK [Gathering Facts]
[WARNING]: Platform linux on host 172.31.54.109 is using the discovered Pyt
h interpreter at /usr/bin/python3.
ok: [172.31.54.109]

TASK [httpd : Install httpd] 172.31.31.173 is using the discovered Pyt
h interpreter at
ok: [172.31.54.109]

TASK [httpd : Deploy httpd config]
ok: [172.31.54.109]

TASK [httpd : Start httpd] 172.31.54.109
ok: [172.31.54.109]

PLAY RECAP
172.31.31.173      ok=4    changed=0    unreachable=0    failed=0    skipped
172.31.54.109     ok=4    changed=0    unreachable=0    failed=0    skipped
bot@ip-172-31-33-85 ~]$
```

TOMCAT:

In the roles directory create tomcat role.

- **ansible-galaxy init tomcat**

```
[root@ip-172-31-33-85 ~]# ls
roles
[root@ip-172-31-33-85 ~]# cd roles/
[root@ip-172-31-33-85 roles]# ls
httpd  nginx
[root@ip-172-31-33-85 roles]# ansible-galaxy init tomcat
- Role tomcat was created successfully
[root@ip-172-31-33-85 roles]# ls
httpd  nginx  tomcat
[root@ip-172-31-33-85 roles]# cd tomcat/
[root@ip-172-31-33-85 tomcat]# ls
README.md  defaults  files  handlers  meta  tasks  templates  tests  vars
[root@ip-172-31-33-85 tomcat]#
```

- **cd tasks**
- **vi main.yml**

```
[root@ip-172-31-33-85 tomcat]# cd tasks/
[root@ip-172-31-33-85 tasks]# ls
main.yml
[root@ip-172-31-33-85 tasks]#
```

- **name: Install Java (Amazon Linux 2023)**

ansible.builtin.package:

name: java-17-amazon-corretto

state: present

- **name: Create Tomcat directory**

ansible.builtin.file:

path: /opt/tomcat

state: directory

- name: Download Tomcat

ansible.builtin.get_url:

url: https://archive.apache.org/dist/tomcat/tomcat-10/v10.1.26/bin/apache-tomcat-10.1.26.tar.gz

dest: /tmp/tomcat.tar.gz

- name: Extract Tomcat

ansible.builtin.unarchive:

src: /tmp/tomcat.tar.gz

dest: /opt/tomcat

remote_src: yes

extra_opts: [--strip-components=1]

- name: Deploy Tomcat server.xml

ansible.builtin.template:

src: server.xml.j2

dest: /opt/tomcat/conf/server.xml

notify: restart tomcat

- name: Start Tomcat

ansible.builtin.command: /opt/tomcat/bin/startup.sh

notify: restart tomcat

```
---
- name: Install Java (Amazon Linux 2023)
  ansible.builtin.package:
    name: java-17-amazon-corretto
    state: present

- name: Create Tomcat directory
  ansible.builtin.file:
    path: /opt/tomcat
    state: directory

- name: Download Tomcat
  ansible.builtin.get_url:
    url: https://archive.apache.org/dist/tomcat/tomcat-10/v10.1.26/bin/apache-tomcat-10.1.26.tar.gz
    dest: /tmp/tomcat.tar.gz

- name: Extract Tomcat
  ansible.builtin.unarchive:
    src: /tmp/tomcat.tar.gz
    dest: /opt/tomcat
    remote_src: yes
    extra_opts: [--strip-components=1]

- name: Deploy Tomcat server.xml
  ansible.builtin.template:
    src: server.xml.j2
    dest: /opt/tomcat/conf/server.xml
    notify: restart tomcat

- name: Start Tomcat
  ansible.builtin.command: /opt/tomcat/bin/startup.sh
  notify: restart tomcat
```

- cd ..
- cd handlers
- vi main.yml

```
[root@ip-172-31-33-85 tasks]# vi main.yml
[root@ip-172-31-33-85 tasks]# cd ..
[root@ip-172-31-33-85 tomcat]# cd handlers/
[root@ip-172-31-33-85 handlers]# ls
main.yml
[root@ip-172-31-33-85 handlers]#
```

- name: restart tomcat

ansible.builtin.command: /opt/tomcat/bin/shutdown.sh
&& /opt/tomcat/bin/startup.sh

```
---  
- name: restart tomcat  
  ansible.builtin.command: /opt/tomcat/bin/shutdown.sh && /opt/tomcat/bin/startup.sh
```

- cd ..
- cd templates
- vi server.xml.j2

```
[root@ip-172-31-33-85 handlers]# cd ..  
[root@ip-172-31-33-85 tomcat]# cd templates/  
[root@ip-172-31-33-85 templates]# ls  
server.xml.j2  
[root@ip-172-31-33-85 templates]#
```

<?xml version="1.0" encoding="UTF-8"?>

<Server port="8005" shutdown="SHUTDOWN">

<Listener

className="org.apache.catalina.startup.VersionLoggerListe
ner" />

<Listener

className="org.apache.catalina.core.AprLifecycleListener"
SSLEngine="on" />

<Listener

className="org.apache.catalina.core.JreMemoryLeakPreve
ntionListener" />

```
<Listener  
className="org.apache.catalina.mbeans.GlobalResourcesLi  
fecycleListener" />
```

```
<Listener  
className="org.apache.catalina.core.ThreadLocalLeakPreve  
ntionListener" />
```

```
<Service name="Catalina">  
  <Connector port="8080" protocol="HTTP/1.1"  
    connectionTimeout="20000"  
    redirectPort="8443" />  
  <Engine name="Catalina" defaultHost="localhost">  
    <Host name="localhost" appBase="webapps"  
      unpackWARs="true" autoDeploy="true">  
      </Host>  
    </Engine>  
  </Service>  
</Server>
```

```
<?xml version="1.0" encoding="UTF-8"?>
<Server port="8005" shutdown="SHUTDOWN">
  <Listener className="org.apache.catalina.startup.VersionLoggerListener" />
  <Listener className="org.apache.catalina.core.AprLifecycleListener" SSLEngine="on" />
  <Listener className="org.apache.catalina.core.JreMemoryLeakPreventionListener" />
  <Listener className="org.apache.catalina.mbeans.GlobalResourcesLifecycleListener" />
  <Listener className="org.apache.catalina.core.ThreadLocalLeakPreventionListener" />

  <Service name="Catalina">
    <Connector port="8080" protocol="HTTP/1.1"
      connectionTimeout="20000"
      redirectPort="8443" />
    <Engine name="Catalina" defaultHost="localhost">
      <Host name="localhost" appBase="webapps"
        unpackWARs="true" autoDeploy="true">
      </Host>
    </Engine>
  </Service>
</Server>
```

Outside the root directory create

- vi site.yml

```
[root@ip-172-31-33-85 tomcat]# cd ..
[root@ip-172-31-33-85 roles]# cd ..
[root@ip-172-31-33-85 ~]# vi site.yml
```

- hosts: all

become: yes

roles:

- tomcat

```
---
- hosts: all
  become: true
  roles:
    - tomcat
```

- ansible-playbook -i /etc/ansible/hosts site.yml

```

[root@ip-172-31-33-85 ~]# ansible-playbook -i /etc/ansible/hosts site.yml
[WARNING]: Invalid characters were found in group names but not replaced, use -vvvv
PLAY [all] *****

TASK [Gathering Facts] *****
[WARNING]: Platform linux on host 172.31.54.109 is using the discovered Python interpreter
installation of another Python interpreter could change the meaning of that path. See
core/2.15/reference_appendices/interpreter_discovery.html for more information.
ok: [172.31.54.109]
[WARNING]: Platform linux on host 172.31.31.173 is using the discovered Python interpreter
installation of another Python interpreter could change the meaning of that path. See
core/2.15/reference_appendices/interpreter_discovery.html for more information.
ok: [172.31.31.173]

TASK [tomcat : Install Java (Amazon Linux 2023)] *****
changed: [172.31.31.173]
changed: [172.31.54.109]

TASK [tomcat : Create Tomcat directory] *****
changed: [172.31.31.173]
changed: [172.31.54.109]

TASK [tomcat : Download Tomcat] *****
changed: [172.31.54.109]
changed: [172.31.31.173]

TASK [tomcat : Extract Tomcat] *****
changed: [172.31.31.173]
changed: [172.31.54.109]

TASK [tomcat : Deploy Tomcat server.xml] *****
changed: [172.31.31.173]

```

```

TASK [tomcat : Download Tomcat] *****
changed: [172.31.54.109]
changed: [172.31.31.173]

TASK [tomcat : Extract Tomcat] *****
changed: [172.31.31.173]
changed: [172.31.54.109]

TASK [tomcat : Deploy Tomcat server.xml] *****
changed: [172.31.31.173]
changed: [172.31.54.109]

TASK [tomcat : Start Tomcat] *****
changed: [172.31.31.173]
changed: [172.31.54.109]

RUNNING HANDLER [tomcat : restart tomcat] *****
changed: [172.31.54.109]
changed: [172.31.31.173]

PLAY RECAP *****
172.31.31.173      : ok=8    changed=7    unreachable=0    failed=0    skipped=0    res
172.31.54.109    : ok=8    changed=7    unreachable=0    failed=0    skipped=0    res

```