



Challenge – Ansible Roles (Nginx, HTTPD, Tomcat)

Create the following roles with proper structure, templates,

handlers, and lifecycle tasks:

1

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).

2

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.

3

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]# 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**

```
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] ****  
[ASK [Gathering Facts]  
[WARNING]: Platform linux on host 172.31.54.109 is using the discovered Python  
interpreter at /usr/bin/python3.  
<: [172.31.54.109]  
TASK [httpd : Install httpd]      172.31.31.173 is using the discovered Python  
interpreter at  
<: [172.31.54.109]  
TASK [httpd : Deploy httpd config]  
<: [172.31.54.109]  
TASK [httpd : Start httpd]      172.31.54.109  
<: [172.31.54.109]  
PLAY RECAP  
172.31.31.173      ok=4      changed=0      unreachable=0      failed=0      skipped=0  
172.31.54.109      ok=4      changed=0      unreachable=0      failed=0      skipped=0  
root@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]# 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
```