ANSIBLE DYNAMIC ASSIGNMENTS (INCLUDE) AND COMMUNITY ROLES.

Our last 2 projects have equipped us with some knowledge and skills on Ansible and we have been able to perform some configuration management using playbooks, roles and imports. We would be moving a step further to configure more UAT webservers in order to learn more concepts and modules using dynamic assignments by using the “include” module.

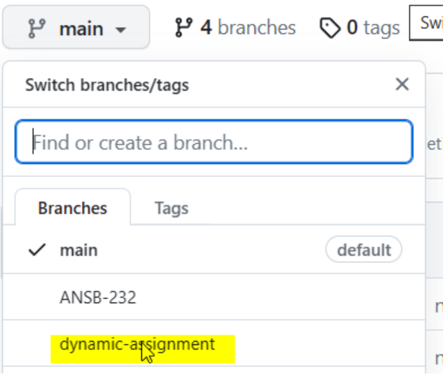
In previous project we used “import” for Static Assignments. All statements are pre-processed at the time playbooks are parsed during execution of the site.yml file inside the playbooks folder. Such statements are not considered hence Static.

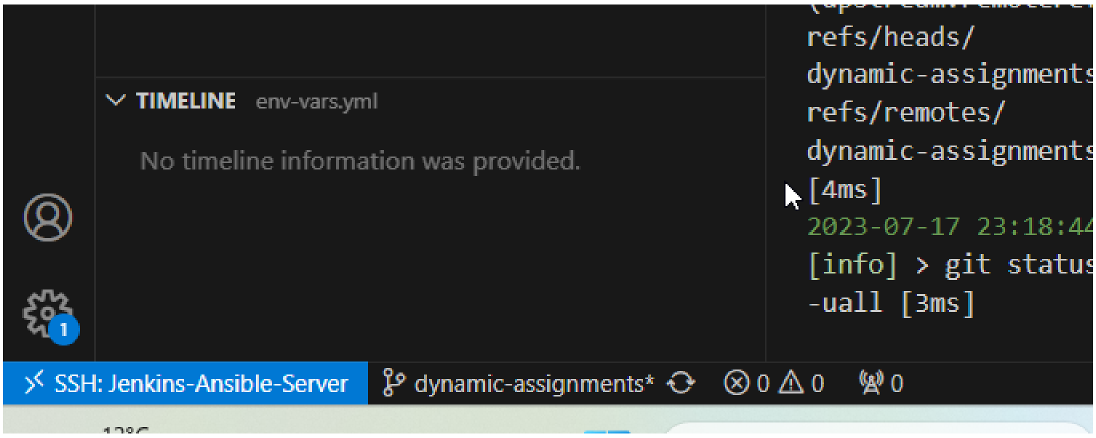
We would be using the “include” module to accommodate such statements that were parsed thereby executing them alongside site.yml file inside the playbooks folder.

Please note: Even while we proceed with these projects it is advisable to use static assignments more as dynamic assignment may be to complex as its always hard to debug the playbook problem due to the dynamic nature .

DYNAMIC ASSIGNMENT STRUCTURE

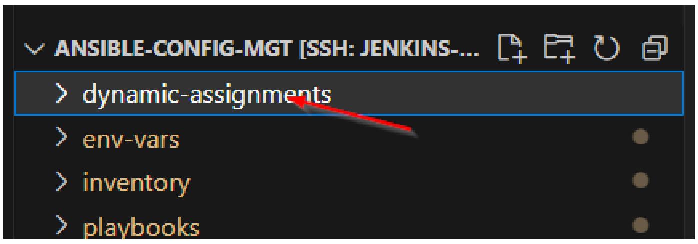
In our GitHub repository for the ansible-config-mgt , we need to create a new branch and its called dynamic-assignments .

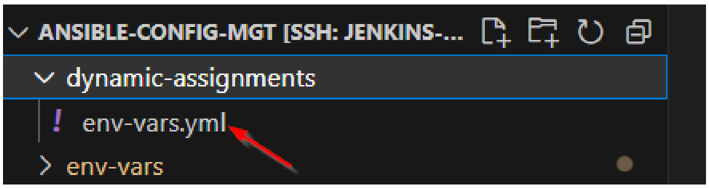


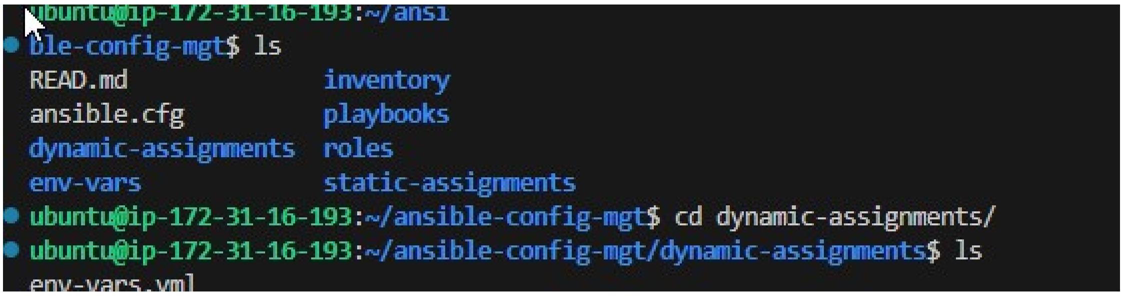

TIMELINE env-vars.yml
No timeline information was provided.
SSH: Jenkins-Ansible-Server
dynamic-assignments*
0 0
0

```
refs/heads/
dynamic-assignments
refs/remotes/
dynamic-assignments
[4ms]
2023-07-17 23:18:44
[info] > git status
-uall [3ms]
```

We also create a new folder with the same name and create a file inside of it called env-vars.yml and we would be using the visual studio code to create them and you can see its display on the terminal as shown below

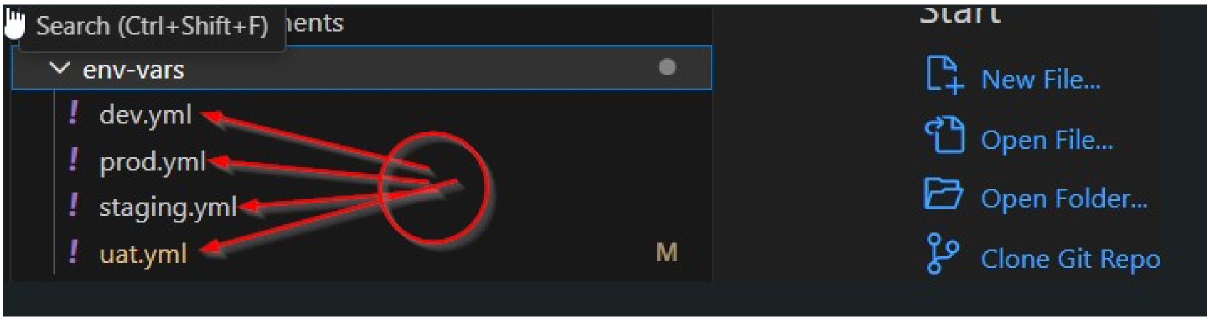




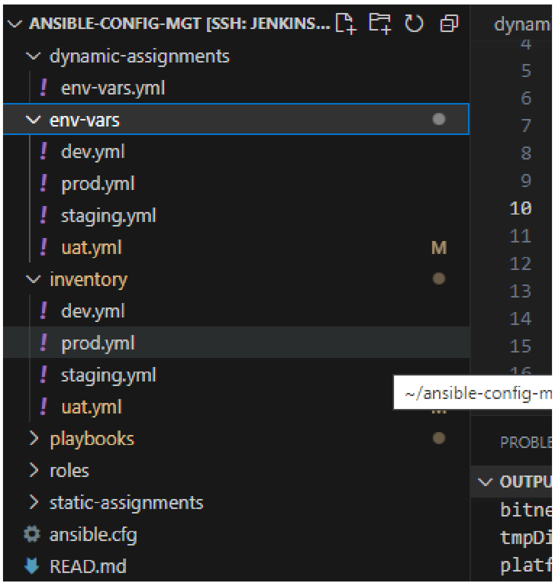


```
ubuntu@ip-172-31-16-193:~/ansi
ble-config-mgt$ ls
README.md            inventory
ansible.cfg          playbooks
dynamic-assignments  roles
env-vars             static-assignments
ubuntu@ip-172-31-16-193:~/ansible-config-mgt$ cd dynamic-assignments/
ubuntu@ip-172-31-16-193:~/ansible-config-mgt/dynamic-assignments$ ls
env-vars.yml
```

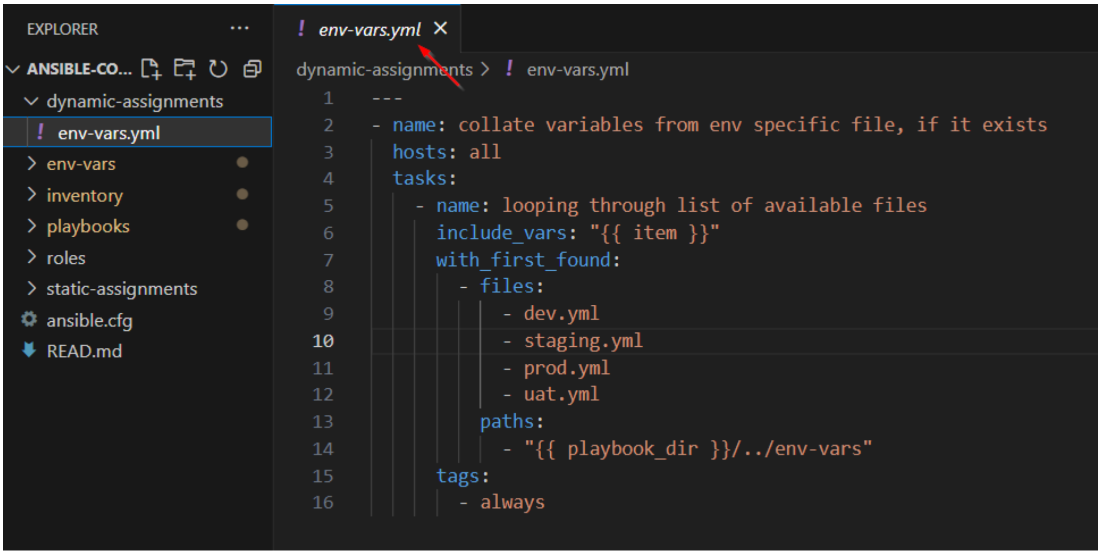
We wpi;d ne creating a new folder called env-vars as this is where we would keep each of the environmental variable files and then create each new YAML files where we would set the variables as shown below



It is recommended that all codes are managed and tracked in github as our github follows a type of structurewhich we have created on our visual studio code as shown below.



Now we would get to paste the codes below into our env-var.yml file as shown below



```
---
- name: collate variables from env specific file, if it exists
  hosts: all
  tasks:
    - name: looping through list of available files
      include_vars: "{{ item }}"
      with_first_found:
        - files:
            - dev.yml
            - staging.yml
            - prod.yml
            - uat.yml
          paths:
            - "{{ playbook_dir }}/../env-vars"
      tags:
        - always
```

PLEASE NOTE :

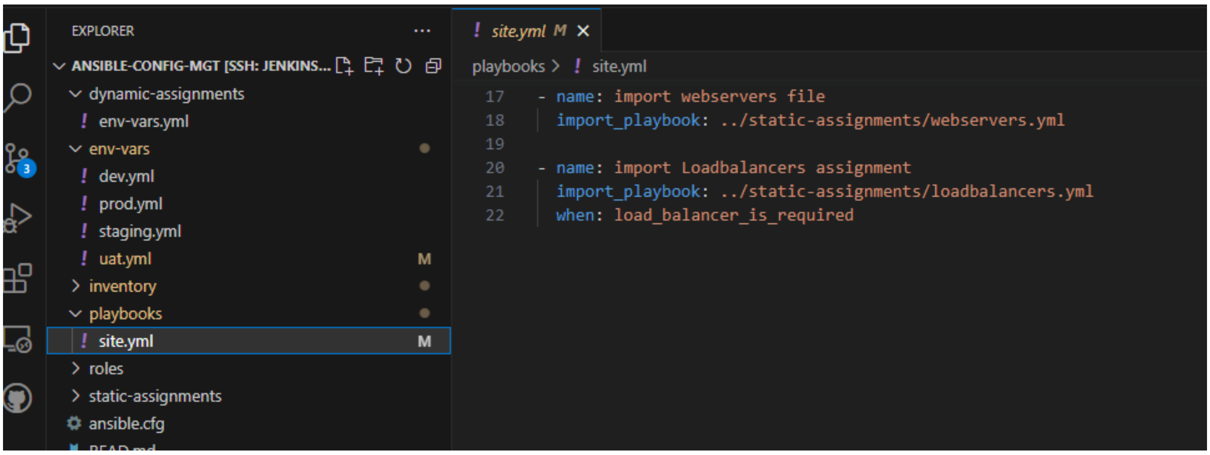
In this code there are things to pay attention too .We used hthe "include_vars" syntax instead of include because we seperated different features of the module .This is because there was deperecation of the previous version and this makes it change to that and we also have the include_role as well as include_tasks

Special variables were also used .{ playbook_dir} will help ansible get the location of the playbook and enhance navigate to other parts of the filesystem. The {inventory_file} would dynamically resolve to the inventory file being used then append the .yml so that it picks up the files in the env-var folder

We also include the with_first_round ,which means looping through the list of files and the first one found is used .This is useful so that we can always set default variables value in case an environment specific env files does not exist

UPDATE SITE.YML WITH DYNAMIC ASSIGNMENTS

We are expected to update our site.yml file with the servers as shown below.

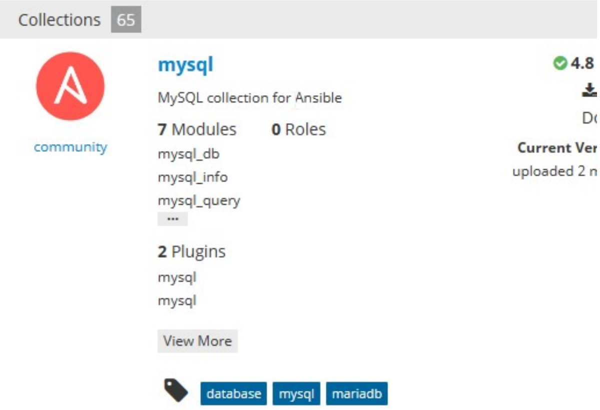


```
- name: import webservers file
  import_playbook: ../static-assignments/webservers.yml

- name: import Loadbalancers assignment
  import_playbook: ../static-assignments/loadbalancers.yml
  when: load_balancer_is_required
```

Community roles

We need to create roles for our MySQL package, create a database and configure used .These roles are production ready and dynamic enough to accommodate most linux flavours .We would use Ansible galaxy to simply download a ready to use ansible role .We download MySql Ansible Role developed by geerlingguy

HINT: Ensure you merge your code commit before performing this ansible galaxy action


Collections 65

community

mysql

MySQL collection for Ansible

7 Modules   0 Roles

mysql_db
mysql_info
mysql_query
...

2 Plugins
mysql
mysql

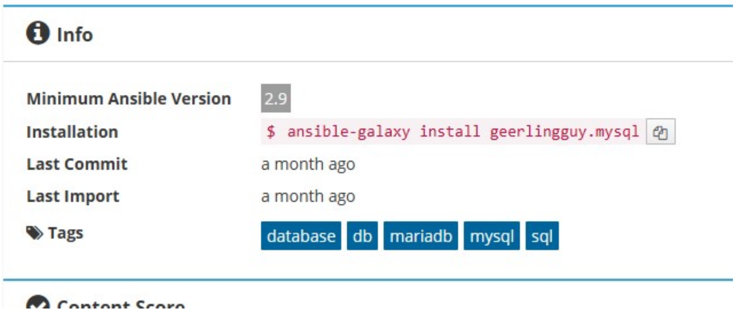
View More

database mysql mariadb

4.8

Dc

Current Ver
uploaded 2 n


Info

Minimum Ansible Version 2.9

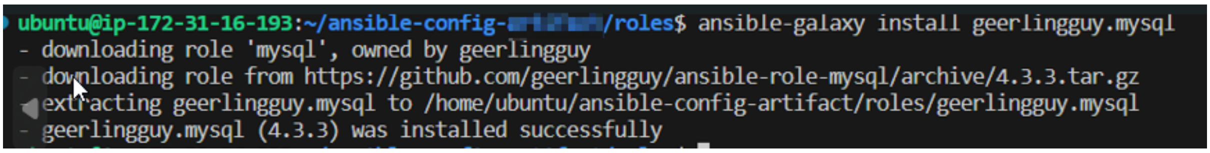
Installation `$ ansible-galaxy install geerlingguy.mysql`

Last Commit a month ago

Last Import a month ago

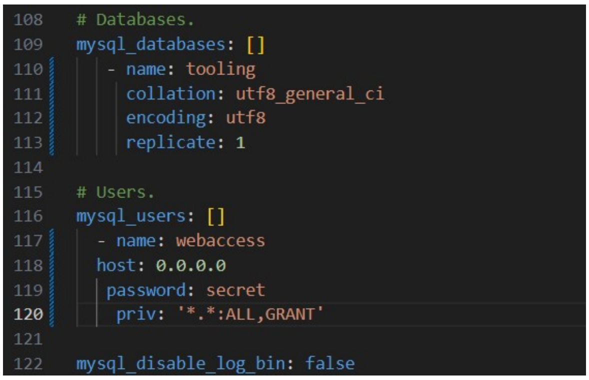
Tags database db mariadb mysql sql

Content Score


```
ubuntu@ip-172-31-16-193:~/ansible-config-[redacted]/roles$ ansible-galaxy install geerlingguy.mysql
- downloading role 'mysql', owned by geerlingguy
- downloading role from https://github.com/geerlingguy/ansible-role-mysql/archive/4.3.3.tar.gz
- extracting geerlingguy.mysql to /home/ubuntu/ansible-config-artifact/roles/geerlingguy.mysql
- geerlingguy.mysql (4.3.3) was installed successfully
```

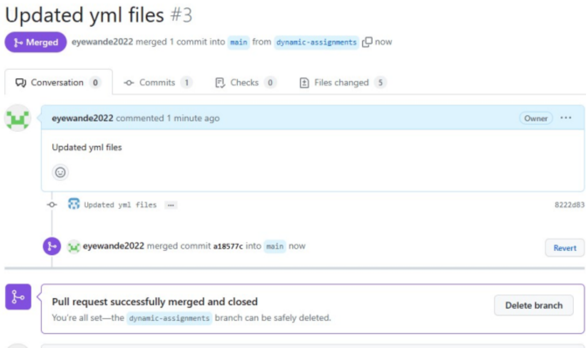
The download came with a readme.md file with instructions that would help us to edit the roles configuration to use the correct credentials for MYSQL required for the tooling website

Navigate to the mysql users tab and you would find the default set up of the configuration. We would update the correct credentials and privilege we want to use for the username ,host list ,password, database access



```
# Databases.
mysql_databases: []
    - name: tooling
      collation: utf8_general_ci
      encoding: utf8
      replicate: 1

# Users.
mysql_users: []
  - name: webaccess
  host: 0.0.0.0
   password: secret
    priv: '*.*:ALL,GRANT'

mysql_disable_log_bin: false
```

Save the updated configuration and ensure you commit the new role files in the github repository and merge into the main as shown below



Updated yml files #3

Merged eyewande2022 merged 1 commit into main from dynamic-assignments now

eyewande2022 commented 1 minute ago

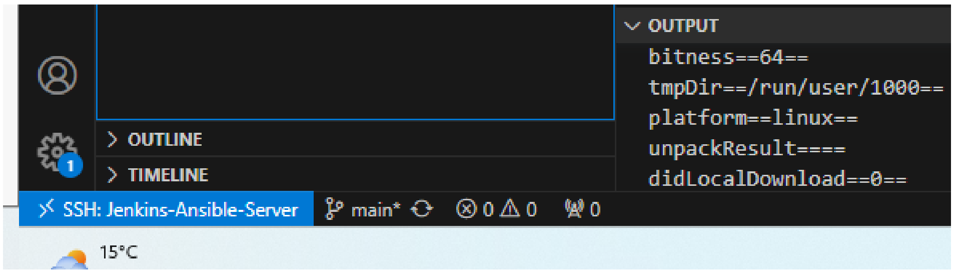
Updated yml files

Updated yml files ... 8222d83

eyewande2022 merged commit a18577c into main now

Pull request successfully merged and closed

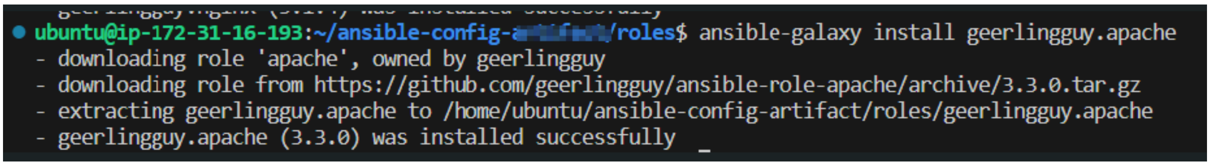
You're all set—the dynamic-assignments branch can be safely deleted.



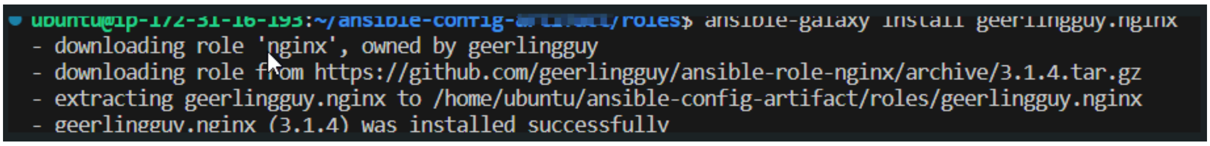
OUTPUT

```
bitness==64==
tmpDir==/run/user/1000==
platform==linux==
unpackResult====
didLocalDownload==0==
```

Once done we proceed to configure the load balancer roles and we would be able to choose from the Nginx or Apache so we have 2 roles respectively to work with .Please note we can only implement one at a time .We would be using the Apache and Nginx role developed by geerlingguy as we did earlier for the mysql as shown below

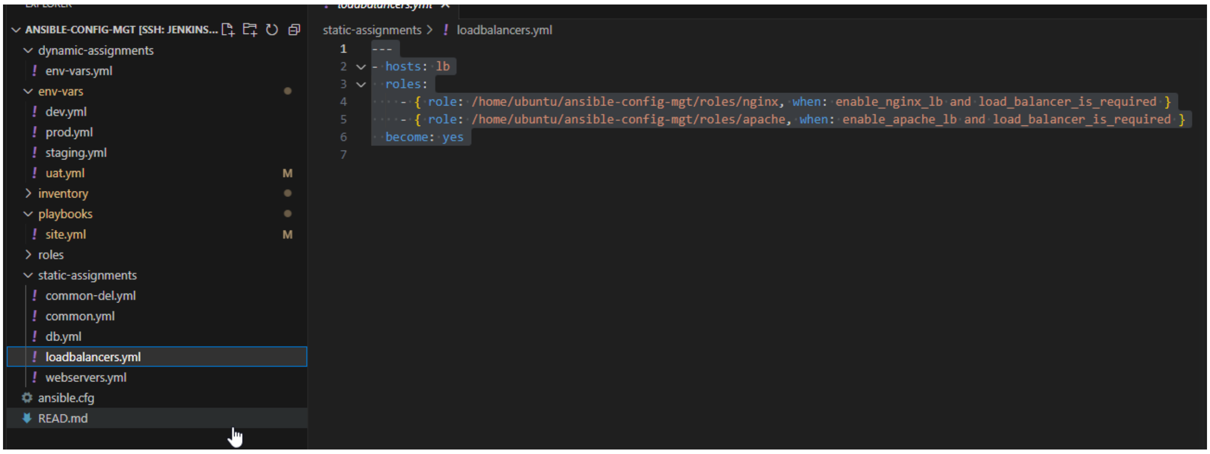


```
  - geerlingguy.nginx (3.1.4) was installed successfully
ubuntu@ip-172-31-16-193:~/ansible-config-[redacted]/roles$ ansible-galaxy install geerlingguy.apache
  - downloading role 'apache', owned by geerlingguy
  - downloading role from https://github.com/geerlingguy/ansible-role-apache/archive/3.3.0.tar.gz
  - extracting geerlingguy.apache to /home/ubuntu/ansible-config-artifact/roles/geerlingguy.apache
  - geerlingguy.apache (3.3.0) was installed successfully _
```



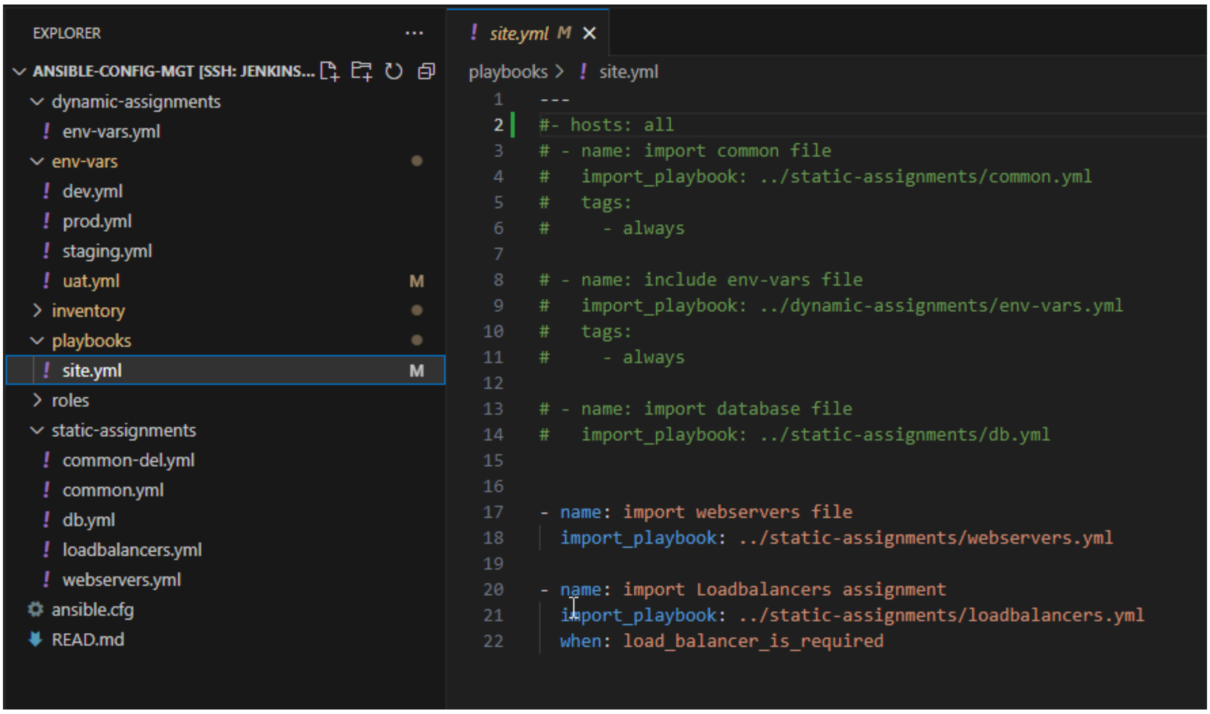
```
ubuntu@ip-172-31-16-193:~/ansible-config-[redacted]/roles$ ansible-galaxy install geerlingguy.nginx
  - downloading role 'nginx', owned by geerlingguy
  - downloading role from https://github.com/geerlingguy/ansible-role-nginx/archive/3.1.4.tar.gz
  - extracting geerlingguy.nginx to /home/ubuntu/ansible-config-artifact/roles/geerlingguy.nginx
  - geerlingguy.nginx (3.1.4) was installed successfully
```

Please note that we should also update both statis-assignment and site.yml files to refer the roles



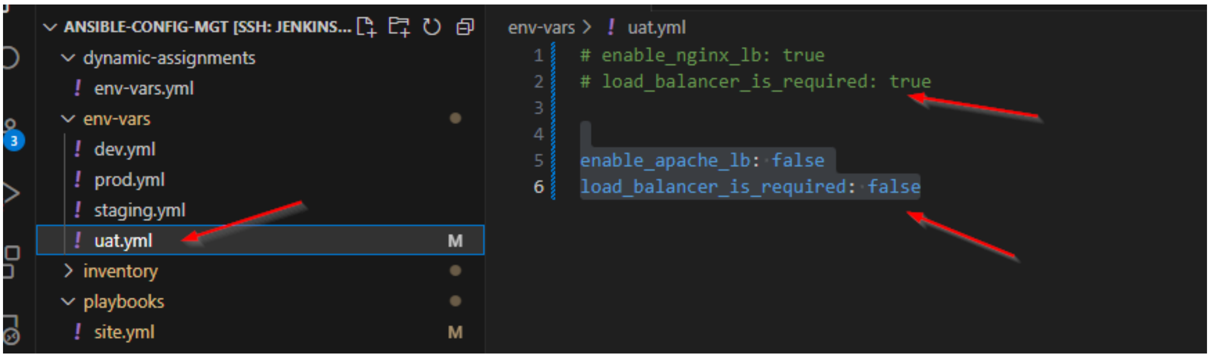
```yaml
---
- hosts: lb
  roles:
    - { role: /home/ubuntu/ansible-config-mgt/roles/nginx, when: enable_nginx_lb and load_balancer_is_required }
    - { role: /home/ubuntu/ansible-config-mgt/roles/apache, when: enable_apache_lb and load_balancer_is_required }
  become: yes
```

Since we cannot use both Nginx and Apache load balancer ,we would need to add conditions and declare variables in their defaults/main,yml file as we would be naming them as enable_nginx_lb: false   and enable_apache_lb: false.We would also declare another variable in both roles load_balancer_is_required and sets its value to false as well.



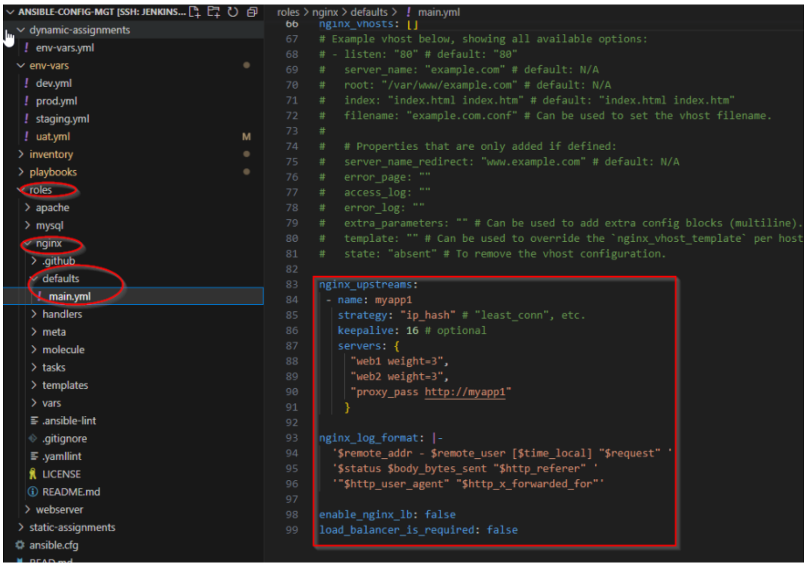
```yaml
---
#- hosts: all
# - name: import common file
#   import_playbook: ../static-assignments/common.yml
#   tags:
#     - always

# - name: include env-vars file
#   import_playbook: ../dynamic-assignments/env-vars.yml
#   tags:
#     - always

# - name: import database file
#   import_playbook: ../static-assignments/db.yml


- name: import webservers file
  import_playbook: ../static-assignments/webservers.yml

- name: import Loadbalancers assignment
  import_playbook: ../static-assignments/loadbalancers.yml
  when: load_balancer_is_required
```

Please note the content of the file that has been commented out .We can make use of the env-vars/uat.yml file to define which load balancer to use in UAT environment by setting respective environment variable to true .



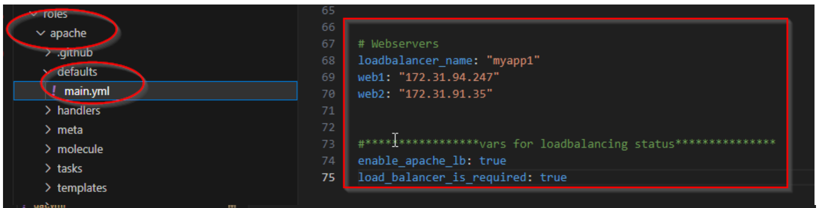
```
# enable_nginx_lb: true
# load_balancer_is_required: true


enable_apache_lb: false
load_balancer_is_required: false
```

Configure nginx load balancer defaults/main.yml

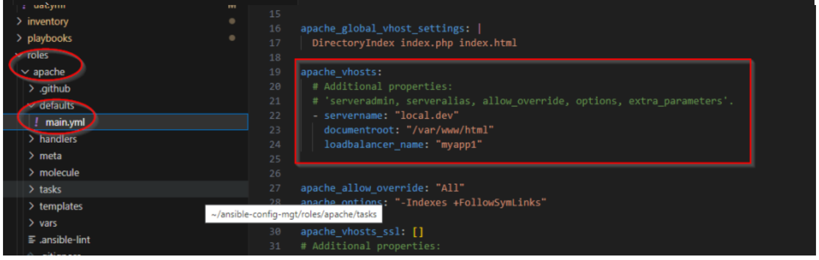


```
nginx_vhosts: []
# Example vhost below, showing all available options:
# - listen: "80" # default: "80"
#   server_name: "example.com" # default: N/A
#   root: "/var/www/example.com" # default: N/A
#   index: "index.html index.htm" # default: "index.html index.htm"
#   filename: "example.com.conf" # Can be used to set the vhost filename.
#
#   # Properties that are only added if defined:
#   server_name_redirect: "www.example.com" # default: N/A
#   error_page: ""
#   access_log: ""
#   error_log: ""
#   extra_parameters: "" # Can be used to add extra config blocks (multiline).
#   template: "" # Can be used to override the `nginx_vhost_template` per host
#   state: "absent" # To remove the vhost configuration.

nginx_upstreams:
  - name: myapp1
    strategy: "ip_hash" # "least_conn", etc.
    keepalive: 16 # optional
    servers: {
      "web1 weight=3",
      "web2 weight=3",
      "proxy_pass http://myapp1"
     }

nginx_log_format: |-
  '$remote_addr - $remote_user [$time_local] "$request" '
  '$status $body_bytes_sent "$http_referer" '
  '"$http_user_agent" "$http_x_forwarded_for"'

enable_nginx_lb: false
load_balancer_is_required: false
```

Configure apache load balancer defaults/main.yml

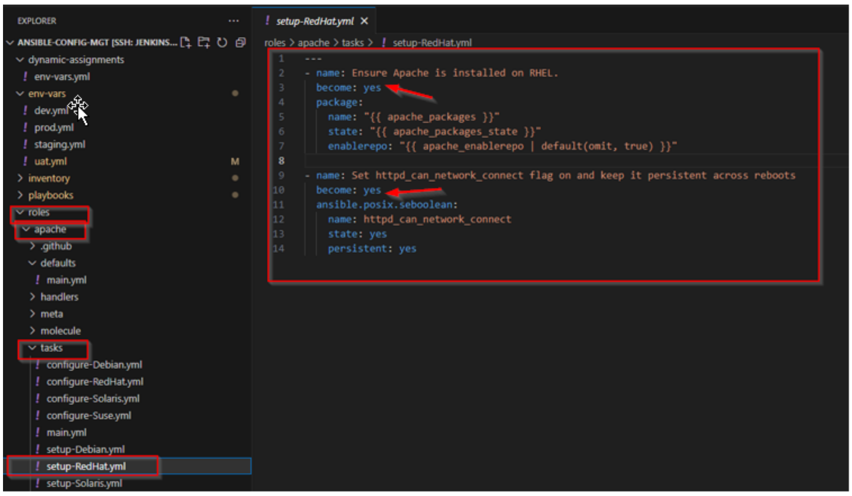


```

# Webservers
loadbalancer_name: "myapp1"
web1: "172.31.94.247"
web2: "172.31.91.35"


#*****************vars for loadbalancing status***************
enable_apache_lb: true
load_balancer_is_required: true
```



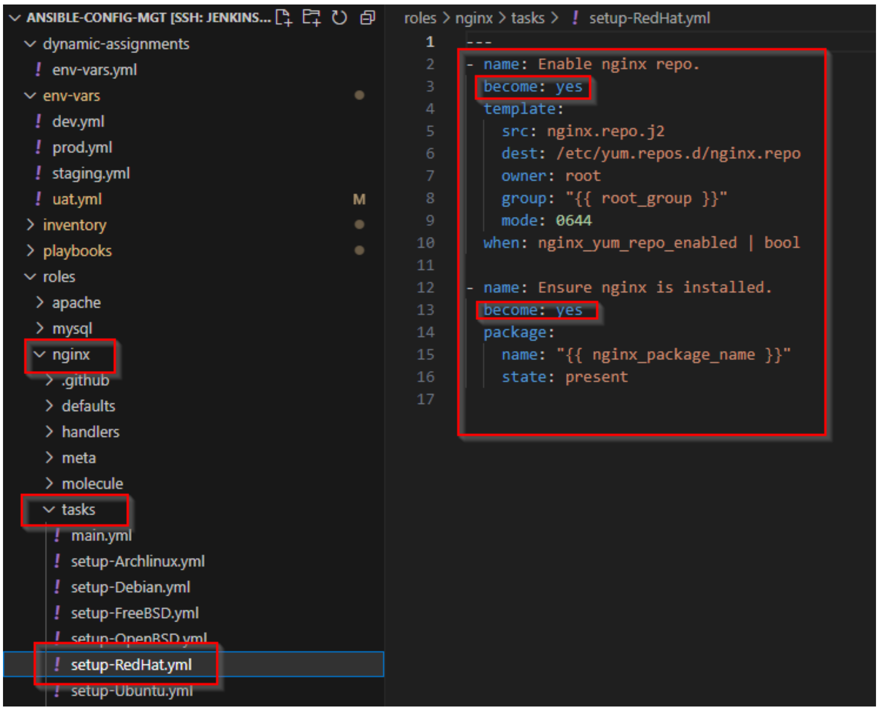
```

apache_global_vhost_settings: |
  DirectoryIndex index.php index.html

apache_vhosts:
  # Additional properties:
  # 'serveradmin, serveralias, allow_override, options, extra_parameters'.
  - servername: "local.dev"
    documentroot: "/var/www/html"
    loadbalancer_name: "myapp1"


apache_allow_override: "All"
apache_options: "-Indexes +FollowSymLinks"

apache_vhosts_ssl: []
# Additional properties:
```

We would now enable the super user on apache on roles/apache/tasks/setup-RedHat.yml



```yaml
---
- name: Ensure Apache is installed on RHEL.
  become: yes
  package:
    name: "{{ apache_packages }}"
    state: "{{ apache_packages_state }}"
    enablerepo: "{{ apache_enablerepo | default(omit, true) }}"

- name: Set httpd_can_network_connect flag on and keep it persistent across reboots
  become: yes
  ansible.posix.seboolean:
    name: httpd_can_network_connect
    state: yes
    persistent: yes
```

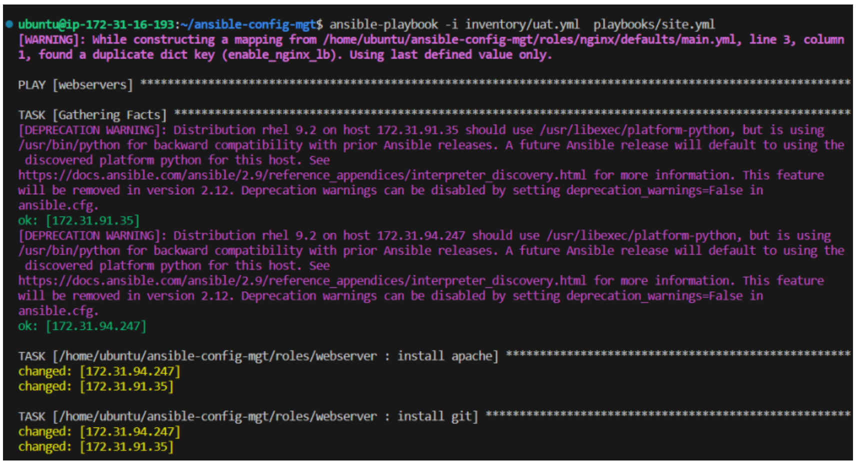
We would now enable the super user on Nginx on roles/apache/tasks/setup-RedHat.yml



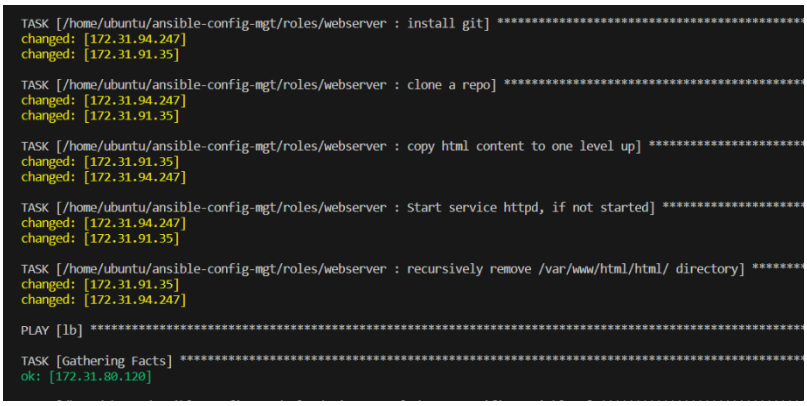
```yaml
---
- name: Enable nginx repo.
  become: yes
  template:
    src: nginx.repo.j2
    dest: /etc/yum.repos.d/nginx.repo
    owner: root
    group: "{{ root_group }}"
    mode: 0644
  when: nginx_yum_repo_enabled | bool

- name: Ensure nginx is installed.
  become: yes
  package:
    name: "{{ nginx_package_name }}"
    state: present
```

Once all these configuration is done .We proceed to run Ansible Against the UAT and load balancer environment.

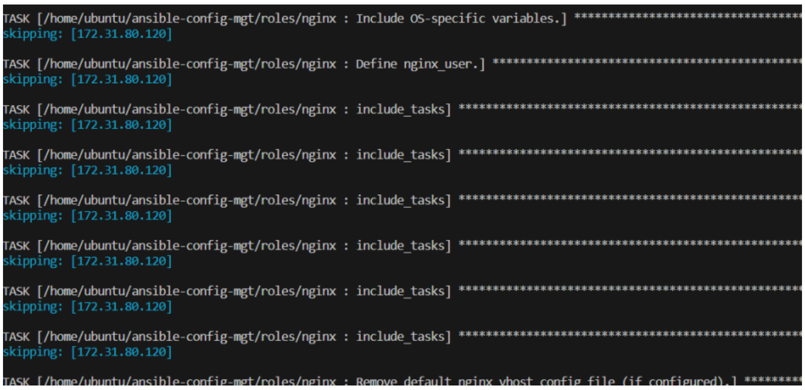
```
$   ansible-playbook -I inventory/uat.yml  playbooks/site.yml
```



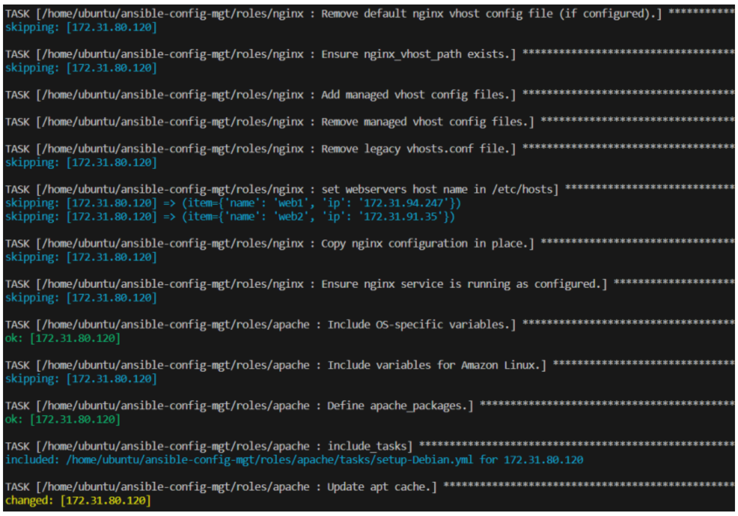
```
● ubuntu@ip-172-31-16-193:~/ansible-config-mgt$ ansible-playbook -i inventory/uat.yml  playbooks/site.yml
  [WARNING]: While constructing a mapping from /home/ubuntu/ansible-config-mgt/roles/nginx/defaults/main.yml, line 3, column
  1, found a duplicate dict key (enable_nginx_lb). Using last defined value only.

  PLAY [webservers] **********************************************************************************************

  TASK [Gathering Facts] *****************************************************************************************
  [DEPRECATION WARNING]: Distribution rhel 9.2 on host 172.31.91.35 should use /usr/libexec/platform-python, but is using
  /usr/bin/python for backward compatibility with prior Ansible releases. A future Ansible release will default to using the
   discovered platform python for this host. See
  https://docs.ansible.com/ansible/2.9/reference_appendices/interpreter_discovery.html for more information. This feature
  will be removed in version 2.12. Deprecation warnings can be disabled by setting deprecation_warnings=False in
  ansible.cfg.
  ok: [172.31.91.35]
  [DEPRECATION WARNING]: Distribution rhel 9.2 on host 172.31.94.247 should use /usr/libexec/platform-python, but is using
  /usr/bin/python for backward compatibility with prior Ansible releases. A future Ansible release will default to using the
   discovered platform python for this host. See
  https://docs.ansible.com/ansible/2.9/reference_appendices/interpreter_discovery.html for more information. This feature
  will be removed in version 2.12. Deprecation warnings can be disabled by setting deprecation_warnings=False in
  ansible.cfg.
  ok: [172.31.94.247]

  TASK [/home/ubuntu/ansible-config-mgt/roles/webserver : install apache] ****************************************
  changed: [172.31.94.247]
  changed: [172.31.91.35]

  TASK [/home/ubuntu/ansible-config-mgt/roles/webserver : install git] *******************************************
  changed: [172.31.94.247]
  changed: [172.31.91.35]
```



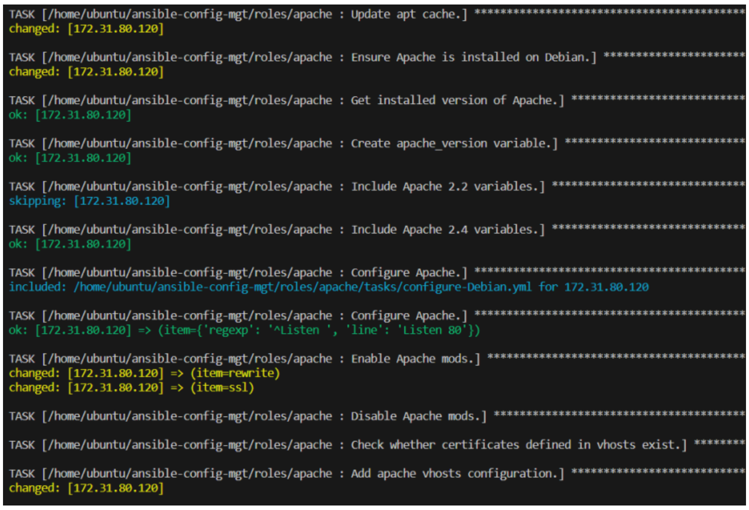
```
  TASK [/home/ubuntu/ansible-config-mgt/roles/webserver : install git] ***************************************
  changed: [172.31.94.247]
  changed: [172.31.91.35]

  TASK [/home/ubuntu/ansible-config-mgt/roles/webserver : clone a repo] **************************************
  changed: [172.31.94.247]
  changed: [172.31.91.35]

  TASK [/home/ubuntu/ansible-config-mgt/roles/webserver : copy html content to one level up] *****************
  changed: [172.31.91.35]
  changed: [172.31.94.247]

  TASK [/home/ubuntu/ansible-config-mgt/roles/webserver : Start service httpd, if not started] ***************
  changed: [172.31.94.247]
  changed: [172.31.91.35]

  TASK [/home/ubuntu/ansible-config-mgt/roles/webserver : recursively remove /var/www/html/html/ directory] ***
  changed: [172.31.91.35]
  changed: [172.31.94.247]

  PLAY [lb] **************************************************************************************************

  TASK [Gathering Facts] *************************************************************************************
  ok: [172.31.80.120]
```



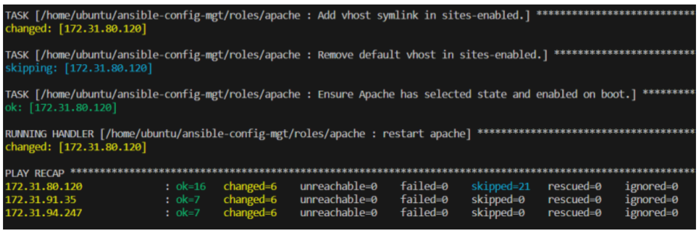
```
TASK [/home/ubuntu/ansible-config-mgt/roles/nginx : Include OS-specific variables.] ****************************
skipping: [172.31.80.120]

TASK [/home/ubuntu/ansible-config-mgt/roles/nginx : Define nginx_user.] ****************************************
skipping: [172.31.80.120]

TASK [/home/ubuntu/ansible-config-mgt/roles/nginx : include_tasks] *********************************************
skipping: [172.31.80.120]

TASK [/home/ubuntu/ansible-config-mgt/roles/nginx : include_tasks] *********************************************
skipping: [172.31.80.120]

TASK [/home/ubuntu/ansible-config-mgt/roles/nginx : include_tasks] *********************************************
skipping: [172.31.80.120]

TASK [/home/ubuntu/ansible-config-mgt/roles/nginx : include_tasks] *********************************************
skipping: [172.31.80.120]

TASK [/home/ubuntu/ansible-config-mgt/roles/nginx : include_tasks] *********************************************
skipping: [172.31.80.120]

TASK [/home/ubuntu/ansible-config-mgt/roles/nginx : include_tasks] *********************************************
skipping: [172.31.80.120]

TASK [/home/ubuntu/ansible-config-mgt/roles/nginx : Remove default nginx vhost config file (if configured).] *********
```



```
TASK [/home/ubuntu/ansible-config-mgt/roles/nginx : Remove default nginx vhost config file (if configured).] **********
skipping: [172.31.80.120]

TASK [/home/ubuntu/ansible-config-mgt/roles/nginx : Ensure nginx_vhost_path exists.] *********************************
skipping: [172.31.80.120]

TASK [/home/ubuntu/ansible-config-mgt/roles/nginx : Add managed vhost config files.] *********************************

TASK [/home/ubuntu/ansible-config-mgt/roles/nginx : Remove managed vhost config files.] ******************************

TASK [/home/ubuntu/ansible-config-mgt/roles/nginx : Remove legacy vhosts.conf file.] *********************************
skipping: [172.31.80.120]

TASK [/home/ubuntu/ansible-config-mgt/roles/nginx : set webservers host name in /etc/hosts] **************************
skipping: [172.31.80.120] => (item={'name': 'web1', 'ip': '172.31.94.247'})
skipping: [172.31.80.120] => (item={'name': 'web2', 'ip': '172.31.91.35'})

TASK [/home/ubuntu/ansible-config-mgt/roles/nginx : Copy nginx configuration in place.] ******************************
skipping: [172.31.80.120]

TASK [/home/ubuntu/ansible-config-mgt/roles/nginx : Ensure nginx service is running as configured.] ******************
skipping: [172.31.80.120]

TASK [/home/ubuntu/ansible-config-mgt/roles/apache : Include OS-specific variables.] *********************************
ok: [172.31.80.120]

TASK [/home/ubuntu/ansible-config-mgt/roles/apache : Include variables for Amazon Linux.] *****************************
skipping: [172.31.80.120]

TASK [/home/ubuntu/ansible-config-mgt/roles/apache : Define apache_packages.] ****************************************
ok: [172.31.80.120]

TASK [/home/ubuntu/ansible-config-mgt/roles/apache : include_tasks] **************************************************
included: /home/ubuntu/ansible-config-mgt/roles/apache/tasks/setup-Debian.yml for 172.31.80.120

TASK [/home/ubuntu/ansible-config-mgt/roles/apache : Update apt cache.] **********************************************
changed: [172.31.80.120]
```



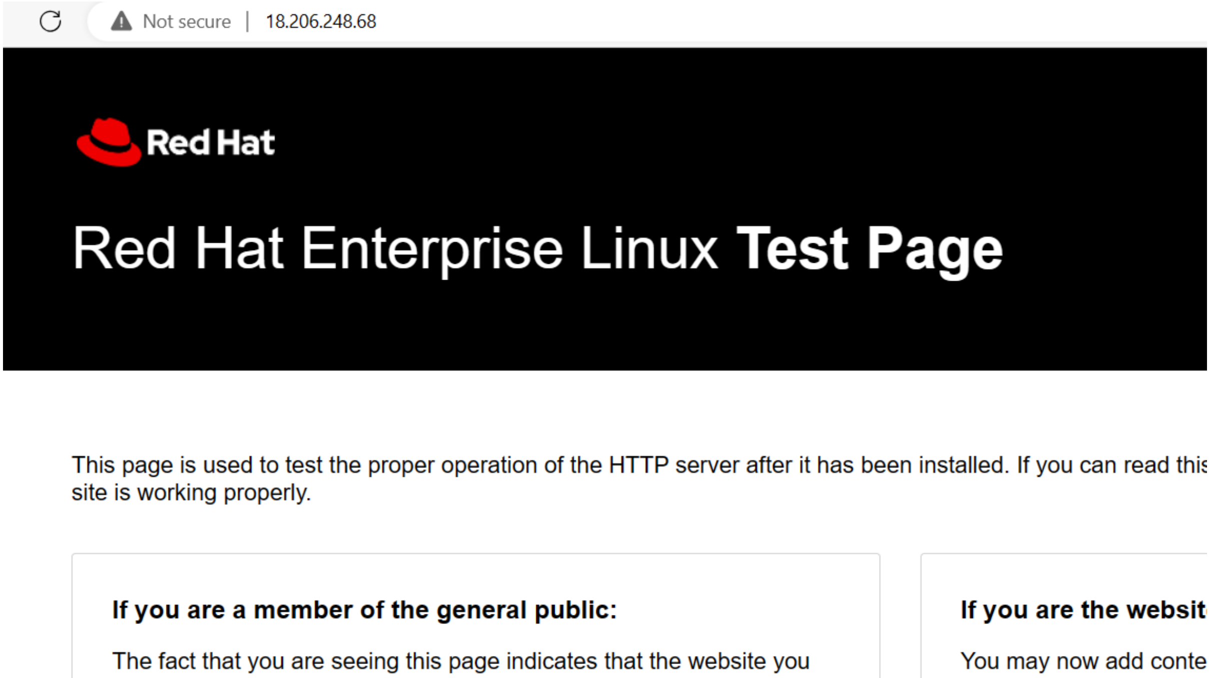
```
TASK [/home/ubuntu/ansible-config-mgt/roles/apache : Update apt cache.] ******************************************
changed: [172.31.80.120]

TASK [/home/ubuntu/ansible-config-mgt/roles/apache : Ensure Apache is installed on Debian.] **********************
changed: [172.31.80.120]

TASK [/home/ubuntu/ansible-config-mgt/roles/apache : Get installed version of Apache.] ***************************
ok: [172.31.80.120]

TASK [/home/ubuntu/ansible-config-mgt/roles/apache : Create apache_version variable.] ****************************
ok: [172.31.80.120]

TASK [/home/ubuntu/ansible-config-mgt/roles/apache : Include Apache 2.2 variables.] ******************************
skipping: [172.31.80.120]

TASK [/home/ubuntu/ansible-config-mgt/roles/apache : Include Apache 2.4 variables.] ******************************
ok: [172.31.80.120]

TASK [/home/ubuntu/ansible-config-mgt/roles/apache : Configure Apache.] ******************************************
included: /home/ubuntu/ansible-config-mgt/roles/apache/tasks/configure-Debian.yml for 172.31.80.120

TASK [/home/ubuntu/ansible-config-mgt/roles/apache : Configure Apache.] ******************************************
ok: [172.31.80.120] => (item={'regexp': '^Listen ', 'line': 'Listen 80'})

TASK [/home/ubuntu/ansible-config-mgt/roles/apache : Enable Apache mods.] ****************************************
changed: [172.31.80.120] => (item=rewrite)
changed: [172.31.80.120] => (item=ssl)

TASK [/home/ubuntu/ansible-config-mgt/roles/apache : Disable Apache mods.] ***************************************

TASK [/home/ubuntu/ansible-config-mgt/roles/apache : Check whether certificates defined in vhosts exist.] ********

TASK [/home/ubuntu/ansible-config-mgt/roles/apache : Add apache vhosts configuration.] ***************************
changed: [172.31.80.120]
```



```
TASK [/home/ubuntu/ansible-config-mgt/roles/apache : Add vhost symlink in sites-enabled.] **************************
changed: [172.31.80.120]

TASK [/home/ubuntu/ansible-config-mgt/roles/apache : Remove default vhost in sites-enabled.] ***********************
skipping: [172.31.80.120]

TASK [/home/ubuntu/ansible-config-mgt/roles/apache : Ensure Apache has selected state and enabled on boot.] *********
ok: [172.31.80.120]

RUNNING HANDLER [/home/ubuntu/ansible-config-mgt/roles/apache : restart apache] ************************************

changed: [172.31.80.120]

PLAY RECAP *********************************************************************************************************
172.31.80.120              : ok=16   changed=6    unreachable=0    failed=0    skipped=21   rescued=0    ignored=0
172.31.91.35               : ok=7    changed=6    unreachable=0    failed=0    skipped=0    rescued=0    ignored=0
172.31.94.247              : ok=7    changed=6    unreachable=0    failed=0    skipped=0    rescued=0    ignored=0
```

Congratulations!!!

We have successfully implemented an Ansible Configuration Management Tool to prepare UAT environment for Tooling web Solution.



Not secure | 18.206.248.68

Red Hat

Red Hat Enterprise Linux **Test Page**

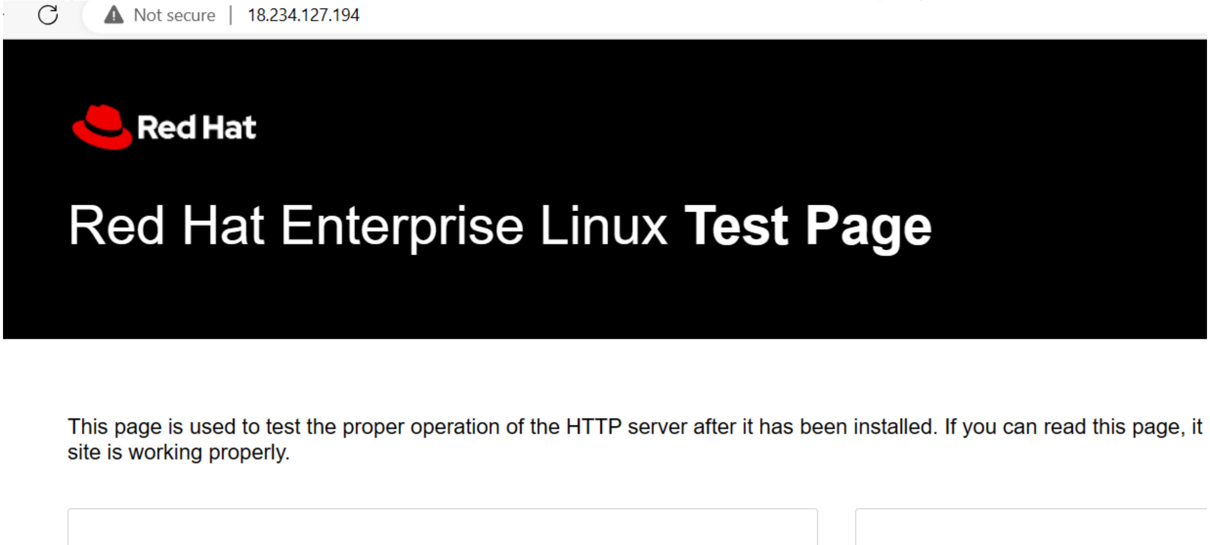
This page is used to test the proper operation of the HTTP server after it has been installed. If you can read this site is working properly.

If you are a member of the general public:

The fact that you are seeing this page indicates that the website you

If you are the websit

You may now add conte



Not secure | 18.234.127.194

Red Hat

Red Hat Enterprise Linux **Test Page**

This page is used to test the proper operation of the HTTP server after it has been installed. If you can read this page, it site is working properly.