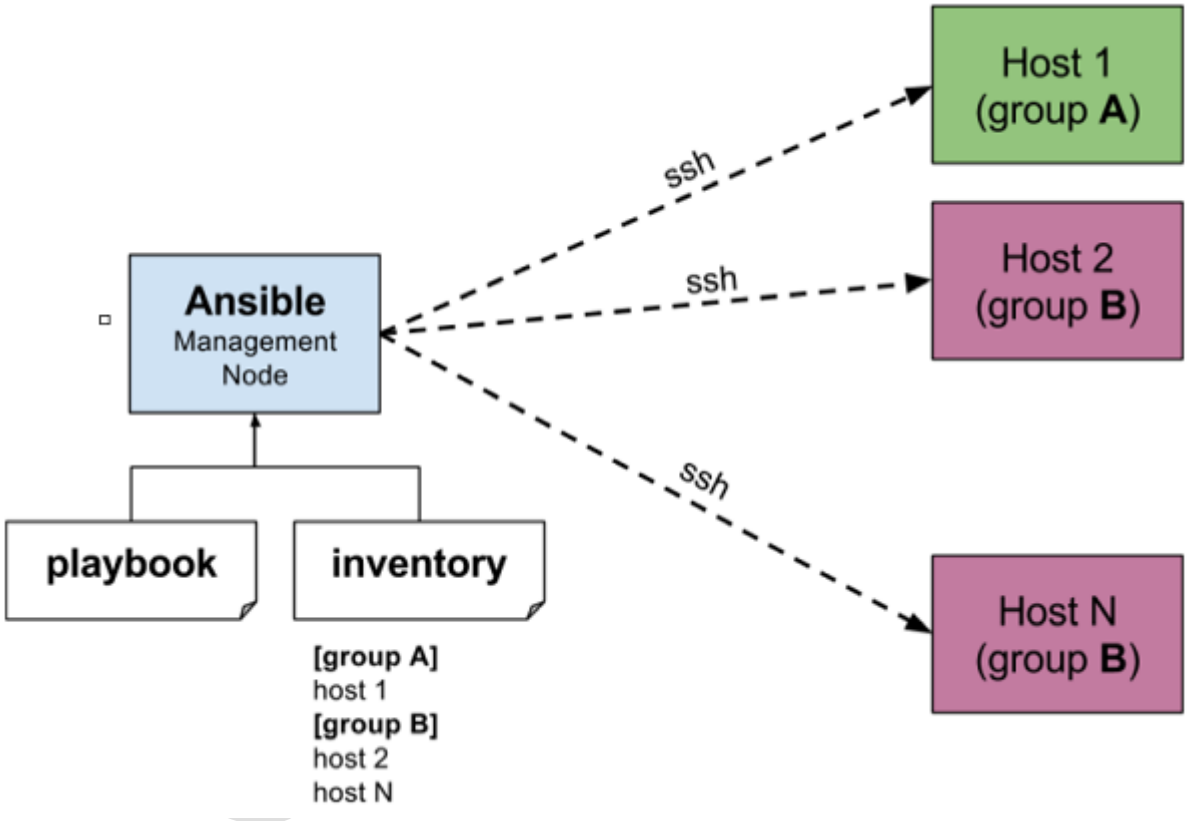
ANSIBLE

What is Ansible?

Ansible is an open source IT Configuration Management, Deployment & Orchestration tool. It aims to provide large productivity gains to a wide variety of automation challenges. This tool is very simple to use yet powerful enough to automate complex multi-tier IT application environments

Why we need Ansible?

We now use Ansible for any task or project that requires repeatable processes and a consistent environment, such as provisioning IoT devices and server infrastructure, installation and configuration of applications, and application deployment



When introduced Ansible?

- It is introduced in the year October 2015 the original author is Michael DeHaan
- But it is started in 1966
- It is written in python language

Chef – When there is a failure on the primary server i.e. chef server, it has a backup server to take the place of the primary server**.**

Puppet – It has multi-master architecture, if the active master goes down, the other master takes the active master place.

Ansible – It runs with a single active node, called the Primary instance. If primary goes down, there is a Secondary instance to take its place.

Salt stack – It can have multiple masters configured. If one master is down, agents connect with the other master in the list. Therefore it has multiple masters to configure salt minions.

Ease of Setup

Chef – Chef has a master-agent architecture.

Puppet – Puppet also has a master-agent architecture.

Ansible – It has only master running on the server machine, but no agents running on the client machine.

Salt stack – Here Server is called as salt master and clients are called as salt minions which run as agents in the client machine.

Configuration Language

Chef – Chef uses Ruby Domain Specific Language (Ruby DSL). It has a steep Learning Curve and its developer oriented.

Puppet

Puppet uses its own puppet Domain Specific Language (Puppet DSL). It is not very easy to learn and its system administrator oriented.

Ansible

Ansible uses YAML i.e yet another mark-up Language (Python). It is quite easy to learn and its administrator oriented. Python is inbuilt into most Unix and Linux deployments nowadays, so setting the tool up and running is quicker.

Salt stack

Salt stack also uses YAML (Python). It is again easy to learn and administrator oriented.

Machine should be

Chef – Chef Server works only on Linux/Unix but Chef Client and Workstation can be on windows as well.

Puppet – Puppet Master works only on Linux/Unix but Puppet Agent also works on windows.

Ansible – Ansible supports windows machines as well but the Ansible server has to be on Linux/Unix machine.

Salt stack – Salt Master works only on Linux/Unix but Salt minions can work on windows as well.

Chef - push

Puppet-pull

Ansible-push

Salt stack-push & pull

Ansible topics

- **Ad hoc command**
- **Play books**
- **Roles**
- **Vault**

Ad hoc command is used to install a single task

Play books is used to install and doing multiple task using YAML lag

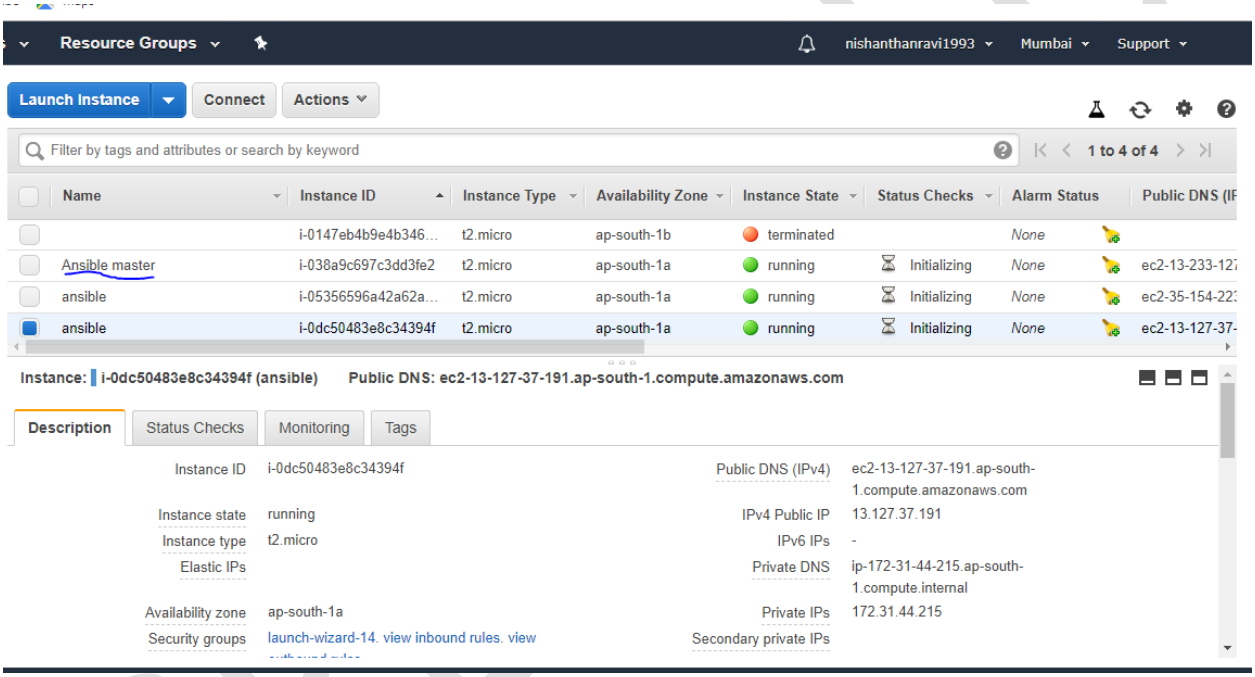
Roles is dividing a complex playbooks into a structural format

Vault is used to hide the your secret files

In this we going to see ansible

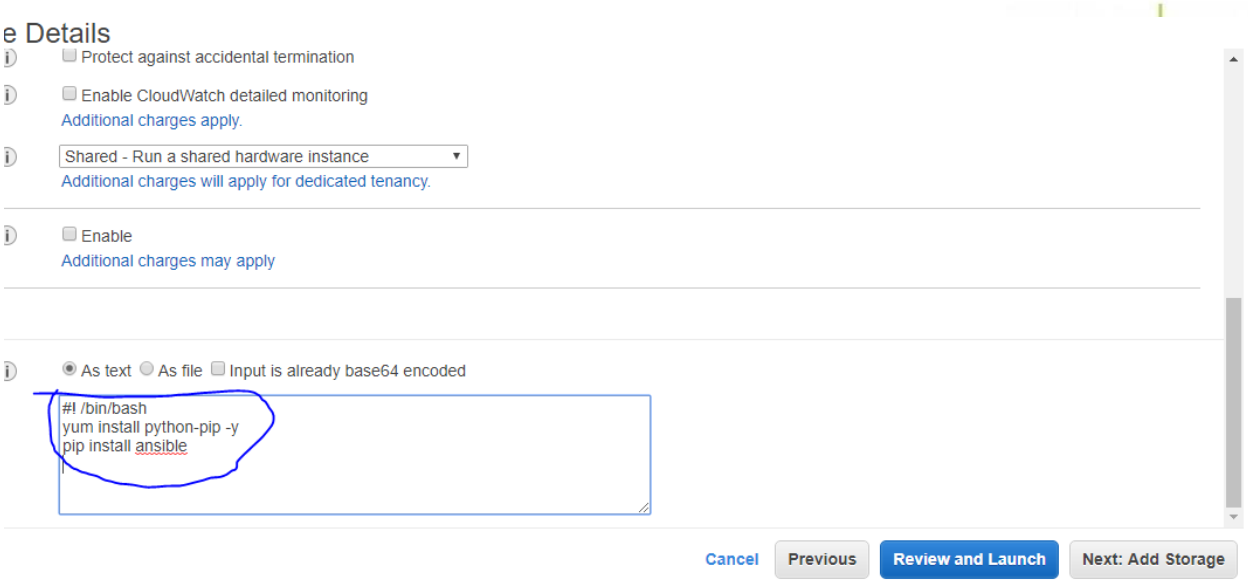
Step 1: ANSIBLE INSTALLATION

Launch the EC2 instance



Step 2: User data:

```
#! /bin/bash
yum install python-pip -y
pip install ansible
```

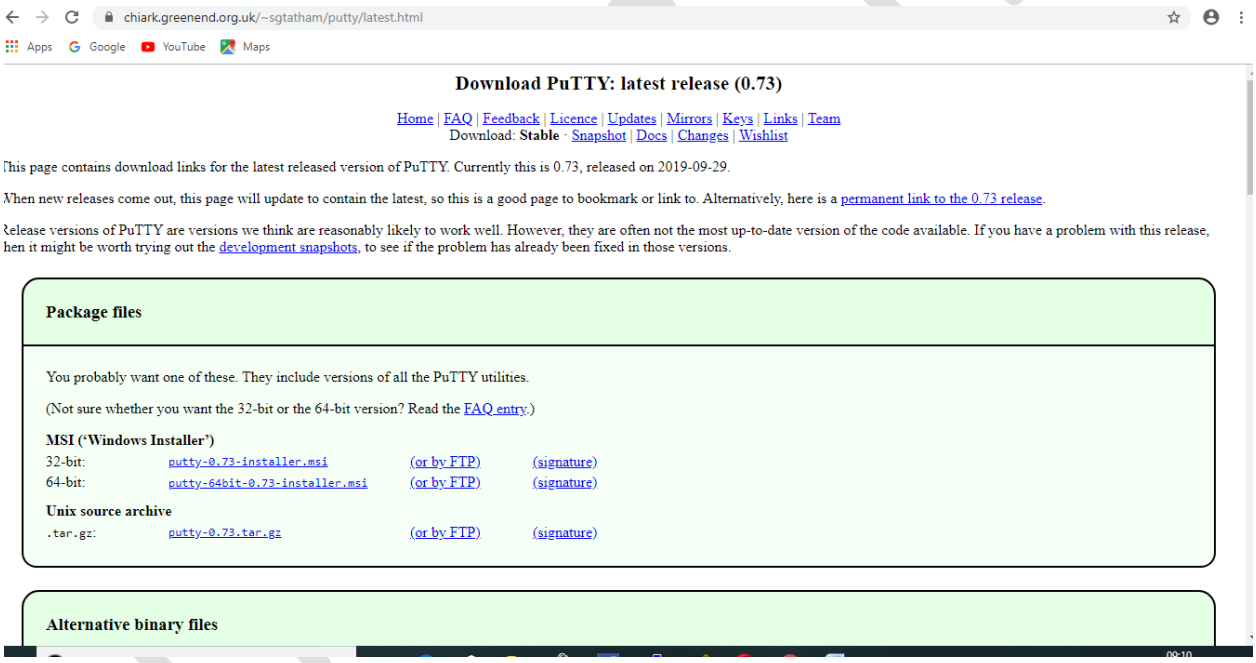


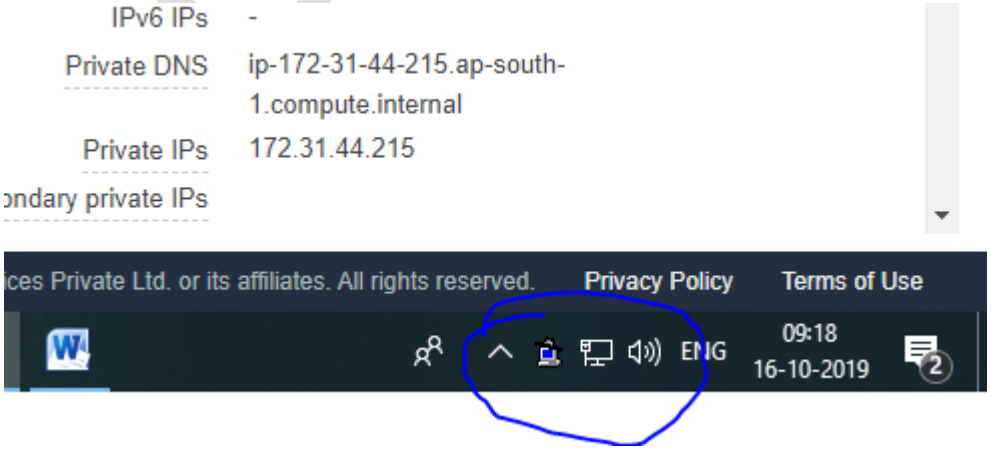
Step 3: Download Pageagent and load your ppk file.

Using this Url

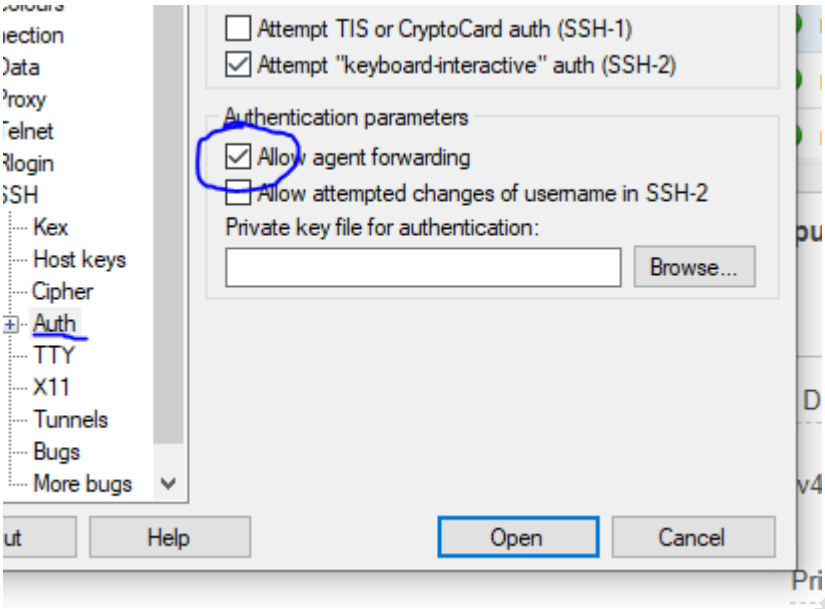
https://www.chiark.greenend.org.uk/~sgtatham/putty/latest.html

And goto this page



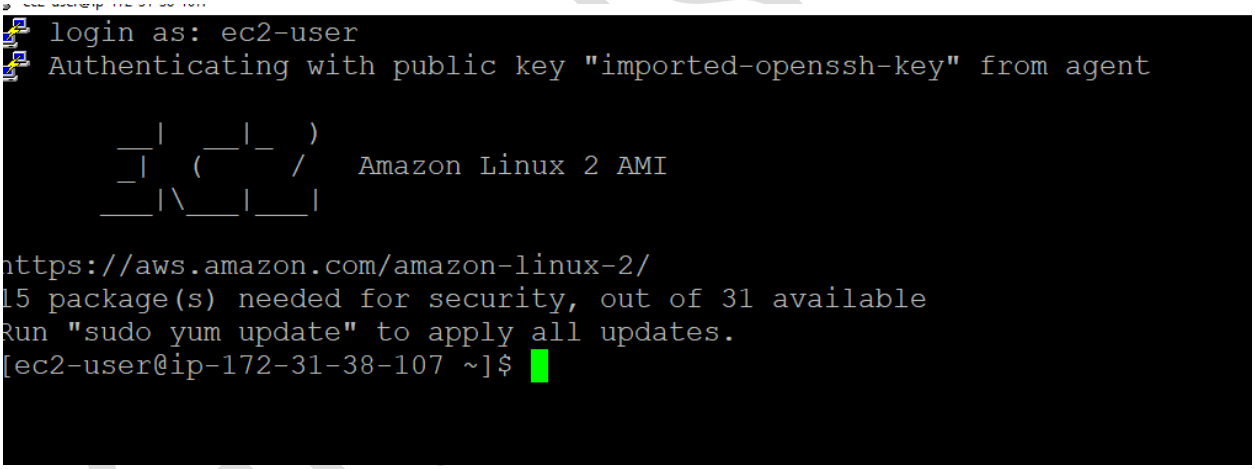


Using right click add the ppk file in the Pageagent



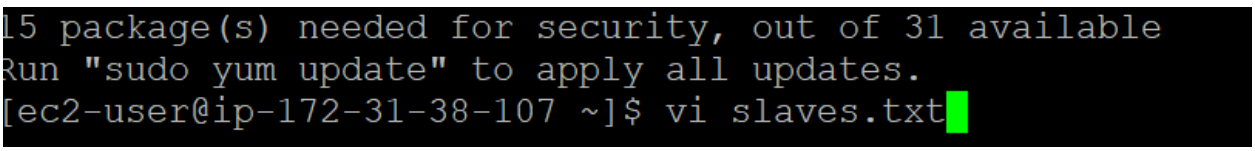
Step 4: In putty ssh session enable allow agent forwarding option- Otherwise while connecting to node instance you will get permission denied error

Logon to ec2-user



Step 5: Ansible adhoc command: Practice the command below with ec2-user and not with root user

Step 6: Create one text file for e.g. slaves.txt and add node instance private IP



Example:

[Web]

IP 1

IP 2

Step 7: Now you need ansible.cfg file and u can get it from

Using this Url
https://raw.githubusercontent.com/ansible/ansible/devel/examples/ansible.cfg

```
[ec2-user@ip-172-31-38-107 ~]$ wget https://raw.githubusercontent.com/ansible/ansible/devel/exam^
ples/ansible.cfg
--2019-10-16 04:28:46--  https://raw.githubusercontent.com/ansible/ansible/devel/examples/ansibl
e.cfg
Resolving raw.githubusercontent.com (raw.githubusercontent.com)... 151.101.152.133
Connecting to raw.githubusercontent.com (raw.githubusercontent.com)|151.101.152.133|:443... conn
ected.
HTTP request sent, awaiting response... 200 OK
Length: 19985 (20K) [text/plain]
Saving to: 'ansible.cfg'

100%[======================================================>] 19,985      --.-K/s   in 0s

2019-10-16 04:28:46 (104 MB/s) - 'ansible.cfg' saved [19985/19985]

[ec2-user@ip-172-31-38-107 ~]$
```

Vi ansible.cfg

```
# ohai - import facts from ohai
# You can combine them using comma (ex: network,virtual)
# You can negate them using ! (ex: !hardware,!facter,!ohai)
# A minimal set of facts is always gathered.
#gather_subset = all

# some hardware related facts are collected
# with a maximum timeout of 10 seconds. This
# option lets you increase or decrease that
# timeout to something more suitable for the
# environment.
# gather_timeout = 10

# Ansible facts are available inside the ansible_facts.* dictionary
# namespace. This setting maintains the behaviour which was the default prior
# to 2.5, duplicating these variables into the main namespace, each with a
# prefix of 'ansible_'.
# This variable is set to True by default for backwards compatibility. It
# will be changed to a default of 'False' in a future release.
# ansible_facts.
# inject_facts_as_vars = True

# additional paths to search for roles in, colon separated
#roles_path    = /etc/ansible/roles

# uncomment this to disable SSH key host checking
host_key_checking = False

# change the default callback, you can only have one 'stdout' type  enabled at a time.
#stdout_callback = skippy


-- INSERT --                                                              71,1          9%
```

Step 8:

ansible all -i slaves.txt -m ping

```
[web]
172.31.41.255
172.31.44.215
~
```

ansible web -i slaves.txt -m ping

```
[ec2-user@ip-172-31-38-107 ~]$ vi ansible.cfg
[ec2-user@ip-172-31-38-107 ~]$ ansible web -i slaves.txt -m ping
 [WARNING]: Platform linux on host 172.31.44.215 is using the discovered Python interpreter at /usr/bin/python, but
future installation of another Python interpreter could change this. See
https://docs.ansible.com/ansible/2.8/reference_appendices/interpreter_discovery.html for more information.

172.31.44.215 | SUCCESS => {
    "ansible_facts": {
        "discovered_interpreter_python": "/usr/bin/python"
    },
    "changed": false,
    "ping": "pong"
}
 [WARNING]: Platform linux on host 172.31.41.255 is using the discovered Python interpreter at /usr/bin/python, but
future installation of another Python interpreter could change this. See
https://docs.ansible.com/ansible/2.8/reference_appendices/interpreter_discovery.html for more information.

172.31.41.255 | SUCCESS => {
    "ansible_facts": {
        "discovered_interpreter_python": "/usr/bin/python"
    },
    "changed": false,
    "ping": "pong"
}
[ec2-user@ip-172-31-38-107 ~]$
```

Step 9:

Ansible web –i slaves.txt –m yum –a “name=httpd state=present” –b

```
}
[ec2-user@ip-172-31-38-107 ~]$ ansible web -i slaves.txt -m yum -a "name=httpd state=present" -b
 [WARNING]: Platform linux on host 172.31.41.255 is using the discovered Python interpreter at /usr/bin/python, but
future installation of another Python interpreter could change this. See
https://docs.ansible.com/ansible/2.8/reference_appendices/interpreter_discovery.html for more information.

172.31.41.255 | CHANGED => {
    "ansible_facts": {
        "discovered_interpreter_python": "/usr/bin/python"
    },
    "changed": true,
    "changes": {
        "installed": [
            "httpd"
        ]
    },
    "msg": "",
    "rc": 0,
    "results": [
```

Step 10:

Ansible web –i slaves.txt –m service –a “name=httpd state=started” –b

```
    ]
}
[ec2-user@ip-172-31-38-107 ~]$ ansible web -i slaves.txt -m service -a "name=httpd state=started" -b
 [WARNING]: Platform linux on host 172.31.41.255 is using the discovered Python interpreter at /usr/bin/python, but future
installation of another Python interpreter could change this. See
https://docs.ansible.com/ansible/2.8/reference_appendices/interpreter_discovery.html for more information.

172.31.41.255 | CHANGED => {
    "ansible_facts": {
        "discovered_interpreter_python": "/usr/bin/python"
    },
    "changed": true,
    "name": "httpd",
    "state": "started",
    "status": {
        "ActiveEnterTimestampMonotonic": "0",
        "ActiveExitTimestampMonotonic": "0",
        "ActiveState": "inactive",
        "After": "remote-fs.target system.slice httpd-init.service nss-lookup.target -.mount tmp.mount network.target basic.target sys
temd-journald.socket",
        "AllowIsolate": "no",
        "AmbientCapabilities": "0",
        "AssertResult": "no",
        "AssertTimestampMonotonic": "0",
        "Before": "shutdown.target",
```

Step 11:

Transferring the file to many servers/machines

ansible all -i slaves.txt -m copy -a "src=./slaves.txt dest=/tmp/slaves.txt"

```
[ec2-user@ip-172-31-38-107 ~]$ ansible all -i slaves.txt -m copy -a "src=./slaves.txt dest=/tmp/slaves.txt"
 [WARNING]: Platform linux on host 172.31.41.255 is using the discovered Python interpreter at /usr/bin/python, but future installation of another
Python interpreter could change this. See https://docs.ansible.com/ansible/2.8/reference_appendices/interpreter_discovery.html for more information.

172.31.41.255 | CHANGED => {
    "ansible_facts": {
        "discovered_interpreter_python": "/usr/bin/python"
    },
    "changed": true,
    "checksum": "591224e514ed3b4b58a2250b9c332c126214a691",
    "dest": "/tmp/slaves.txt",
    "gid": 1000,
    "group": "ec2-user",
    "md5sum": "2ebcee162856d8f1898d63309ed9c664",
    "mode": "0664",
    "owner": "ec2-user",
    "size": 34,
    "src": "/home/ec2-user/.ansible/tmp/ansible-tmp-1571214270.93-72194836138402/source",
    "state": "file",
    "uid": 1000
}
```

Setp 12:

Deleting whole directory and files

Ansible abc -m file -a "dest = /path/user1/new state = absent"

Step 13: **(for Ubuntu machine)**

For installation and management of applications

ansible webservers -m apt -a 'name=python state=present'

Step 14:

User: To add and delete users

ansible webservers -m user -a 'name=nishanth password=admin123' -b

ansible webservers -m user -a 'name=nishanth state=absent' (to delete user) -b

```
[ec2-user@ip-172-31-38-107 ~]$ ansible all -i slaves.txt -m user -a "name=nishanth password=admin123" -b
 [WARNING]: The input password appears not to have been hashed. The 'password' argument must be encrypted for this module to work
properly.

 [WARNING]: Platform linux on host 172.31.41.255 is using the discovered Python interpreter at /usr/bin/python, but future
installation of another Python interpreter could change this. See
https://docs.ansible.com/ansible/2.8/reference_appendices/interpreter_discovery.html for more information.

172.31.41.255 | CHANGED => {
    "ansible_facts": {
        "discovered_interpreter_python": "/usr/bin/python"
    },
    "changed": true,
    "comment": "",
    "create_home": true,
    "group": 1001,
    "home": "/home/nishanth",
    "name": "nishanth",
    "password": "NOT_LOGGING_PASSWORD",
    "shell": "/bin/bash",
    "state": "present",
    "system": false,
    "uid": 1001
}
```

Task: use Ubuntu machine and without using -i

Step 15:

Deploy your webapp straight from git:

ansible webservers -m git -a "repo=https://foo.example.org/repo.git dest=/srv/myapp version=HEAD"

ansible webservers -m service -a "name=httpd state=restarted"

ansible all -i slaves.txt --list-host

ansible <specific ip> -i slaves.txt -a "uname -a"

ansible all -i slaves.txt -a "uname -a" -u ec2-user

ansible all -i slaves.txt -a "uname -a" -u ec2-user –b

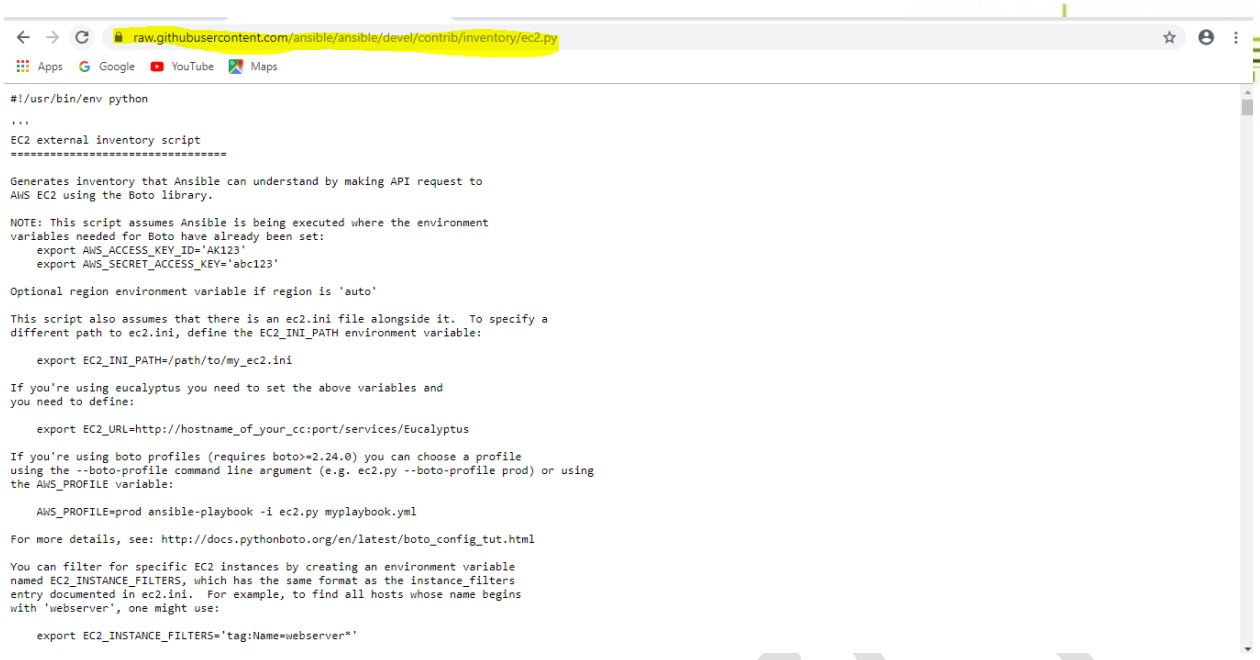
ansible jenkins -i slaves.txt -a "grep -i JENKINS_PORT /etc/sysconfig/jenkins" -b

Dynamic Inventory:

Step 1:

You can find sample python script for dynamic inventory in this URL

https://raw.githubusercontent.com/ansible/ansible/devel/contrib/inventory/ec2.py



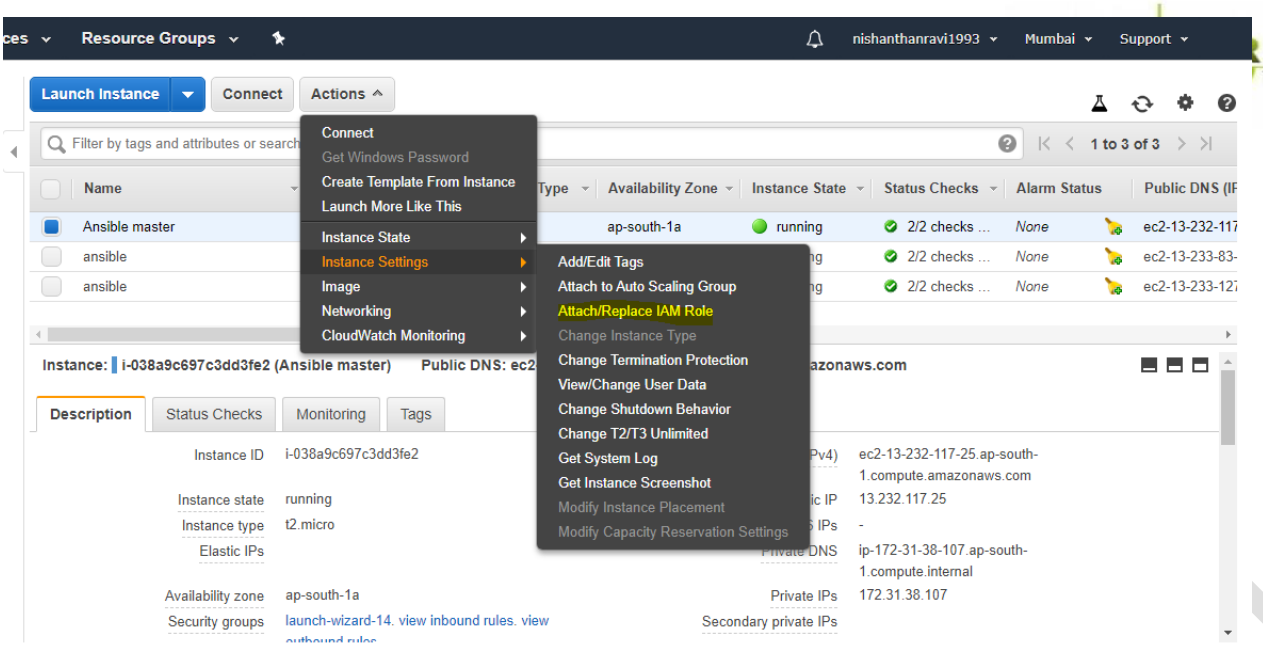

```
}
[ec2-user@ip-172-31-38-107 ~]$ wget https://raw.githubusercontent.com/ansible/ansible/devel/contrib/inventory/ec2.py
--2019-10-16 08:30:24--  https://raw.githubusercontent.com/ansible/ansible/devel/contrib/inventory/ec2.py
Resolving raw.githubusercontent.com (raw.githubusercontent.com)... 151.101.152.133
Connecting to raw.githubusercontent.com (raw.githubusercontent.com)|151.101.152.133|:443... connected.
HTTP request sent, awaiting response... 200 OK
Length: 73130 (71K) [text/plain]
Saving to: 'ec2.py'

100%[======================================================================================================>] 73,130      --.-K/s   in 0.002s

2019-10-16 08:30:24 (32.9 MB/s) - 'ec2.py' saved [73130/73130]

[ec2-user@ip-172-31-38-107 ~]$
```

chmod 777 ec2-py

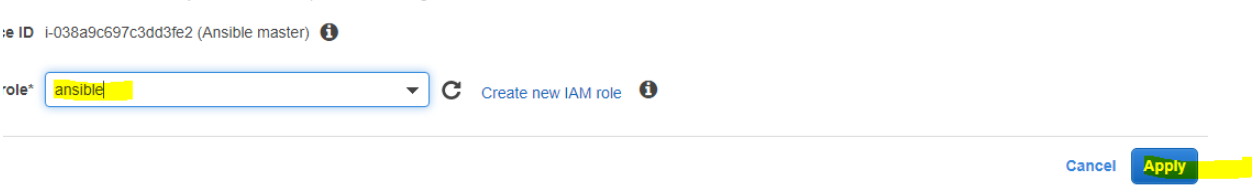
```
2019-10-16 08:30:24 (32.9 MB/s) - 'ec2.py' saved [73130/73130]

[ec2-user@ip-172-31-38-107 ~]$ chmod 777 ec2.py
[ec2-user@ip-172-31-38-107 ~]$
```

Check ls –lrt

Step 2:



Using IAM full admin access



Install boto in control machine to work with dynamic inventory with the below command.

Pip install boto

```
[ec2-user@ip-172-31-38-107 ~]$ ansible all -i ec2.py -m ping
[DEPRECATION WARNING]: The TRANSFORM_INVALID_GROUP_CHARS settings is set to allow bad characters in group names by default, this will change, but
still be user configurable on deprecation. This feature will be removed in version 2.10. Deprecation warnings can be disabled by setting
deprecation_warnings=False in ansible.cfg.
 [WARNING]: Invalid characters were found in group names but not replaced, use -vvvv to see details

 [WARNING]: Platform linux on host 13.233.83.10 is using the discovered Python interpreter at /usr/bin/python, but future installation of another
Python interpreter could change this. See https://docs.ansible.com/ansible/2.8/reference_appendices/interpreter_discovery.html for more information.

13.233.83.10 | SUCCESS => {
    "ansible_facts": {
        "discovered_interpreter_python": "/usr/bin/python"
    },
    "changed": false,
    "ping": "pong"
}
 [WARNING]: Platform linux on host 13.233.127.134 is using the discovered Python interpreter at /usr/bin/python, but future installation of another
Python interpreter could change this. See https://docs.ansible.com/ansible/2.8/reference_appendices/interpreter_discovery.html for more information.

13.233.127.134 | SUCCESS => {
    "ansible_facts": {
        "discovered_interpreter_python": "/usr/bin/python"
    },
    "changed": false,
    "ping": "pong"
}
 [WARNING]: Platform linux on host 13.232.117.25 is using the discovered Python interpreter at /usr/bin/python, but future installation of another
Python interpreter could change this. See https://docs.ansible.com/ansible/2.8/reference_appendices/interpreter_discovery.html for more information.

13.232.117.25 | SUCCESS => {
    "ansible_facts": {
        "discovered_interpreter_python": "/usr/bin/python"
    },
    "changed": false,
    "ping": "pong"
}
[ec2-user@ip-172-31-38-107 ~]$
```

Step 3:

Create IAM role in AWS with full administrative access and attach role to your control machine

Step 4:

Dynamic Inventory example

ansible all -i ec2.py -a "uname -a"

Playbooks

Step 1:

Install visual studio code

https://code.visualstudio.com/docs/?dv=win64user

Step 2:

Install ansible plugins in visual studio code which will make our job easy

Step 3:

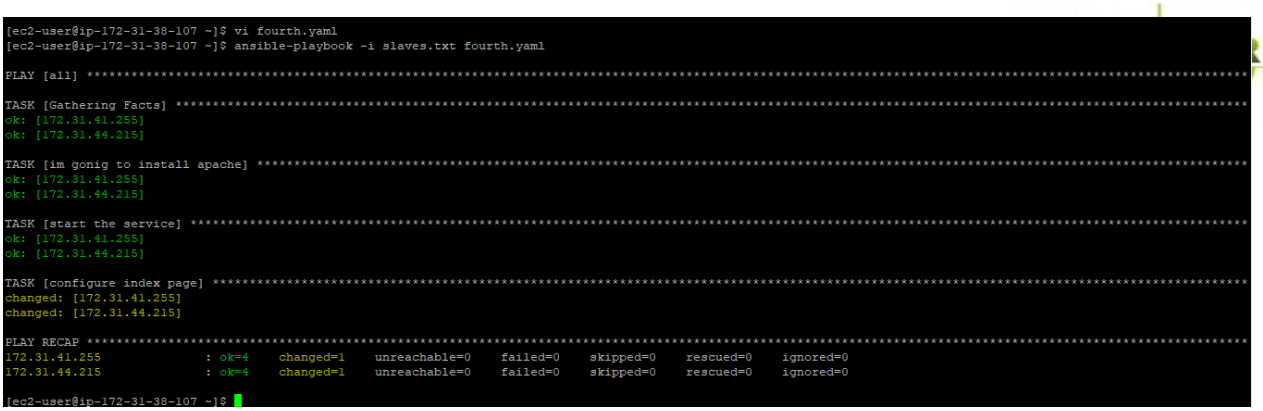
playbook file should be with .yaml format

vi filename.yaml

```
- hosts: all
  remote_user: ec2-user
  become: yes
  tasks:
  - name: im gonig to install apache
    yum:
      name: httpd
      state: present
  - name:  start the service
    service:
      name: httpd
      state: started
  - name: configure index page
     copy:
      src: index.html
      dest: /var/www/html/index.html
  - name: just a test
```

To run

ansible-playbook –I slaves.txt filename.yaml



Task 1:

```
- hosts: all
  remote_user: ec2-user
  become: yes

   tasks:
    - name: install httpd server
      package:
       name: httpd
       state: present

    - name: Start service httpd, if not running
      service:
      name: httpd
      state: started

    - template:
       src: /home/ec2-user/index.html.j2
       dest: /var/www/html/index.html
```

To run this file

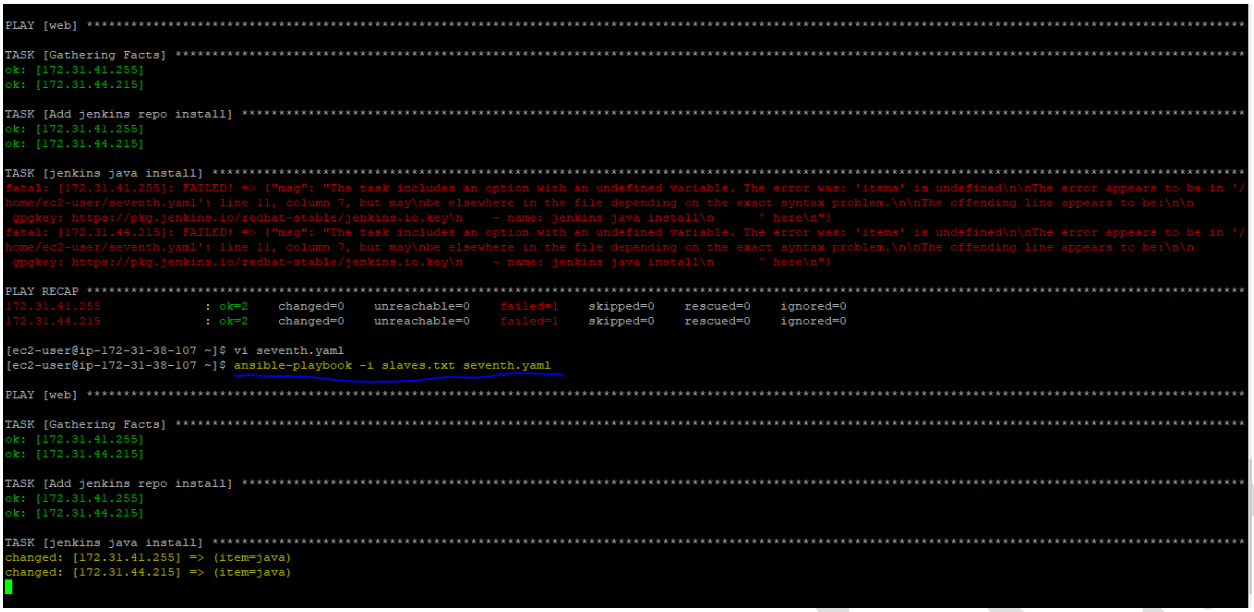
Task 2:

Create the (vi file name.yaml)

```
- hosts: all
  remote_user: ec2-user
  become: yes
  tasks:
   - name: im going to install apache
       yum:
       name: "{{ item }}"
       state: present
       with_items:
         - mysql
          - php
          - unzip
```

Run this (ansible-playbook -i slaves.txt filename.yaml)

Task 3:




```
- hosts: web
  remote_user: ec2-user
  become: yes
  tasks:
    - name: Add jenkins repo install
      yum_repository:
        name: jenkins
        description: jenkins YUM repo
        baseurl: https://pkg.jenkins.io/redhat-stable
        gpgkey: https://pkg.jenkins.io/redhat-stable/jenkins.io.key
    - name: jenkins java install
      yum:
        name: "{{ item }}"
        state: present
      loop:
            - java
            - jenkins
```

- name: jenkins start

service:

name: jenkins

state: started

```
TASK [Add jenkins repo install] ************************************************************************************************
ok: [172.31.41.255]
ok: [172.31.44.215]

TASK [jenkins java install] ****************************************************************************************************
changed: [172.31.41.255] => (item=java)
changed: [172.31.44.215] => (item=java)
changed: [172.31.41.255] => (item=jenkins)
changed: [172.31.44.215] => (item=jenkins)

TASK [jenkins start] ***********************************************************************************************************
changed: [172.31.41.255]
changed: [172.31.44.215]

PLAY RECAP *********************************************************************************************************************
172.31.41.255              : ok=4    changed=2    unreachable=0    failed=0    skipped=0    rescued=0    ignored=0
172.31.44.215              : ok=4    changed=2    unreachable=0    failed=0    skipped=0    rescued=0    ignored=0

[ec2-user@ip-172-31-38-107 ~]$
```

Change the port num for jenkins

```
- hosts: web
  remote_user: ec2-user
  become: yes
  vars:
      port:8000
  tasks:
    - name: Add jenkins repo install
        yum_repository:
          name: jenkins
          description: jenkins YUM repo
          baseurl: https://pkg.jenkins.io/redhat-stable
          gpgkey: https://pkg.jenkins.io/redhat-stable/jenkins.io.key
    - name: jenkins java install
        yum:
            name: "{{ item }}"
            state: present
        loop:
              - java
              - jenkins
    - name: going to change port
        lineinfile:
          path: /etc/sysconfig/jenkins
          regexp: '^jeankins-port='
          line: "jenkins-port-{{port}}"
        notify:
            -restart jenkins
    - name: jenkins start
        service:
          name: jenkins
          state: started
  handlers:
    - name: restart jenkins
        service:
          name: jenkins
          state:restarted

~
~
```

- hosts: web

remote_user: ec2-user

become: yes

vars:

port:8000

tasks:

```
  - name: Add jenkins repo install
      yum_repository:
        name: jenkins
        description: jenkins YUM repo
        baseurl: https://pkg.jenkins.io/redhat-stable
        gpgkey: https://pkg.jenkins.io/redhat-stable/jenkins.io.key
  - name: jenkins java install
      yum:
         name: "{{ item }}"
         state: present
      loop:
            - java
            - jenkins
  - name: going to change port
      lineinfile:
        path: /etc/sysconfig/jenkins
        regexp: '^jeankins-port='
        line: "jenkins-port-{{port}}"
      notify:
        -restart jenkins
  - name: jenkins start
      service:
        name: jenkins
        state: started
handlers:
  - name: restart jenkins
```

```
    service:
      name: jenkins
      state:restarted
```

Task 4:

```
- hosts: jenkins
  remote_user: ec2-user
  become: yes
  vars:
    jenkins_port: 9006
  tasks:
    - name: jenkins installation from yum
      yum_repository:
        name: jenkins
        description: jenkins
        baseurl: http://pkg.jenkins.io/redhat
        gpgkey:  https://jenkins-ci.org/redhat/jenkins-ci.org.key

    - name : Install jenkins and Java
      package:
        name: "{{item}}"
        state: present
      loop:
        - java
        - jenkins
        - httpd
```

```
  - name: we are going to start the service
    service:
       name: jenkins # required. Name of the service.
       enabled: yes # not required. Whether the service should start on boot.
B(At least one of state and enabled are required.)
       state: started
  - name: change default port number
    lineinfile:
       path: /etc/sysconfig/jenkins
       regexp: '^JENKINS_PORT='
       line: "JENKINS_PORT={{ jenkins_port }}"
    notify:
     - restart jenkins
  - name: validate port change
    command: "grep -i JENKINS_PORT /etc/sysconfig/jenkins"
    register: grep_results
  - name: debug grep results
    debug:
     msg: "{{ hostvars['172.31.21.72'] }}"
    when: grep_results.rc != 0
 handlers:
  - name: restart jenkins
    service:
       name: jenkins # required. Name of the service.
       state: restarted
```

Task 5: Run playbook:

ansible-playbook -i slaves.txt jenkins.yml

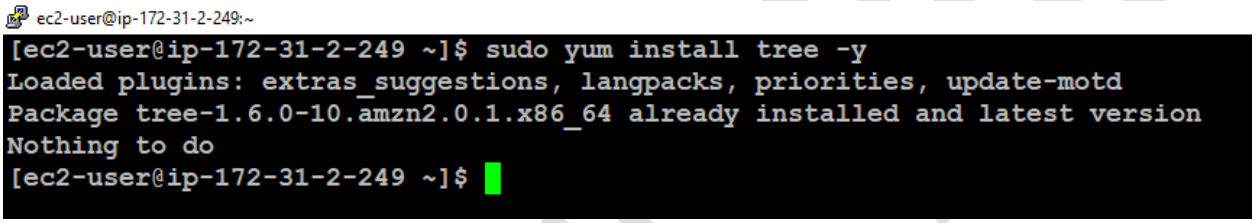
Example to pass variable in run time

ansible-playbook -i slaves.txt jenkins.yml -e "jenkins_port=8001"

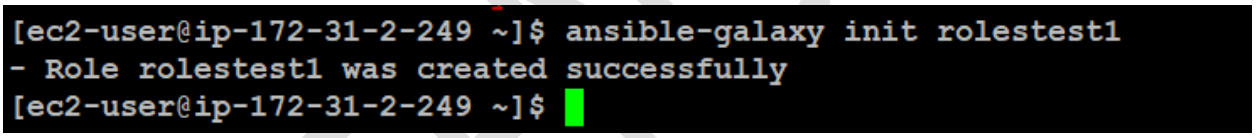
Roles:

Step 1:

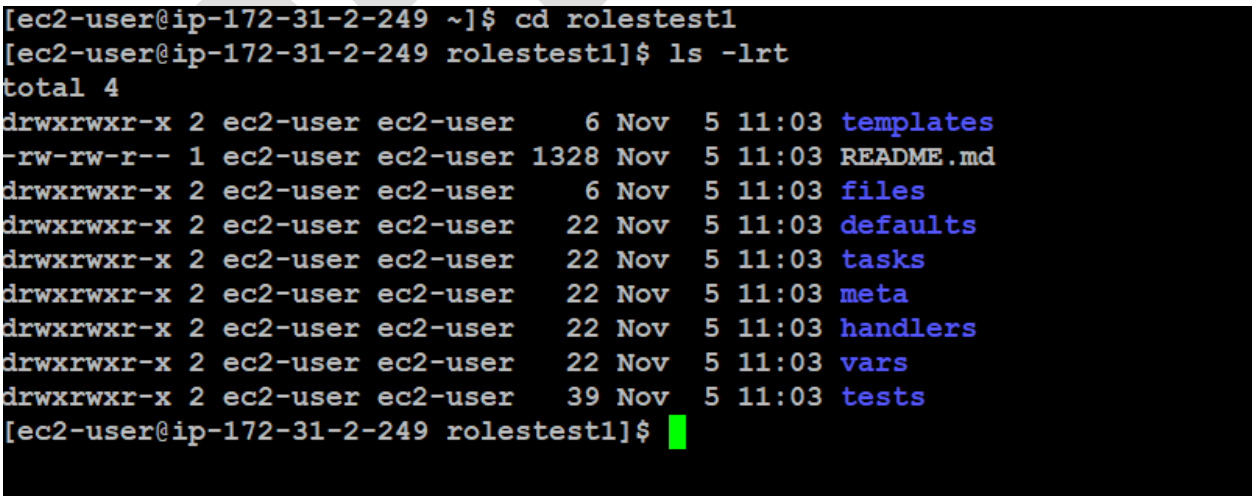
Sudo yum install tree –y



Now create new file



Now log into file



Cd task/

Using vi main,yml

ec2-user@ip-172-31-2-249:~/rolestest/tasks

```
---
# tasks file for rolestest
#
- name: im going to install apache
  yum:
    name: httpd
    state: present

- name: start service
  service:
       name: httpd
       state: started

- name: configure index page
  copy:
    src: index.html
    dest: /var/www/html/index.html
~
~
~
~
~
~
~
~
~
~
~
~
~
~
"main.yml" 17L, 279C
```

Check it current dictory

pwd

```
[ec2-user@ip-172-31-2-249 tasks]$ vi main.yml
[ec2-user@ip-172-31-2-249 tasks]$  pwd
/home/ec2-user/rolestest/tasks
[ec2-user@ip-172-31-2-249 tasks]$ cd ../files/
[ec2-user@ip-172-31-2-249 files]$
```

```
[ec2-user@ip-172-31-2-249 files]$ vi index.html
this is ansible roles
~
```

Using **cd**

come back path

vi role.yml

ec2-user@ip-172-31-2-249:~

```
---

- hosts: all
  remote_user: ec2-user
  become: yes
  roles:
      - rolestest
~
```

```
[ec2-user@ip-172-31-2-249 ~]$ vi roles.yaml
[ec2-user@ip-172-31-2-249 ~]$ ansible-playbook -i slaves.txt roles.yaml

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

TASK [Gathering Facts] *********************************************************************************************
ok: [13.232.36.128]

TASK [rolestest : im going to install apache] **********************************************************************
ok: [13.232.36.128]

TASK [rolestest : start service] ***********************************************************************************
ok: [13.232.36.128]

TASK [rolestest : configure index page] ****************************************************************************
ok: [13.232.36.128]

PLAY RECAP *********************************************************************************************************
13.232.36.128              : ok=4    changed=0    unreachable=0    failed=0    skipped=0    rescued=0    ignored=0

[ec2-user@ip-172-31-2-249 ~]$
```

```
[ec2-user@ip-172-31-2-249 ~]$  tree rolestest
rolestest
├── defaults
│   └── main.yml
├── files
│   ├── index.html
│   └── roles.yaml
├── handlers
│   └── main.yml
├── meta
│   └── main.yml
├── README.md
├── tasks
│   └── main.yml
├── templates
├── tests
│   ├── inventory
│   └── test.yml
└── vars
    └── main.yml

8 directories, 10 files
[ec2-user@ip-172-31-2-249 ~]$
```