Academic Year: 2024-25 **Semester: V Class /**
Branch: TE IT
Subject: DevOPs Lab (DL)
Subject Lab In-charge: Prof. Sujata Oak

EXPERIMENT NO.10

Aim: Installation of Ansible on top of AWS instance. Configure SSH access to Ansible master/slave and setup ansible host and test the connection.

Theory: 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.

Ansible Terms:

- **Controller Machine**: The machine where Ansible is installed, responsible for running the provisioning on the servers you are managing.
- **Inventory**: An initialization file that contains information about the servers you are managing.
- **Playbook**: The entry point for Ansible provisioning, where the automation is defined through tasks using YAML format.
- **Task**: A block that defines a single procedure to be executed, e.g. Install a package.
- **Module**: A module typically abstracts a system task, like dealing with packages or creating and changing files. Ansible has a multitude of built-in modules, but you can also create custom ones.
- **Role**: A pre-defined way for organizing playbooks and other files in order to facilitate sharing and reusing portions of a provisioning.
- **Play**: A provisioning executed from start to finish is called a play. In simple words, execution of a playbook is called a play.
- **Facts**: Global variables containing information about the system, like network interfaces or operating system.
- **Handlers**: Used to trigger service status changes, like restarting or stopping a service.

STEP1: Connect AWS Instances

STEP 2: Connect to Instances: ansible-master

```
devasc@labvm:~$ cd Desktop/
devasc@labvm:~/Desktop$ cd ansible_lab/
devasc@labvm:~/Desktop/ansible_lab$ chmod 400 "ansible-key.pem"
devasc@labvm:~/Desktop/ansible_lab$ ssh -i "ansible-key.pem" ubuntu@ec2-54-196-1
34-80.compute-1.amazonaws.com
```

```
devasc@labvm:~/Desktop/ansible_lab$ ssh -i "ansible-key.pem" ubuntu@ec2-54-196-134-80.c
ompute-1.amazonaws.com
The authenticity of host 'ec2-54-196-134-80.compute-1.amazonaws.com (54.196.134.80)' ca
n't be established.
ECDSA key fingerprint is SHA256:NDn3OD2bYHeoA/SigJ3484lN+ZjFZsdpNDFmGpQIB74.
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added 'ec2-54-196-134-80.compute-1.amazonaws.com,54.196.134.80' (E
CDSA) to the list of known hosts.
Welcome to Ubuntu 24.04 LTS (GNU/Linux 6.8.0-1012-aws x86_64)

 * Documentation:  https://help.ubuntu.com
 * Management:     https://landscape.canonical.com
 * Support:        https://ubuntu.com/pro

 System information as of Sat Sep 14 17:18:37 UTC 2024

  System load:  0.0               Processes:             105
  Usage of /:   22.8% of 6.71GB   Users logged in:       0
  Memory usage: 20%               IPv4 address for enX0: 172.31.18.177
  Swap usage:   0%

Expanded Security Maintenance for Applications is not enabled.

0 updates can be applied immediately.

Enable ESM Apps to receive additional future security updates.
See https://ubuntu.com/esm or run: sudo pro status
```

```
Ubuntu comes with ABSOLUTELY NO WARRANTY, to the extent permitted by
applicable law.

To run a command as administrator (user "root"), use "sudo <command>".
See "man sudo_root" for details.

ubuntu@ip-172-31-18-177:~$
```

Connect to Instances: ansible-slave

```
devasc@labvm:~$ cd Desktop/
devasc@labvm:~/Desktop$ cd ansible_lab/
devasc@labvm:~/Desktop/ansible_lab$ chmod 400 "ansible-key.pem"
devasc@labvm:~/Desktop/ansible_lab$ ssh -i "ansible-key.pem" ubuntu@ec2-3-84-176
-161.compute-1.amazonaws.com
```

```
devasc@labvm:~/Desktop/ansible_lab$ ssh -i "ansible-key.pem" ubuntu@ec2-3-84-176
-161.compute-1.amazonaws.com
The authenticity of host 'ec2-3-84-176-161.compute-1.amazonaws.com (3.84.176.161
)' can't be established.
ECDSA key fingerprint is SHA256:YopQszxHVveP3+lp8lzwC+BAp7TuiPK46dceLc5ncW4.
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added 'ec2-3-84-176-161.compute-1.amazonaws.com,3.84.176.16
1' (ECDSA) to the list of known hosts.
Welcome to Ubuntu 24.04 LTS (GNU/Linux 6.8.0-1012-aws x86_64)

 * Documentation:  https://help.ubuntu.com
 * Management:     https://landscape.canonical.com
 * Support:        https://ubuntu.com/pro

 System information as of Sat Sep 14 17:22:55 UTC 2024

  System load:  0.0                Processes:             104
  Usage of /:   22.8% of 6.71GB    Users logged in:       0
  Memory usage: 19%                IPv4 address for enX0: 172.31.16.10
  Swap usage:   0%

Expanded Security Maintenance for Applications is not enabled.
```

```
Enable ESM Apps to receive additional future security updates.
See https://ubuntu.com/esm or run: sudo pro status


The list of available updates is more than a week old.
To check for new updates run: sudo apt update


The programs included with the Ubuntu system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/copyright.

Ubuntu comes with ABSOLUTELY NO WARRANTY, to the extent permitted by
applicable law.

To run a command as administrator (user "root"), use "sudo <command>".
See "man sudo_root" for details.

ubuntu@ip-172-31-16-10:~$
```

STEP3: To Ping master and slave machine:

ansible-master

```
ubuntu@ip-172-31-18-177:~$ sudo su
root@ip-172-31-18-177:/home/ubuntu#
```

To ping master to slave

```
ubuntu@ip-172-31-18-177:~$ sudo su
root@ip-172-31-18-177:/home/ubuntu# ping 172.31.16.10
PING 172.31.16.10 (172.31.16.10) 56(84) bytes of data.
```

To ping slave to master

```
ubuntu@ip-172-31-16-10:~$ sudo su
root@ip-172-31-16-10:/home/ubuntu# ping 172.31.18.177
PING 172.31.18.177 (172.31.18.177) 56(84) bytes of data.
```

STEP 4: Ansible-master : Ansible Installation

#apt update -y

```
root@ip-172-31-18-177:/home/ubuntu#  apt update -y
Hit:1 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble InRelease
Get:2 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble-updates InRelease [126 kB]
Get:3 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble-backports InRelease [126 kB]
Get:4 http://security.ubuntu.com/ubuntu noble-security InRelease [126 kB]
Get:5 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble/universe amd64 Packages [15.
0 MB]
```

Add Ansible Repository

 # apt-add-repository ppa:ansible/ansible

```
root@ip-172-31-18-177:/home/ubuntu# apt-add-repository ppa:ansible/ansible
Repository: 'Types: deb
URIs: https://ppa.launchpadcontent.net/ansible/ansible/ubuntu/
Suites: noble
Components: main
'
Description:
Ansible is a radically simple IT automation platform that makes your applications and s
ystems easier to deploy. Avoid writing scripts or custom code to deploy and update your
 applications— automate in a language that approaches plain English, using SSH, with no
 agents to install on remote systems.

http://ansible.com/

If you face any issues while installing Ansible PPA, file an issue here:
https://github.com/ansible-community/ppa/issues
More info: https://launchpad.net/~ansible/+archive/ubuntu/ansible
Adding repository.
Press [ENTER] to continue or Ctrl-c to cancel.
```

```
Press [ENTER] to continue or Ctrl-c to cancel.
Hit:1 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble InRelease
Hit:2 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble-updates InRelease
Hit:3 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble-backports InRelease
Hit:4 http://security.ubuntu.com/ubuntu noble-security InRelease
Get:5 https://ppa.launchpadcontent.net/ansible/ansible/ubuntu noble InRelease [17.8 kB]
Get:6 https://ppa.launchpadcontent.net/ansible/ansible/ubuntu noble/main amd64 Packages
 [776 B]
Get:7 https://ppa.launchpadcontent.net/ansible/ansible/ubuntu noble/main Translation-en
 [472 B]
Fetched 19.1 kB in 3s (5994 B/s)
Reading package lists... Done
```

#apt update -y

```
root@ip-172-31-18-177:/home/ubuntu# apt update -y
Hit:1 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble InRelease
Hit:2 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble-updates InRelease
Hit:3 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble-backports InRelease
Hit:4 http://security.ubuntu.com/ubuntu noble-security InRelease
Hit:5 https://ppa.launchpadcontent.net/ansible/ansible/ubuntu noble InRelease
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
133 packages can be upgraded. Run 'apt list --upgradable' to see them.
```

 # apt-get install ansible -y

```
root@ip-172-31-18-177:/home/ubuntu# apt-get install ansible -y
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following additional packages will be installed:
  ansible-core python3-jmespath python3-kerberos python3-nacl python3-ntlm-auth
  python3-packaging python3-paramiko python3-requests-ntlm python3-resolvelib
  python3-winrm python3-xmltodict sshpass
Suggested packages:
  python-nacl-doc python3-gssapi python3-invoke
The following NEW packages will be installed:
  ansible ansible-core python3-jmespath python3-kerberos python3-nacl
  python3-ntlm-auth python3-packaging python3-paramiko python3-requests-ntlm
  python3-resolvelib python3-winrm python3-xmltodict sshpass
0 upgraded, 13 newly installed, 0 to remove and 133 not upgraded.
```

 # ansible --version

```
root@ip-172-31-18-177:/home/ubuntu# ansible --version
ansible [core 2.16.11]
  config file = /etc/ansible/ansible.cfg
  configured module search path = ['/root/.ansible/plugins/modules', '/usr/share/ansibl
e/plugins/modules']
  ansible python module location = /usr/lib/python3/dist-packages/ansible
  ansible collection location = /root/.ansible/collections:/usr/share/ansible/collectio
ns
  executable location = /usr/bin/ansible
  python version = 3.12.3 (main, Apr 10 2024, 05:33:47) [GCC 13.2.0] (/usr/bin/python3)
  jinja version = 3.1.2
  libyaml = True
```

Ansible-slave :

#apt update -y

```
root@ip-172-31-16-10:/home/ubuntu# apt update -y
Hit:1 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble InRelease
Get:2 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble-updates InRelease [12
6 kB]
Get:3 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble-backports InRelease [
126 kB]
Get:4 http://security.ubuntu.com/ubuntu noble-security InRelease [126 kB]
Get:5 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble/universe amd64 Packag
es [15.0 MB]
Get:6 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble/universe Translation-
en [5982 kB]
```

STEP5:

Ansible-master:

 # nano /etc/ansible/hosts

```
root@ip-172-31-18-177:/home/ubuntu# nano /etc/ansible/hosts
```

```
  GNU nano 7.2                                /etc/ansible/hosts *

# Ex 1: Ungrouped hosts, specify before any group headers:

## green.example.com
## blue.example.com
## 192.168.100.1
## 192.168.100.10

# Ex 2: A collection of hosts belonging to the 'webservers' group:

## [webservers]
## alpha.example.org
## beta.example.org
## 192.168.1.100
## 192.168.1.110
[client_1]
172.31.16.10
```

Add ip address of ansible-slave machine

Save the file

STEP6: To create SSH Key:

Ansible-master:

root@ip-172-31-18-177:/home/ubuntu# ssh-keygen -t rsa

```
root@ip-172-31-18-177:/home/ubuntu# ssh-keygen -t rsa
Generating public/private rsa key pair.
Enter file in which to save the key (/root/.ssh/id_rsa):
Enter passphrase (empty for no passphrase):
Enter same passphrase again:
Your identification has been saved in /root/.ssh/id_rsa
Your public key has been saved in /root/.ssh/id_rsa.pub
The key fingerprint is:
SHA256:+2Ydets/gm0rpyBWOT4wd7wBLenG5xzA/lINvXmWqUQ root@ip-172-31-18-177
The key's randomart image is:
+---[RSA 3072]----+
|                 |
|          . o .  |
|           * o E |
|          + * + o o|
|         oSX B = = |
|          B.O * +  |
|         o.= Boo   |
|        . ..Boo* . |
|          o.o*o+.o|
+----[SHA256]-----+
```

root@ip-172-31-18-177:/home/ubuntu# cd /root/.ssh/

root@ip-172-31-18-177:~/.ssh# ls

```
root@ip-172-31-18-177:/home/ubuntu# cd /root/.ssh/
root@ip-172-31-18-177:~/.ssh# ls
authorized_keys  id_rsa  id_rsa.pub
```

root@ip-172-31-18-177:~/.ssh# cat id_rsa.pub

```
root@ip-172-31-18-177:~/.ssh# cat id_rsa.pub
ssh-rsa AAAAB3NzaC1yc2EAAAADAQABAAABgQDeOKZYM2cg4a4f6OLTtYTNA/UiHuHCaj2n5YpU3gSbs94AkBw
XBJi9xC6lSdn0uZOxJQ6O1TxrGc6ZanyHFFSPgzCg88kMXUaaq/CD75rcvCmKID3EYXtCAw6v0jmJMDWIRC5Hcw
TPRToF0uja5Htro2MA89jaJ6wMGicX1emEB0oF2j7J+2uPu6jki5gOsT+Yjb2+ZdAt03cV/LtmAOYEZ9d9eJZfD
AiW+6zICP4wLXkOHVbUTllN3TYj9Q550ltW0IenFvacKBHYHI8YsNgVZ+Kw15UU3ycEDTODQuPmnBm5+ZtsJVUt
PTs4gmCSbqQZtbaQAEFqMZl5A9MoOkSNDYBfJXbJVO4wwofGnM68G2gGSbv6UztUNOlyzAZV1wcFYI90v7p2yVD
1KDnOfEcTH0IJtu61UJUlXZpqalEqp1IiNpySe7/zntdZskT3DrkSJ8AQvIcYcX2TV9SJKvCudH6oO75ToTbhCX
oB/KCAY+TKojp4Qqb5gt9ha5aIxJk= root@ip-172-31-18-177
```

Copy this key into ansible-slave machine

Ansible-slave:

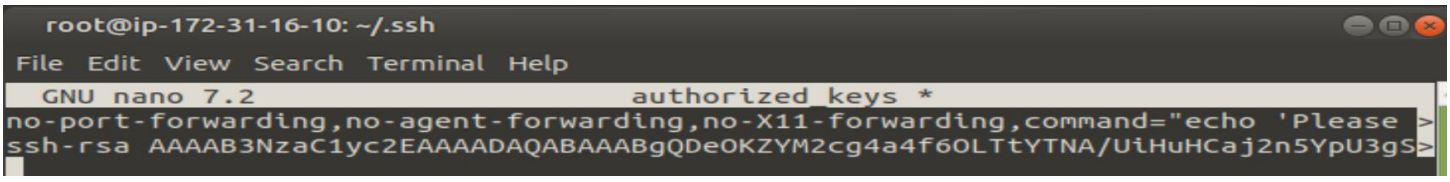
root@ip-172-31-16-10:/home/ubuntu# cd /root/.ssh/

root@ip-172-31-16-10:~/.ssh# ls

```
root@ip-172-31-16-10:/home/ubuntu# cd /root/.ssh/
root@ip-172-31-16-10:~/.ssh# ls
authorized_keys
```

root@ip-172-31-16-10:~/.ssh# nano authorized_keys

```
root@ip-172-31-16-10:~/.ssh# nano authorized_keys
```



Save it.

root@ip-172-31-16-10:~/.ssh# nano /etc/ssh/sshd_config

```
root@ip-172-31-16-10:~/.ssh# nano /etc/ssh/sshd_config
```

```
root@ip-172-31-16-10: ~/.ssh
File  Edit  View  Search  Terminal  Help
  GNU nano 7.2                          /etc/ssh/sshd_config *
#ListenAddress ::

#HostKey /etc/ssh/ssh_host_rsa_key
#HostKey /etc/ssh/ssh_host_ecdsa_key
#HostKey /etc/ssh/ssh_host_ed25519_key

# Ciphers and keying
#RekeyLimit default none

# Logging
#SyslogFacility AUTH
#LogLevel INFO

# Authentication:

#LoginGraceTime 2m
#PermitRootLogin prohibit-password
PermitRootLogin yes
#StrictModes yes
#MaxAuthTries 6
```

Save it.

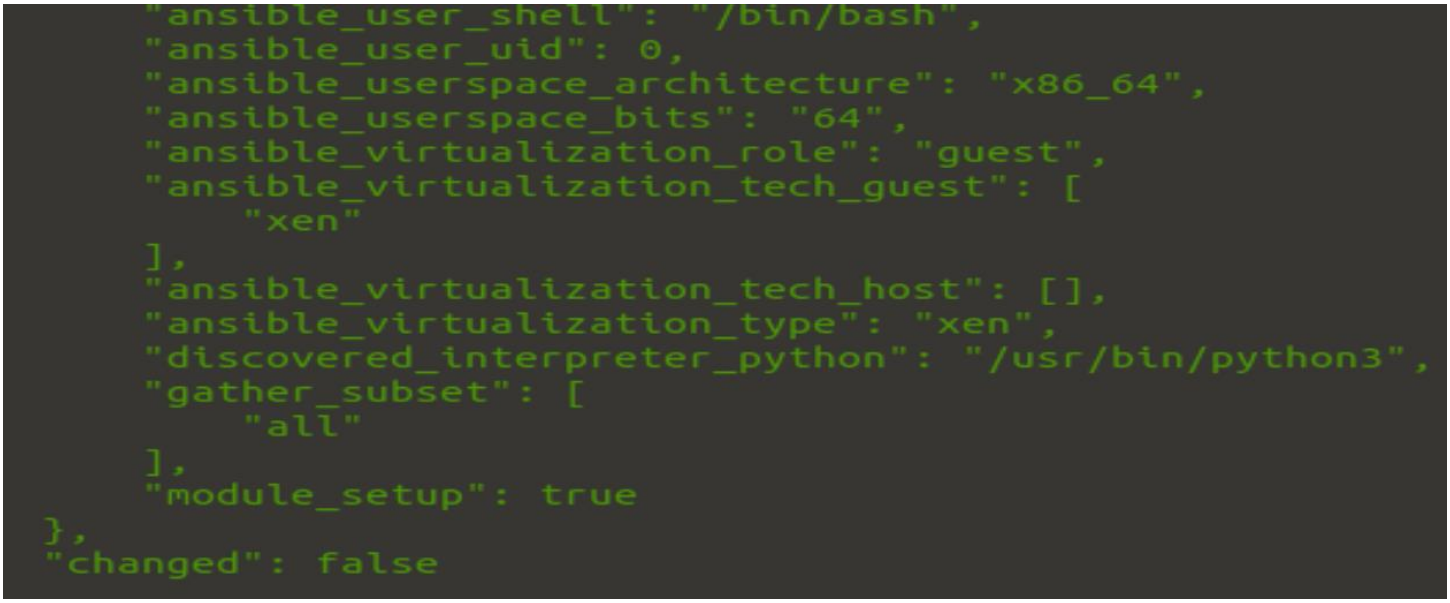
STEP7 :

Ansible-master:

1] root@ip-172-31-18-177:~/.ssh# ansible -m ping all

```
root@ip-172-31-18-177:~/.ssh# ansible -m ping all
The authenticity of host '172.31.16.10 (172.31.16.10)' can't be established.
ED25519 key fingerprint is SHA256:2qlJKjwxmY/FOPpFgKW6lKr4R+R+YwewVnZkfqRizQ8.
This key is not known by any other names.
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
172.31.16.10 | SUCCESS => {
    "ansible_facts": {
        "discovered_interpreter_python": "/usr/bin/python3"
    },
    "changed": false,
    "ping": "pong"
}
```

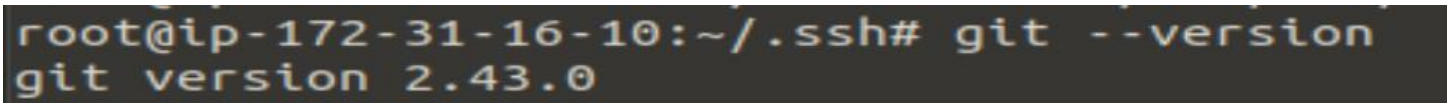
2] root@ip-172-31-18-177:~/.ssh# ansible client_1 -m setup



3]

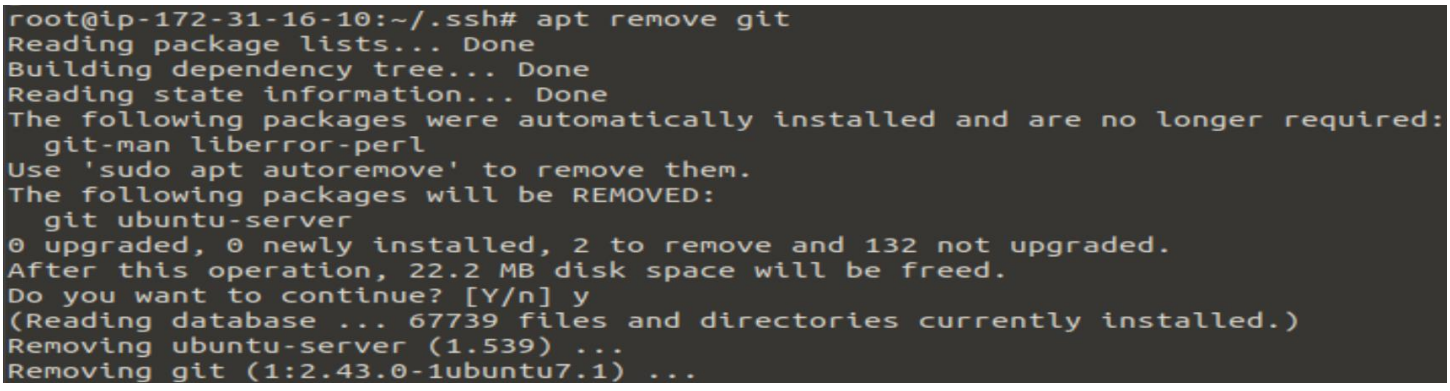
Ansible-slave:

root@ip-172-31-16-10:~/.ssh# git --version

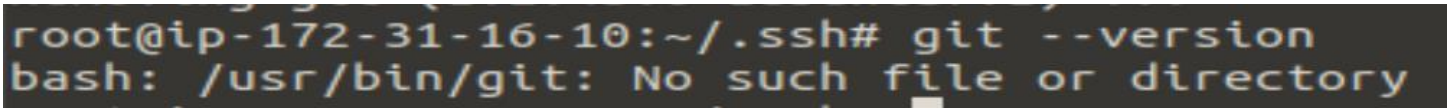


So let me remove it

root@ip-172-31-16-10:~/.ssh# apt remove git



root@ip-172-31-16-10:~/.ssh# git --version



So now I want to install git on all slave machine

Ansible-master:

root@ip-172-31-18-177:~/.ssh# ansible client_1 -m apt -a "name=git state=present" --become

```
root@ip-172-31-18-177:~/.ssh# ansible client_1 -m apt -a "name=git state=present" --bec
ome
172.31.16.10 | CHANGED => {
    "ansible_facts": {
        "discovered_interpreter_python": "/usr/bin/python3"
    },
    "cache_update_time": 1726335400,
    "cache_updated": false,
    "changed": true,
    "stderr": "",
    "stderr_lines": [],
    "stdout": "Reading package lists...\nBuilding dependency tree...\nReading state inf
ormation...\nSuggested packages:\n  git-daemon-run | git-daemon-sysvinit git-doc git-em
```

Ansible-slave:

root@ip-172-31-16-10:~/.ssh# git --version

```
root@ip-172-31-16-10:~/.ssh# git --version
git version 2.43.0
```

How to uninstall package from a ansible-master machine?

In ansible-slave machine :

root@ip-172-31-16-10:~/.ssh# nano test.txt

```
root@ip-172-31-16-10:~/.ssh# nano test.txt
```

```
root@ip-172-31-16-10: ~/.ssh
File  Edit  View  Search  Terminal  Help
GNU nano 7.2                                    test.txt
```

In ansible-master machine:

root@ip-172-31-18-177:~/.ssh# ansible client_1 -m apt -a "name=nano state=absent" --become

```
root@ip-172-31-18-177:~/.ssh# ansible client_1 -m apt -a "name=nano state=absent" --bec
ome
172.31.16.10 | CHANGED => {
    "ansible_facts": {
        "discovered_interpreter_python": "/usr/bin/python3"
    },
    "changed": true,
    "stderr": "",
    "stderr_lines": [],
    "stdout": "Reading package lists...\nBuilding dependency tree...\nReading state inf
ormation...\nThe following packages will be REMOVED:\n  nano\n0 upgraded, 0 newly insta
lled, 1 to remove and 132 not upgraded.\nAfter this operation, 856 kB disk space will b
```

In ansible-slave machine:

root@ip-172-31-16-10:~/.ssh# nano test.txt

```
root@ip-172-31-16-10:~/.ssh# nano test.txt
bash: /usr/bin/nano: No such file or directory
```

In ansible-master machine:

root@ip-172-31-18-177:~/.ssh# ansible client_1 -m apt -a "name=nano state=present" --become

```
root@ip-172-31-18-177:~/.ssh# ansible client_1 -m apt -a "name=nano state=present" --be
come
172.31.16.10 | CHANGED => {
    "ansible_facts": {
        "discovered_interpreter_python": "/usr/bin/python3"
    },
    "cache_update_time": 1726335400,
    "cache_updated": false,
    "changed": true,
    "stderr": "",
    "stderr_lines": [],
    "stdout": "Reading package lists...\nBuilding dependency tree...\nReading state inf
ormation...\nSuggested packages:\n  hunspell\nThe following NEW packages will be instal
led:\n  nano\n0 upgraded, 1 newly installed, 0 to remove and 132 not upgraded.\nNeed to
 get 281 kB of archives.\nAfter this operation, 856 kB of additional disk space will be
```

In ansible-slave machine:

root@ip-172-31-16-10:~/.ssh# nano test.txt

```
root@ip-172-31-16-10: ~/.ssh
File  Edit  View  Search  Terminal  Help
  GNU nano 7.2                                    test.txt
```

Conclusion: In the experiment, we successfully installed Ansible on top of AWS Instance. Also,configured SSH access to Ansible slave and setup ansible host and tested connection.