Configure Management tool:

Ansible:

PREPARED BY:

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Objective:

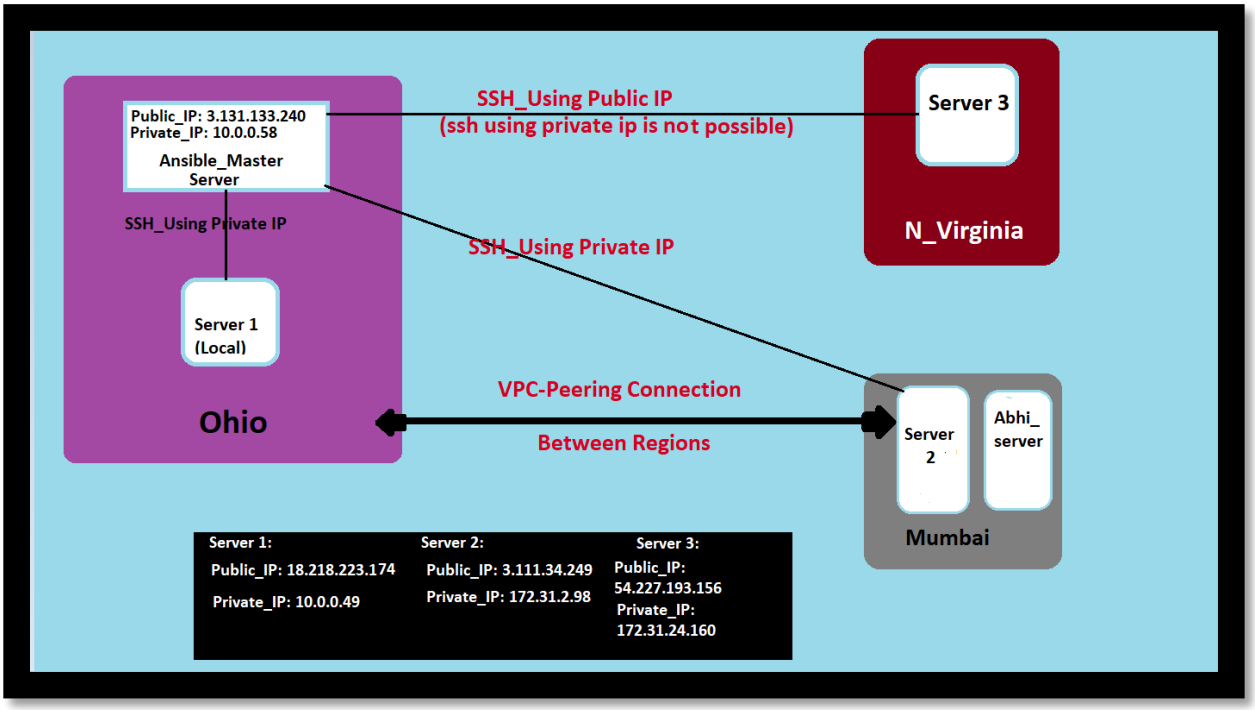
This project aims to establish a robust and secure connection between an Ansible master and its slave nodes in different AWS regions and deploys new EC2 instance using ansible playbook.

What is Ansible:

Ansible is an open-source automation tool used for IT tasks such as configuration management, application deployment, and orchestration. Developed by Red Hat, Ansible allows for the automation of repetitive IT processes, thereby improving efficiency and reducing errors. Ansible does not require any agents or additional software for client machines.

Ansible uses a push configuration model, where there is a central control node which pushes configurations and tasks to the managed nodes (target nodes/ servers) over SSH for Linux or WinRM for Windows.

Flow Diagram:



Explanation:

In this project we have servers located in Ohio, North Virginia and in Mumbai. We have Ansible Master node in Ohio region with a server1 node inside a private VPC called Abi_VPC, we have one more server2 node in Mumbai and these two VPC's are peered. We have one server3 in North Virginia and this VPC is ideal (i-e there is no peering between any VPC's).

Note: all instances are running on Ubuntu machine ….

Now in the Ansible master Node we would update all packages and install ansible. Once installed create a ssh public and private key using the command ***ssh-keygen,*** which is stored in **/root/.ssh** similarly use the same command and run it in all the other servers. Copy the public key of master node and paste it in the authorized keys of all the servers to form a ssh connections.

Since Ansible master node with a private Ip is 10.0.0.58 and server1 are in the same region we can ssh using server1 private Ip (i-e ssh 10.0.0.49), also since there is VPC peering connection between Ohio and Mumbai VPC we can also form a secure shell (ssh) connection from master node to server2 using private IP of server2 (i-e ssh 172.31.2.98). But since master node and server3 are neither in same region nor there is any VPC peering between the regions, so we cannot ssh using private ip of server3, but we can ssh using public ip of server3 (i-e ssh 54.227.193.156).

Create an inventory file in the /.ansible directory where in all the servers private ip's are listed.

Once all setup is configured, we can test the ansible's push configurations by running an ansible adhoc shell commands to create a file abi.txt in the nodes/servers from master server. In this since we have used private IP of server 3 due to this there is no file created in the server3.

Here we also launched an EC2 instance in Mumbai region using Ansible playbook.

For this I have written the yaml code and pushed the configuration from Master node of Ohio region. For this first, we need to create an IAM role and attach it to the Master node with admin permission to EC2 service. Then install python3-pip, python3-boto, python3-boto3 and python3-botcore in the master node since these packages help in launching ec2 instances. After this run the yaml code for launching ec2 instances, run the playbook syntax-check command to check if there are any errors, once there are no errors run the ansible playbook and a new instance would be launched in the Mumbai region. Refer Configuration page for yaml code and IP address configuration.

Note: Public IP addresses are dynamically assigned by AWS.

Results:

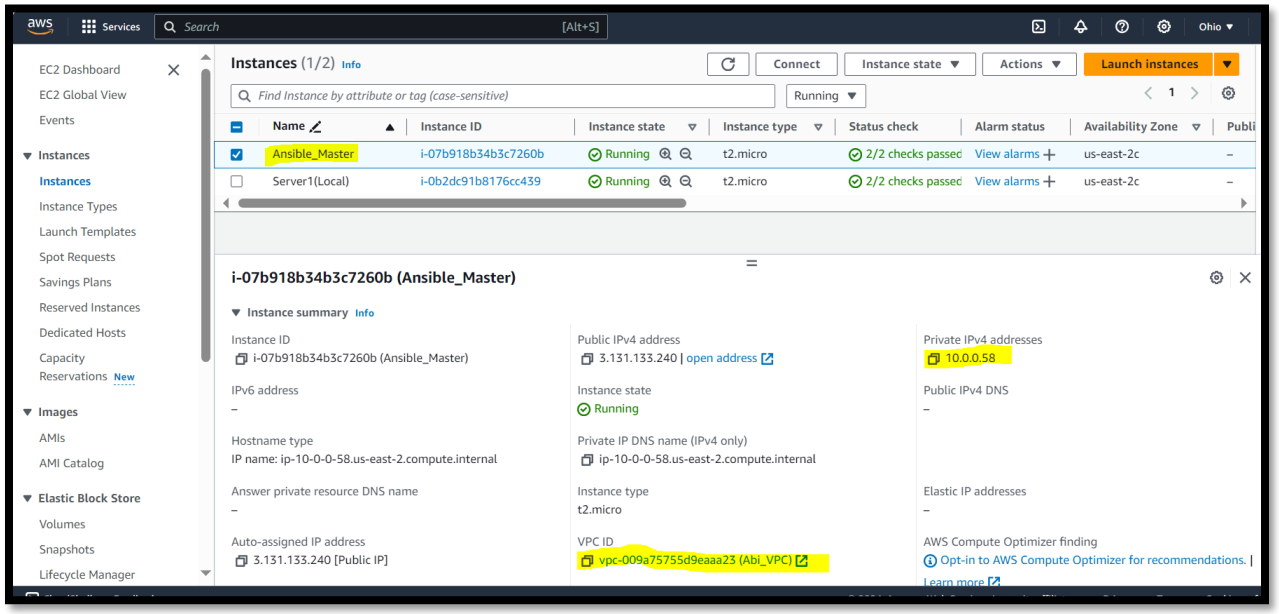


Fig 1: Ansible_Master instance created in Abi_VPC of Ohio region.

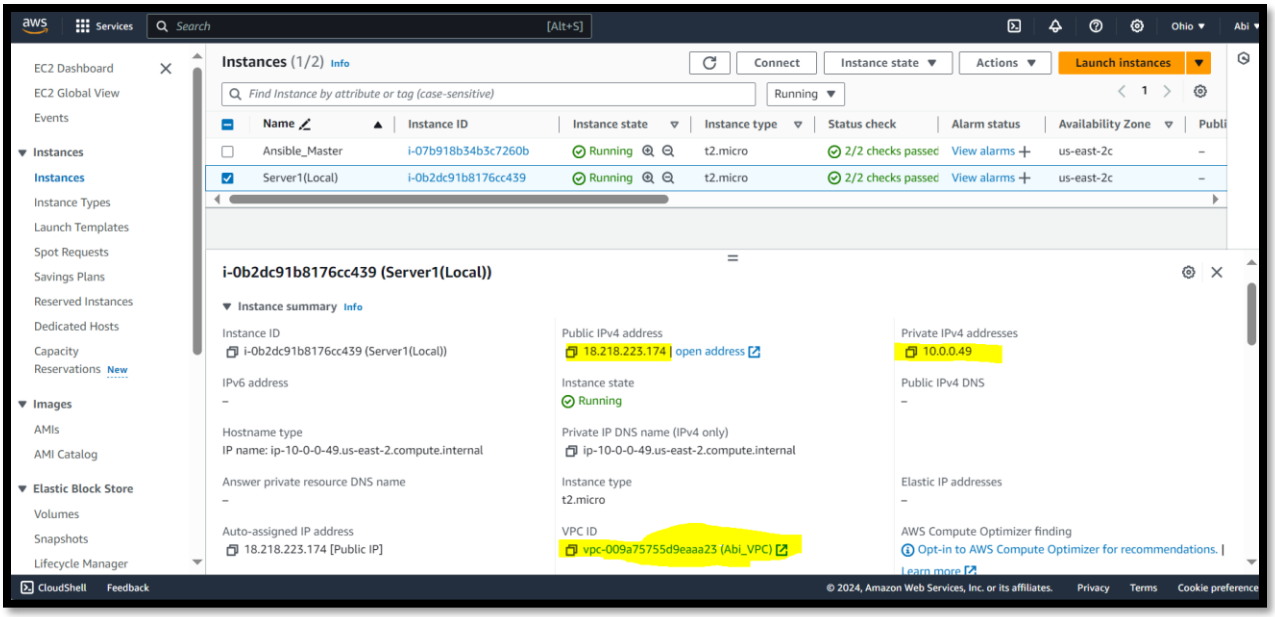


Fig 2: Server1(Local) created in Abi_VPC of Ohio region.

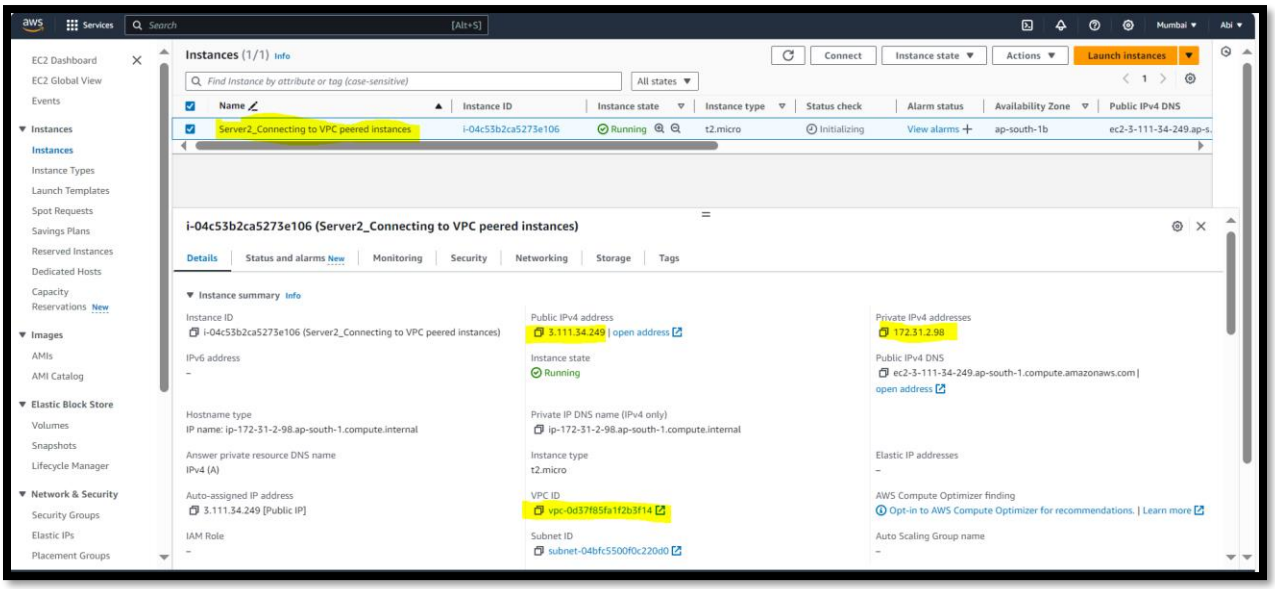


Fig 3: Server2 instance created in Destination_VPC of Mumbai Region.

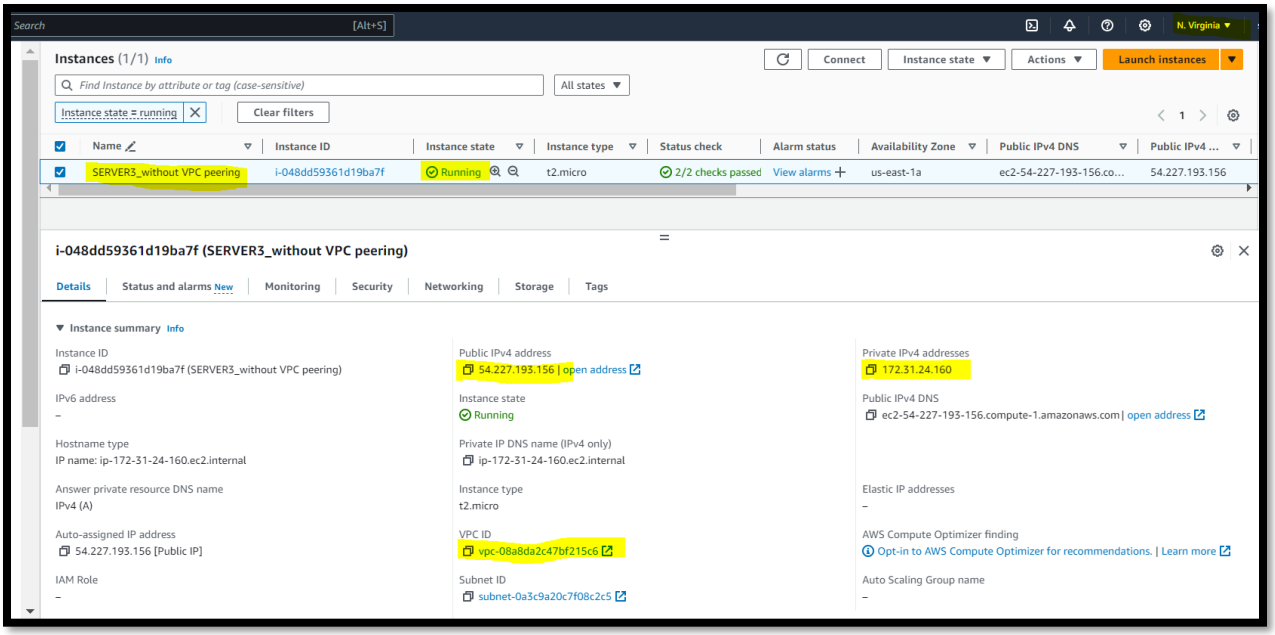


Fig 4: Server3 instance created in N.Virginia Region.

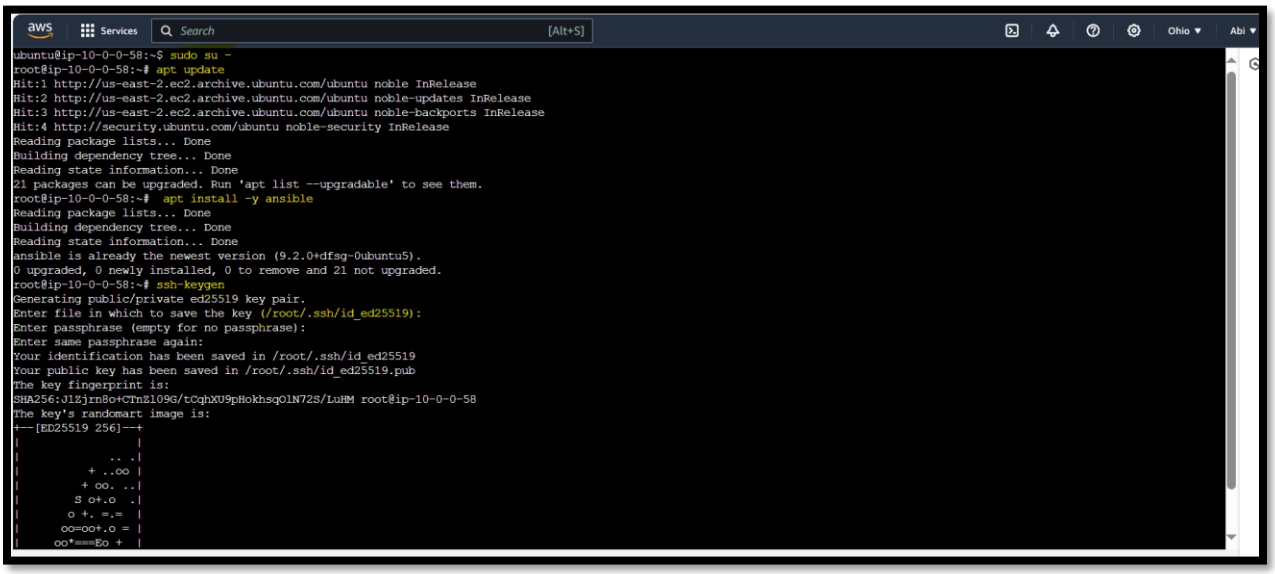


Fig 4: Packages installed in Ansible_master.

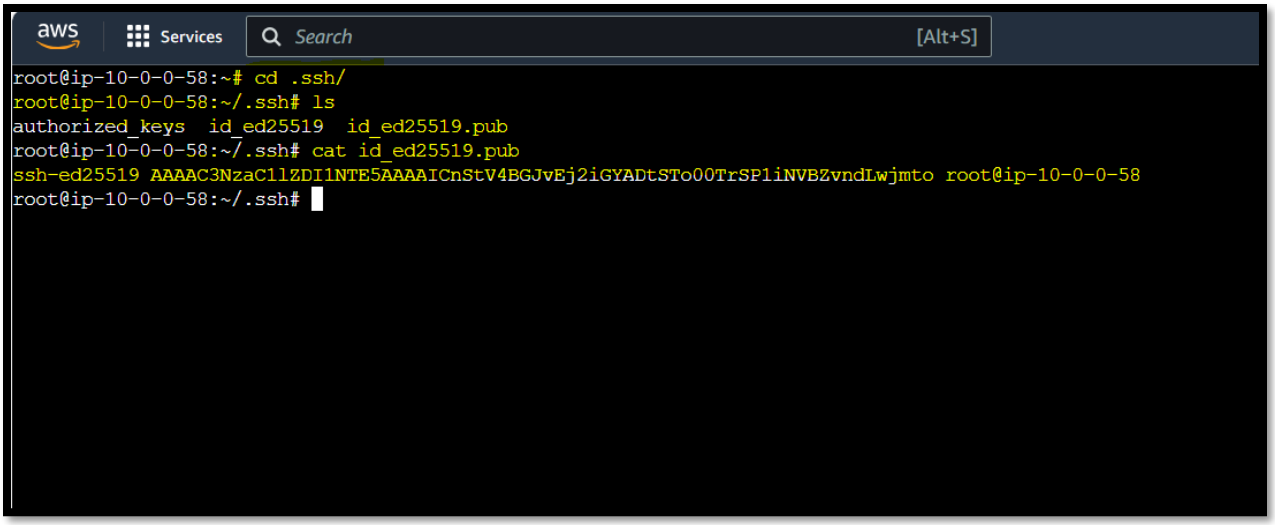


Fig 5: extracting public key from Ansible_Master.

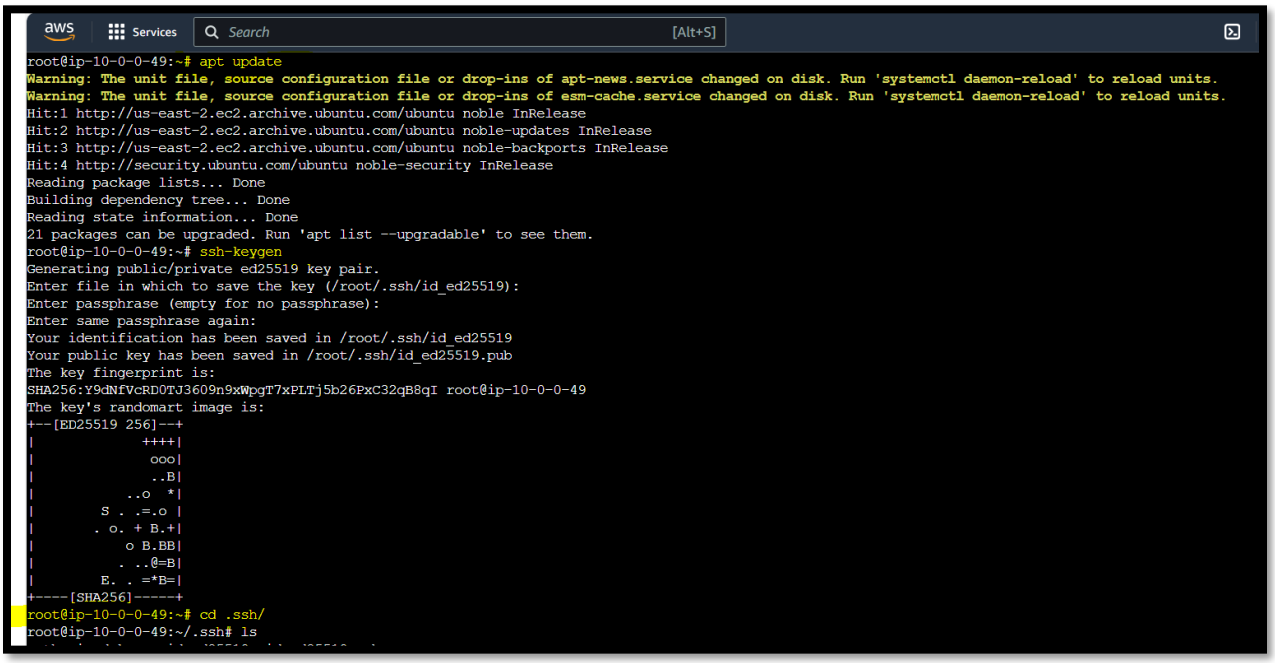


Fig 6: Updating packages in Server1.

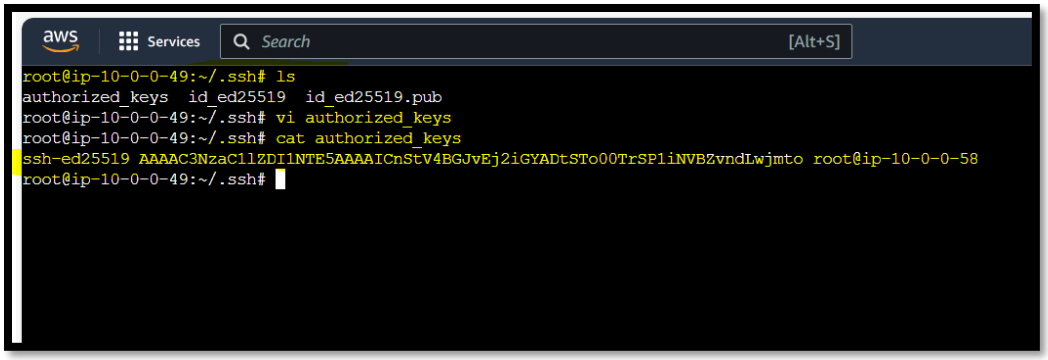


Fig 7: Updating Ansible_Master's public key in the authorized key of Server1.

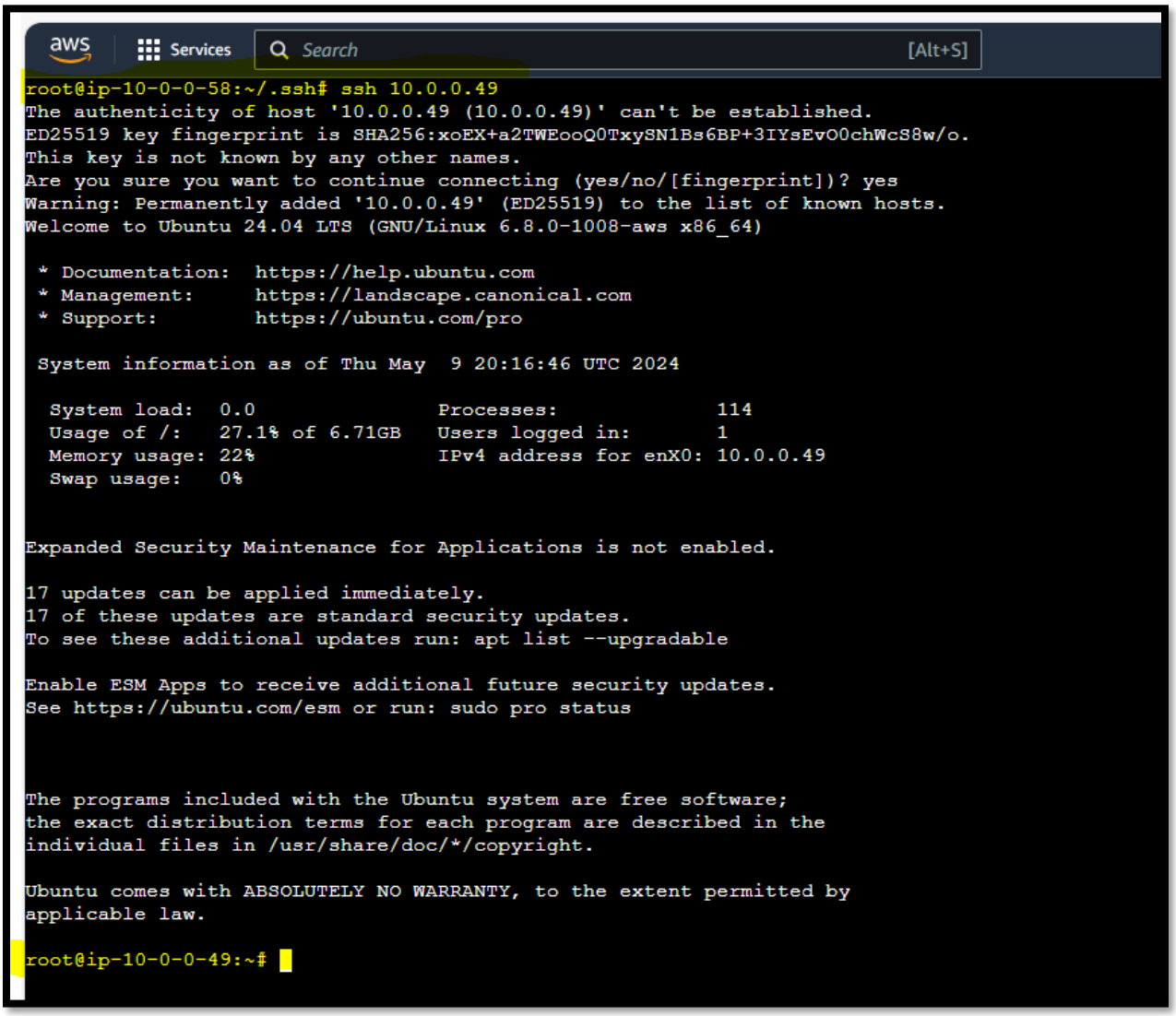


Fig 8: Results of SSH connection from Ansible_Master to server1.

```
ubuntu@ip-10-0-0-58:~$ sudo su -
root@ip-10-0-0-58:~# ping 3.111.34.249
PING 3.111.34.249 (3.111.34.249) 56(84) bytes of data.
64 bytes from 3.111.34.249: icmp_seq=1 ttl=49 time=222 ms
64 bytes from 3.111.34.249: icmp_seq=2 ttl=49 time=222 ms
^Z
[1]+  Stopped                 ping 3.111.34.249
root@ip-10-0-0-58:~# ping 172.31.2.98
PING 172.31.2.98 (172.31.2.98) 56(84) bytes of data.
64 bytes from 172.31.2.98: icmp_seq=1 ttl=64 time=219 ms
64 bytes from 172.31.2.98: icmp_seq=2 ttl=64 time=219 ms
64 bytes from 172.31.2.98: icmp_seq=3 ttl=64 time=219 ms
64 bytes from 172.31.2.98: icmp_seq=4 ttl=64 time=219 ms
^Z
[2]+  Stopped                 ping 172.31.2.98
root@ip-10-0-0-58:~# ssh 172.31.2.98
The authenticity of host '172.31.2.98 (172.31.2.98)' can't be established.
ED25519 key fingerprint is SHA256:DW9Pq+89qDyP8d6nPzBGydkIhyaCyh+3oD9DNcSNcQ4.
This key is not known by any other names.
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added '172.31.2.98' (ED25519) to the list of known hosts.
Welcome to Ubuntu 24.04 LTS (GNU/Linux 6.8.0-1008-aws x86_64)

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

 System information as of Mon May 13 18:04:46 UTC 2024

  System load:  0.0               Processes:             115
  Usage of /:   23.4% of 6.71GB   Users logged in:       1
  Memory usage: 20%               IPv4 address for enX0: 172.31.2.98
  Swap usage:   0%
```

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

 System information as of Mon May 13 18:04:46 UTC 2024

  System load:  0.0               Processes:             115
  Usage of /:   23.4% of 6.71GB   Users logged in:       1
  Memory usage: 20%               IPv4 address for enX0: 172.31.2.98
  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


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.

root@ip-172-31-2-98:~#
root@ip-172-31-2-98:~#
root@ip-172-31-2-98:~#
```

Fig 9: Results of SSH connection from Ansible_Master to server2.

```
ubuntu@ip-10-0-0-58:~$ sudo su -
root@ip-10-0-0-58:~# ping 172.31.24.160
PING 172.31.24.160 (172.31.24.160) 56(84) bytes of data.
^Z
[1]+  Stopped                 ping 172.31.24.160
root@ip-10-0-0-58:~# ping 54.227.193.156
PING 54.227.193.156 (54.227.193.156) 56(84) bytes of data.
64 bytes from 54.227.193.156: icmp_seq=1 ttl=42 time=10.0 ms
64 bytes from 54.227.193.156: icmp_seq=2 ttl=42 time=9.94 ms
64 bytes from 54.227.193.156: icmp_seq=3 ttl=42 time=9.91 ms
^Z
[2]+  Stopped                 ping 54.227.193.156
root@ip-10-0-0-58:~# ssh 172.31.24.160
^Z
[3]+  Stopped                 ssh 172.31.24.160
root@ip-10-0-0-58:~# ssh 54.227.193.156
The authenticity of host '54.227.193.156 (54.227.193.156)' can't be established.
ED25519 key fingerprint is SHA256:Maz5MgjX3DtF8xmLhXoog/WNQpzTmp9rZ+aaWGBHLDc.
This key is not known by any other names.
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added '54.227.193.156' (ED25519) to the list of known hosts.
Welcome to Ubuntu 24.04 LTS (GNU/Linux 6.8.0-1008-aws x86_64)

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

 System information as of Mon May 13 16:40:08 UTC 2024

  System load:  0.0               Processes:             106
  Usage of /:   23.3% of 6.71GB   Users logged in:       0
  Memory usage: 19%               IPv4 address for enX0: 172.31.24.160
  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


The list of available updates is more than a week old.
```

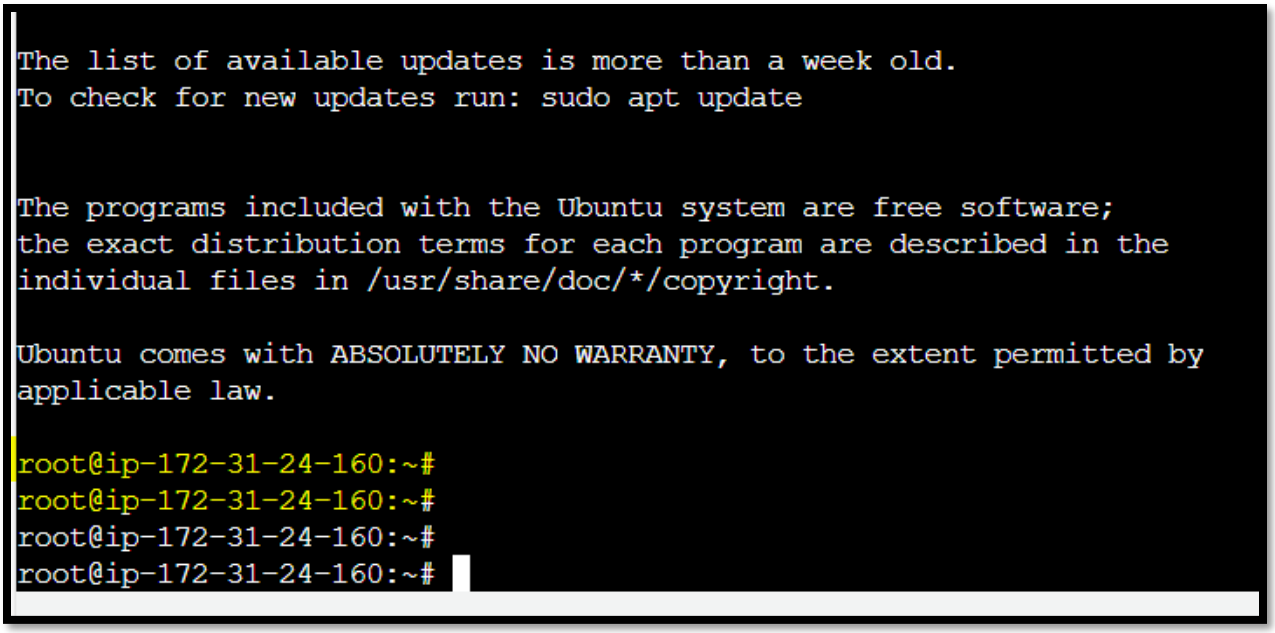
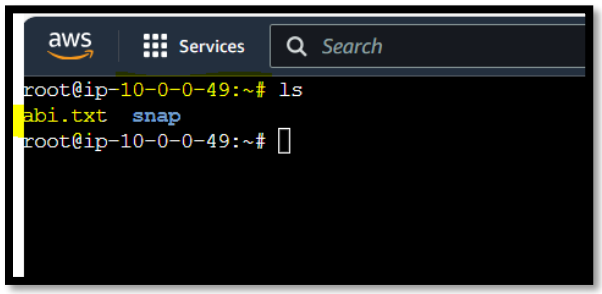
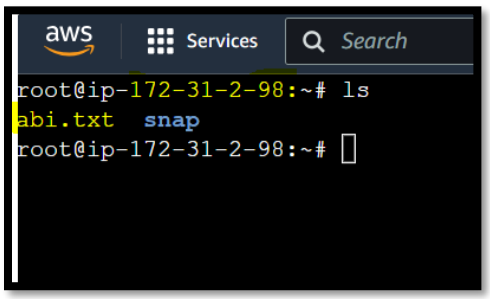


Fig 10: Results of SSH connection from Ansible_Master to server3's public IP.

Fig 11: Results of running ansible adhoc command from Ansible_Master to create file in server1, 2 and server3.





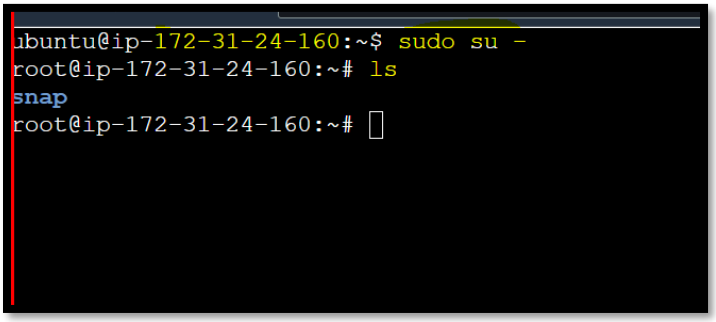


Fig 12: Results of file creation in server1,2 and 3.

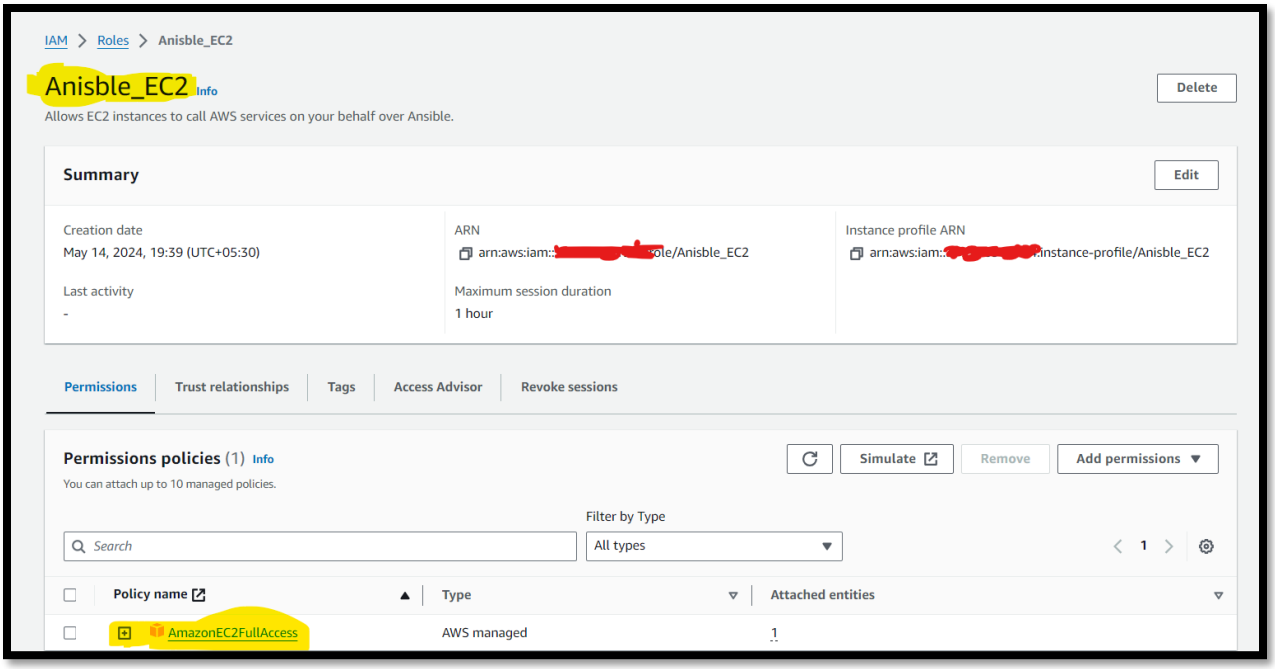


Fig 13: Creation of IAM role for EC2 full Admin Access.

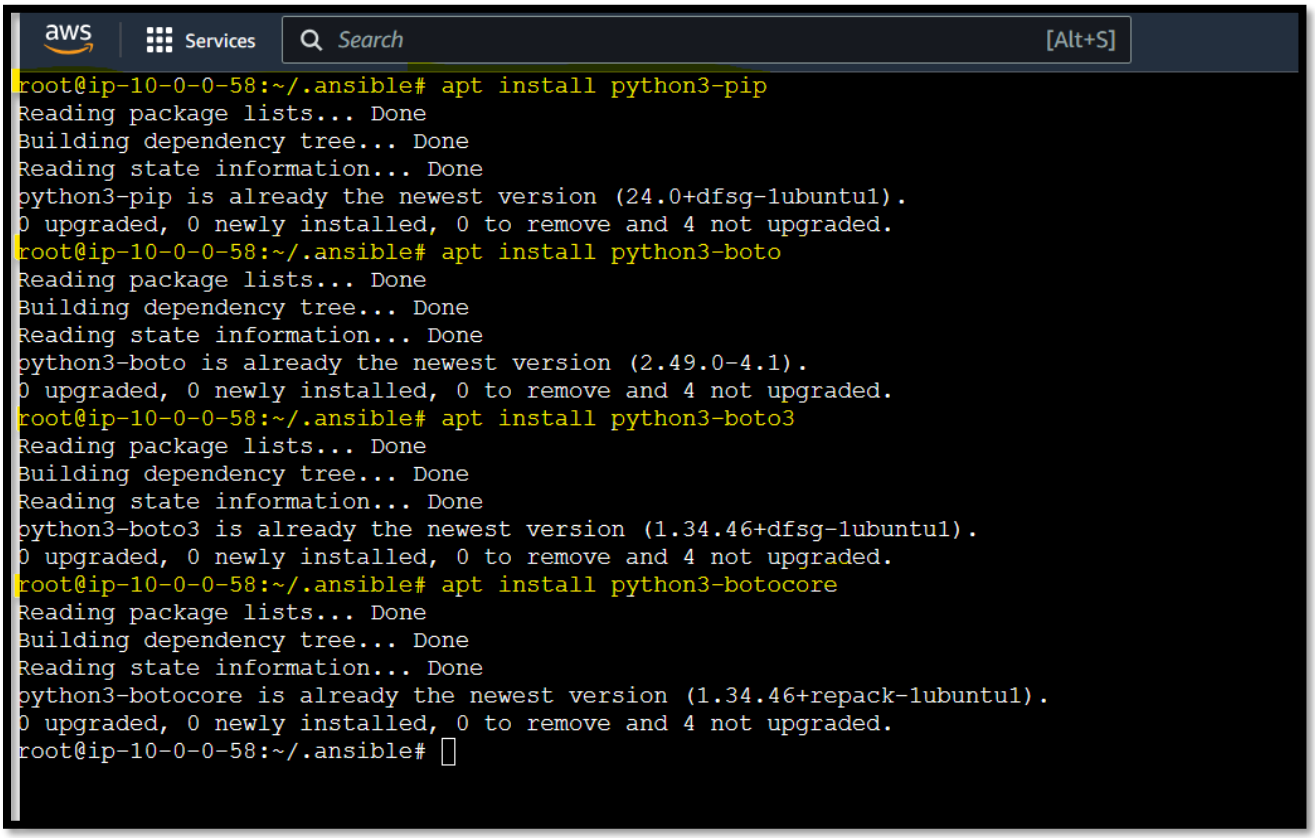


Fig 14: Installing packages in Ansible_Master.

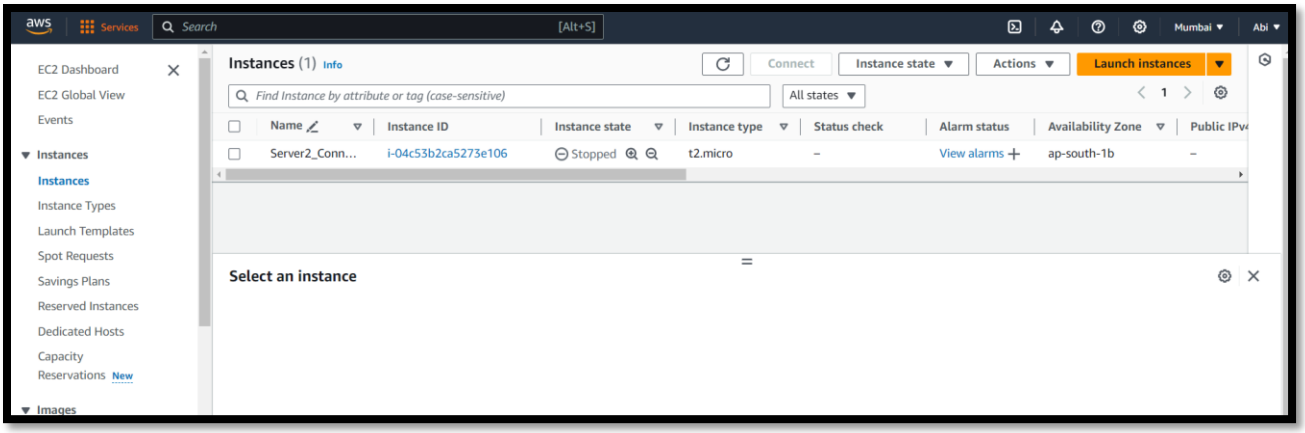


Fig 15: Instance status in Mumbai region before running ansible-playbook command.

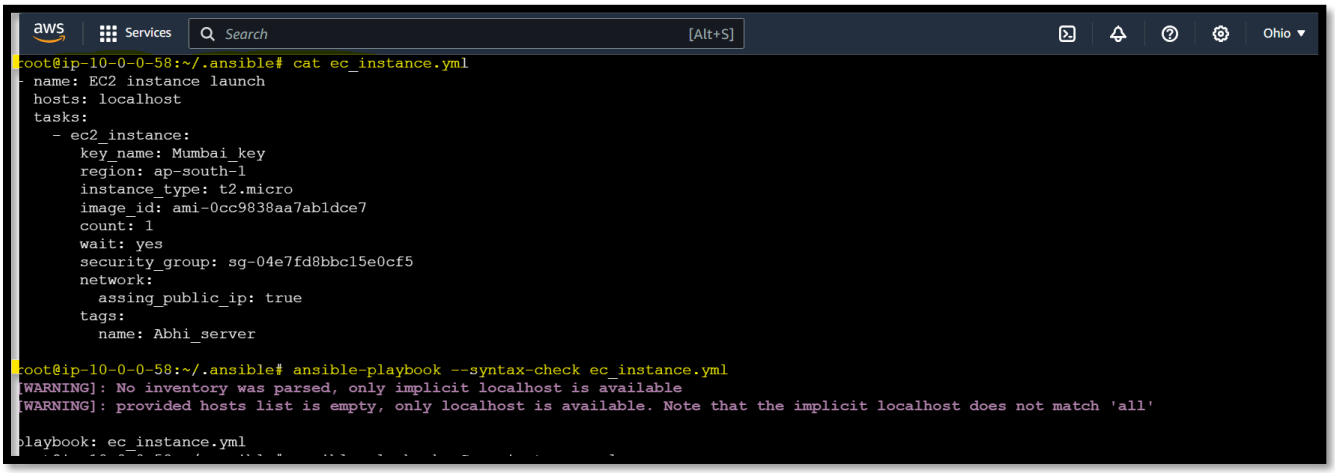


Fig 16: output of ansible-playbook syntax-check command.

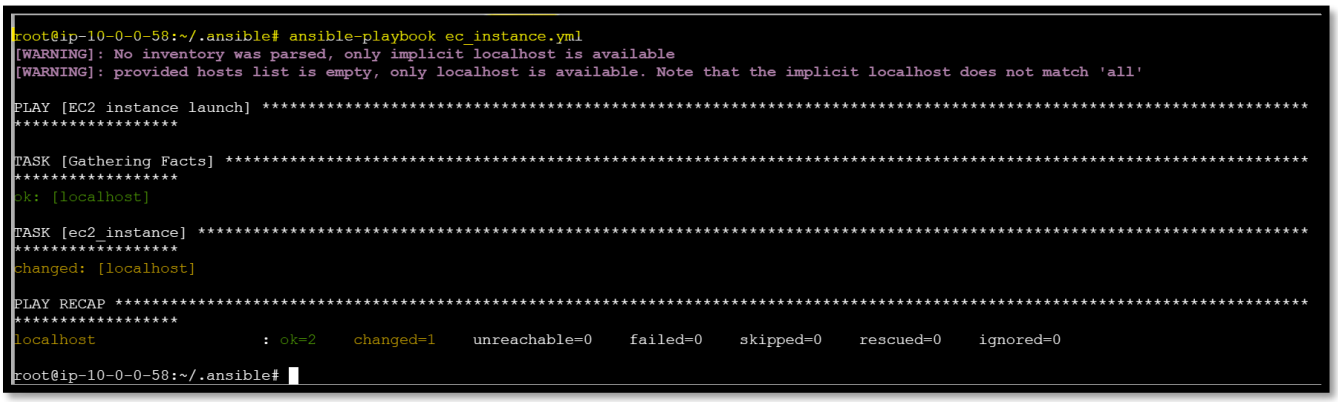


Fig 17: Results of running ansible-playbook from Ansible_Master.

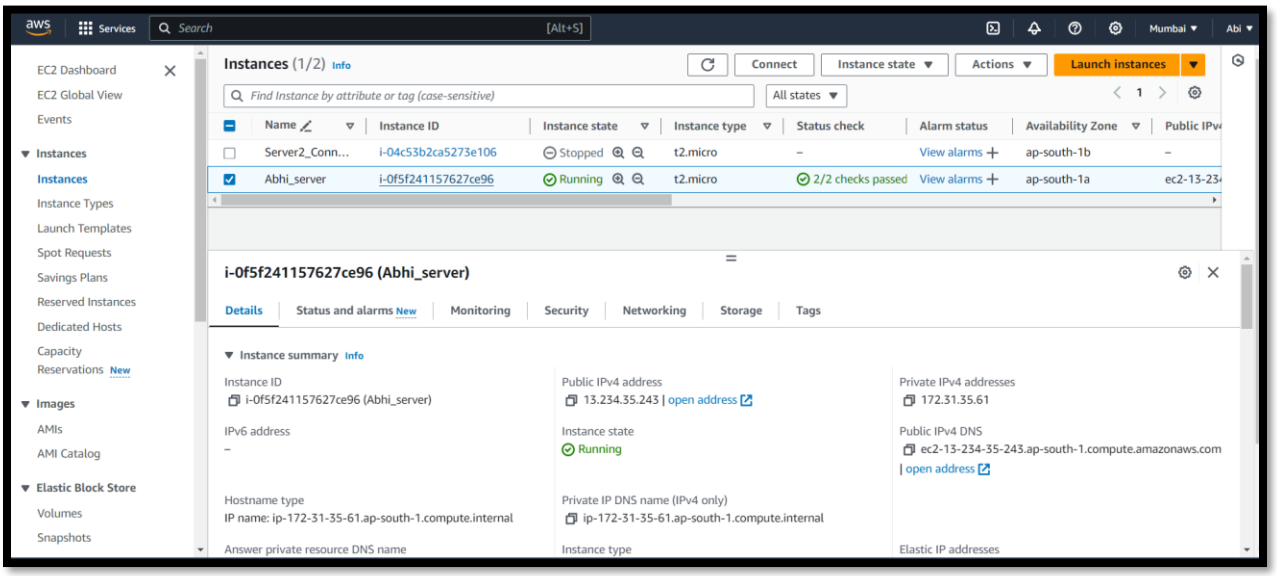


Fig 18: Instance created in Mumbai region after running ansible-playbook command.

Project learnings and observations:

- Cannot ssh using private ip if both the systems are not in the same region, could be achieved by VPC peering.
- Keep updated all the packages in the instances before running any new packages.
- Always run ansible syntax-check command before running any playbook, if there are any errors or packages which should installed will be listed, install them accordingly.
- Always use space while writing yaml code, do not use tab.
- Use the correct module name or correct playbooks while working with ansible, use ansible documentation for reference.
- If we are working on the same AWS account, then creating an IAM policy and attaching it to Ansible_Master node will help in launching Instances. But if not in the same AWS account, then we need to add access keys and secret key in the yaml code of destination account.