



# **Software Provisioning and Configuration Management**

**LAB FILE SUBMITTED BY:**

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**BATCH: 1 Devops**

# Lab Exercise 01

## Creating Static Host Inventory

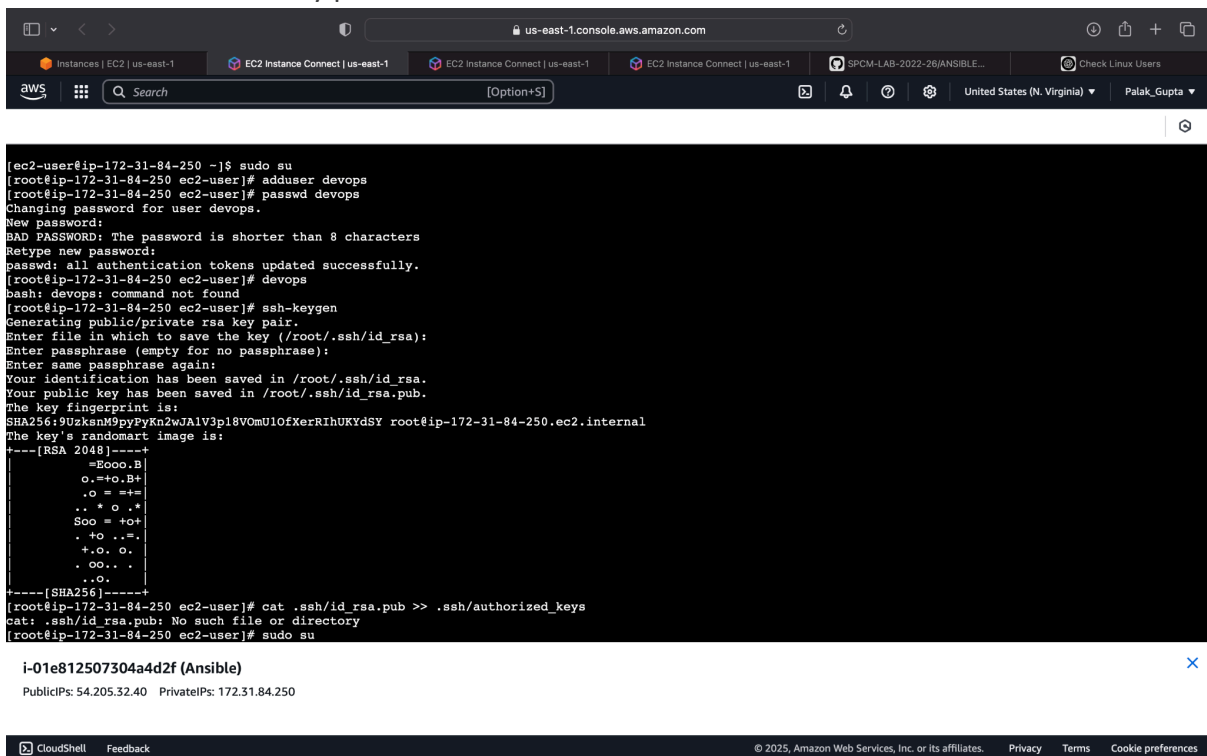
**Objective:** To create a static host inventory for managing and automating infrastructure tasks efficiently across multiple servers using Ansible

**Tools required:** Ubuntu OS

**Prerequisites:** You need to have Ansible installed to proceed with this demo

Steps to be followed:

1. Generate SSH key pair on the main node



The screenshot shows the AWS CloudShell interface with a terminal window. The terminal output shows the user 'ec2-user' on instance 'i-01e812507304a4d2f' in the 'us-east-1' region. The user runs 'sudo su' to become root. Then, they run 'adduser devops' to create a new user. The password 'devops' is set. Then, they run 'ssh-keygen' to generate an SSH key pair. The key is saved in '/root/.ssh/id\_rsa' with a passphrase. The key fingerprint is displayed. Finally, they run 'cat .ssh/id\_rsa.pub >> .ssh/authorized\_keys' to add the public key to the authorized keys file. The terminal output is as follows:

```
[ec2-user@ip-172-31-84-250 ~]$ sudo su
[root@ip-172-31-84-250 ec2-user]# adduser devops
[root@ip-172-31-84-250 ec2-user]# passwd devops
Changing password for user devops.
New password:
BAD PASSWORD: The password is shorter than 8 characters
Retype new password:
passwd: all authentication tokens updated successfully.
[root@ip-172-31-84-250 ec2-user]# devops
bash: devops: command not found
[root@ip-172-31-84-250 ec2-user]# ssh-keygen
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:
SHA256:9UzksnM9pyPyKnZwJAlV3p18VomU10fXerRIhUKYdSY root@ip-172-31-84-250.ec2.internal
The key's randomart image is:
+---[RSA 2048]-----+
|          =Ro0o.B+          |
|       o.=+o.B+         |
|      .o = +o+         |
|     .. * o . *         |
|    Soo = +o+         |
|   . +o ..=          |
|  +.o. o.           |
| .oo.. .            |
| ..o.              |
+---[SHA256]-----+
[root@ip-172-31-84-250 ec2-user]# cat .ssh/id_rsa.pub >> .ssh/authorized_keys
cat: .ssh/id_rsa.pub: No such file or directory
[root@ip-172-31-84-250 ec2-user]# sudo su
```

Below the terminal output, the host inventory is displayed:

```
i-01e812507304a4d2f (Ansible)
PublicIPs: 54.205.32.40  PrivateIPs: 172.31.84.250
```

The bottom of the screenshot shows the AWS CloudShell footer with the text 'CloudShell Feedback' and '© 2025, Amazon Web Services, Inc. or its affiliates. Privacy Terms Cookie preferences'.

2. Copy the SSH key to the two other nodes

```
us-east-1.console.aws.amazon.com

Instances | EC2 | us-east-1 | EC2 Instance Connect | us-east-1 | EC2 Instance Connect | us-east-1 | SPCM-LAB-2022-26/ANSIBLE... | Check Linux Users

[Option+S]

[devops@ip-172-31-84-250 ~]$ cat .ssh/id_rsa.pub >> .ssh/authorized_keys
[devops@ip-172-31-84-250 ~]$ ssh-copy-id devops@172.31.81.156
/usr/bin/ssh-copy-id: INFO: Source of key(s) to be installed: "/home/devops/.ssh/id_rsa.pub"
The authenticity of host '172.31.81.156 (172.31.81.156)' can't be established.
ECDSA key fingerprint is SHA256:umsNob3qjn5n3zljXdt8+wOm01lu6lJkKMu8+FWAg8.
ECDSA key fingerprint is MD5:a3:22:b2:62:b6:3a:c1:4c:fb:6b:bf:b4:04:ca:91:9a.
Are you sure you want to continue connecting (yes/no)? yes
/usr/bin/ssh-copy-id: INFO: attempting to log in with the new key(s), to filter out any that are already installed
/usr/bin/ssh-copy-id: INFO: 1 key(s) remain to be installed -- if you are prompted now it is to install the new keys
devops@172.31.81.156's password:

Number of key(s) added: 1

Now try logging into the machine, with: "ssh 'devops@172.31.81.156'"
and check to make sure that only the key(s) you wanted were added.

[devops@ip-172-31-84-250 ~]$ ssh-copy-id devops@172.31.94.216
/usr/bin/ssh-copy-id: INFO: Source of key(s) to be installed: "/home/devops/.ssh/id_rsa.pub"
The authenticity of host '172.31.94.216 (172.31.94.216)' can't be established.
ECDSA key fingerprint is SHA256:Ua2wkuxaalxAXYv4KShCPDlCk3anfaHx47octliCds.
ECDSA key fingerprint is MD5:25:92:2b:c1:79:be:0e:36:29:dd:42:1a:cc:a4:f0:dd.
Are you sure you want to continue connecting (yes/no)? yes
/usr/bin/ssh-copy-id: INFO: attempting to log in with the new key(s), to filter out any that are already installed
/usr/bin/ssh-copy-id: INFO: 1 key(s) remain to be installed -- if you are prompted now it is to install the new keys
devops@172.31.94.216's password:

Number of key(s) added: 1

Now try logging into the machine, with: "ssh 'devops@172.31.94.216'"
and check to make sure that only the key(s) you wanted were added.

[devops@ip-172-31-84-250 ~]$ sudo su
We trust you have received the usual lecture from the local System
Administrator. It usually boils down to these three things:
```

i-01e812507304a4d2f (Ansible)

PublicIPs: 54.205.32.40 PrivateIPs: 172.31.84.250

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3. Update the inventory or host file with the host IP address
4. Establish connectivity between the hosts specified in the host file and the Ansible server

## Step 1: Generate SSH key pair on the main node

- 1.1 Use the following command to generate the SSH key on the Ansible server:

**ssh-keygen**

```
[ec2-user@ip-172-31-84-250 ~]$ sudo su
[root@ip-172-31-84-250 ec2-user]# adduser devops
[root@ip-172-31-84-250 ec2-user]# passwd devops
Changing password for user devops.
New password:
BAD PASSWORD: The password is shorter than 8 characters
Retype new password:
passwd: all authentication tokens updated successfully.
[root@ip-172-31-84-250 ec2-user]# devops
bash: devops: command not found
[root@ip-172-31-84-250 ec2-user]# ssh-keygen
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:
SHA256:9UzksnM9pyPyKn2wJAlV3p18VomU1OfXerRIhUKYdSY root@ip-172-31-84-250.ec2.internal
The key's randomart image is:
+---[RSA 2048]---+
  =Eooo.B
  o.=+o.B+
  ..+ o .+
  S..o =+o+
  .+o ..=
  +.o. o.
  .oo..
  ..o.
+---[SHA256]-----+
[root@ip-172-31-84-250 ec2-user]# cat .ssh/id_rsa.pub >> .ssh/authorized_keys
cat: .ssh/id_rsa.pub: No such file or directory
[root@ip-172-31-84-250 ec2-user]# sudo su
```

i-01e812507304a4d2f (Ansible)

PublicIPs: 54.205.32.40 PrivateIPs: 172.31.84.250

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## Step 2: Copy the SSH key to the other two nodes

2.1 Use the following command to copy the public key to a file named **authorized\_keys**

in localhost:

```
cat .ssh/id_rsa.pub >> .ssh/authorized_keys
```

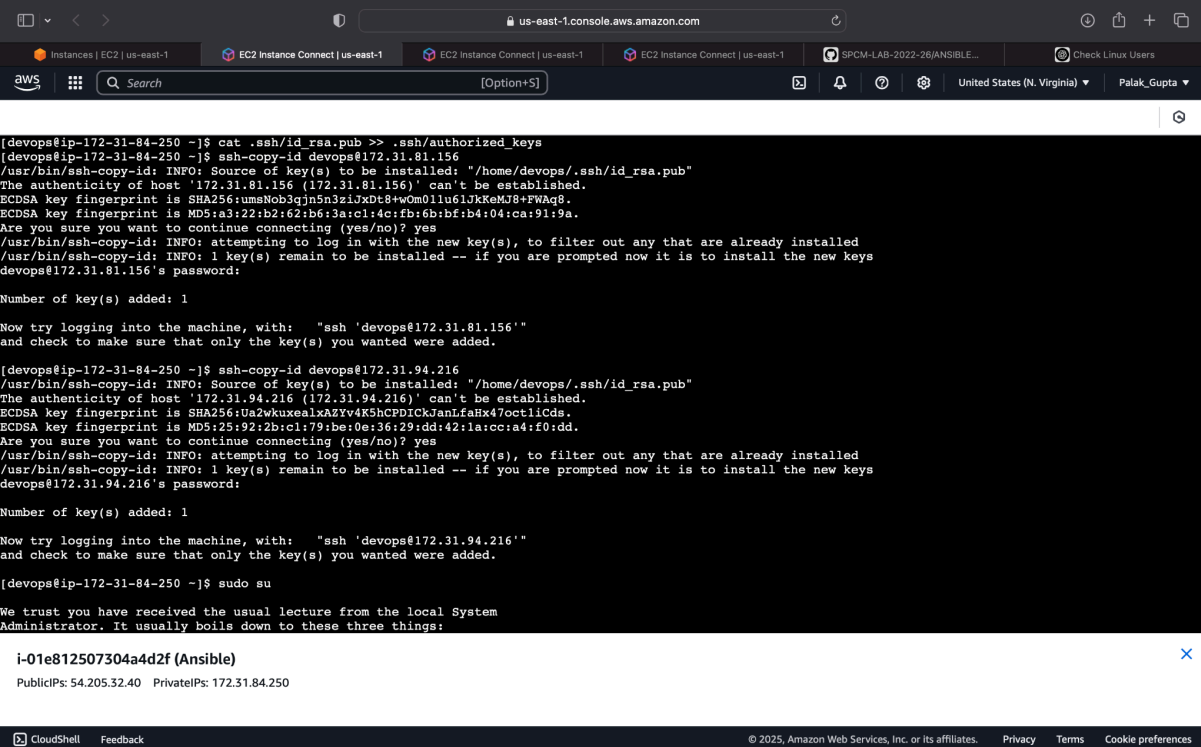
```
[devops@ip-172-31-84-250 ~]$ cat .ssh/id_rsa.pub >> .ssh/authorized_keys
[devops@ip-172-31-84-250 ~]$ ssh-copy-id devops@172.31.81.156
/usr/bin/ssh-copy-id: INFO: Source of key(s) to be installed: "/home/devops/.ssh/id_
The authenticity of host '172.31.81.156 (172.31.81.156)' can't be established.
ECDSA key fingerprint is SHA256:umsNob3qjn5n3ziJxDt8+wOm01lu61JkKeMJ8+FWAq8.
ECDSA key fingerprint is MD5:a3:22:b2:62:b6:3a:c1:4c:fb:6b:bf:b4:04:ca:91:9a.
Are you sure you want to continue connecting (yes/no)? yes
```

2.2 Run the following command to go to the **.ssh** directory of the Ansible server:

```
cd .ssh
```

2.3 Run the following command to copy the public key to another node that will connect to the Ansible server:

**ssh-copy-id username@ip -p 22**



```
[devops@ip-172-31-84-250 ~]$ cat .ssh/id_rsa.pub >> .ssh/authorized_keys
[devops@ip-172-31-84-250 ~]$ ssh-copy-id devops@172.31.81.156
/usr/bin/ssh-copy-id: INFO: Source of key(s) to be installed: "/home/devops/.ssh/id_rsa.pub"
The authenticity of host '172.31.81.156 (172.31.81.156)' can't be established.
ECDSA key fingerprint is SHA256:umsNob3qjn5n3ziJxDt8+wOm01lu6lJkKxMJ8+FWAq8.
ECDSA key fingerprint is MD5:a3:22:b2:62:b6:3a:c1:4c:fb:6b:bf:b4:04:ca:91:9a.
Are you sure you want to continue connecting (yes/no)? yes
/usr/bin/ssh-copy-id: INFO: attempting to log in with the new key(s), to filter out any that are already installed
/usr/bin/ssh-copy-id: INFO: 1 key(s) remain to be installed -- if you are prompted now it is to install the new keys
devops@172.31.81.156's password:

Number of key(s) added: 1

Now try logging into the machine, with: "ssh 'devops@172.31.81.156'"
and check to make sure that only the key(s) you wanted were added.

[devops@ip-172-31-84-250 ~]$ ssh-copy-id devops@172.31.94.216
/usr/bin/ssh-copy-id: INFO: Source of key(s) to be installed: "/home/devops/.ssh/id_rsa.pub"
The authenticity of host '172.31.94.216 (172.31.94.216)' can't be established.
ECDSA key fingerprint is SHA256:Ua2wkuxaalxA2Yv4K5hCPDICKJanLfaHx47octliCds.
ECDSA key fingerprint is MD5:25:92:2b:c1:79:be:0e:36:29:dd:42:1a:cc:a4:f0:dd.
Are you sure you want to continue connecting (yes/no)? yes
/usr/bin/ssh-copy-id: INFO: attempting to log in with the new key(s), to filter out any that are already installed
/usr/bin/ssh-copy-id: INFO: 1 key(s) remain to be installed -- if you are prompted now it is to install the new keys
devops@172.31.94.216's password:

Number of key(s) added: 1

Now try logging into the machine, with: "ssh 'devops@172.31.94.216'"
and check to make sure that only the key(s) you wanted were added.

[devops@ip-172-31-84-250 ~]$ sudo su

We trust you have received the usual lecture from the local System
Administrator. It usually boils down to these three things:
```

i-01e812507304a4d2f (Ansible) ✕

PublicIPs: 54.205.32.40 PrivateIPs: 172.31.84.250

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**Note:** You must use a **username@ip** with your node and IP username, which are provided in the lab credential.

2.4 Execute the following command to exit the **.ssh** directory of the Ansible server:

**cd**

```
[root@ip-172-31-84-250 ec2-user]# su - devops
Last login: Fri Apr 25 09:44:34 UTC 2025 on pts/0
[devops@ip-172-31-84-250 ~]$ sudo su
[root@ip-172-31-84-250 devops]# sudo yum update -y
Loaded plugins: extras_suggestions, langpacks, priorities, update-motd
No packages marked for update
[devops@ip-172-31-84-250 devops]# sudo yum update -y
Loaded plugins: extras_suggestions, langpacks, priorities, update-motd
No packages marked for update
[devops@ip-172-31-84-250 devops]# sudo amazon-linux-extras enable ansible2
Topic ansible2 has end-of-support date of 2023-09-30
0 *ansible2=latest enabled \
  [ =2.4.2 =2.4.6 =2.8 =stable ]
2 httpd_modules available [ =1.0 =stable ]
3 memcached1.5 available \
  [ =1.5.1 =1.5.16 =1.5.17 ]
9 R3.4 available [ =3.4.3 =stable ]
10 rust1 available \
  [ =1.22.1 =1.26.0 =1.26.1 =1.27.2 =1.31.0 =1.38.0
    =stable ]
18 libreoffice available \
  [ =5.0.6.2_15 =5.3.6.1 =stable ]
19 gimp available [ =2.8.22 ]
20 *docker=latest enabled \
  [ =17.12.1 =18.03.1 =18.06.1 =18.09.9 =stable ]
21 mate-desktop1.x available \
  [ =1.19.0 =1.20.0 =stable ]
22 GraphicsMagick1.3 available \
  [ =1.3.29 =1.3.32 =1.3.34 =stable ]
24 epel available [ =7.11 =stable ]
25 testing available [ =1.0 =stable ]
```

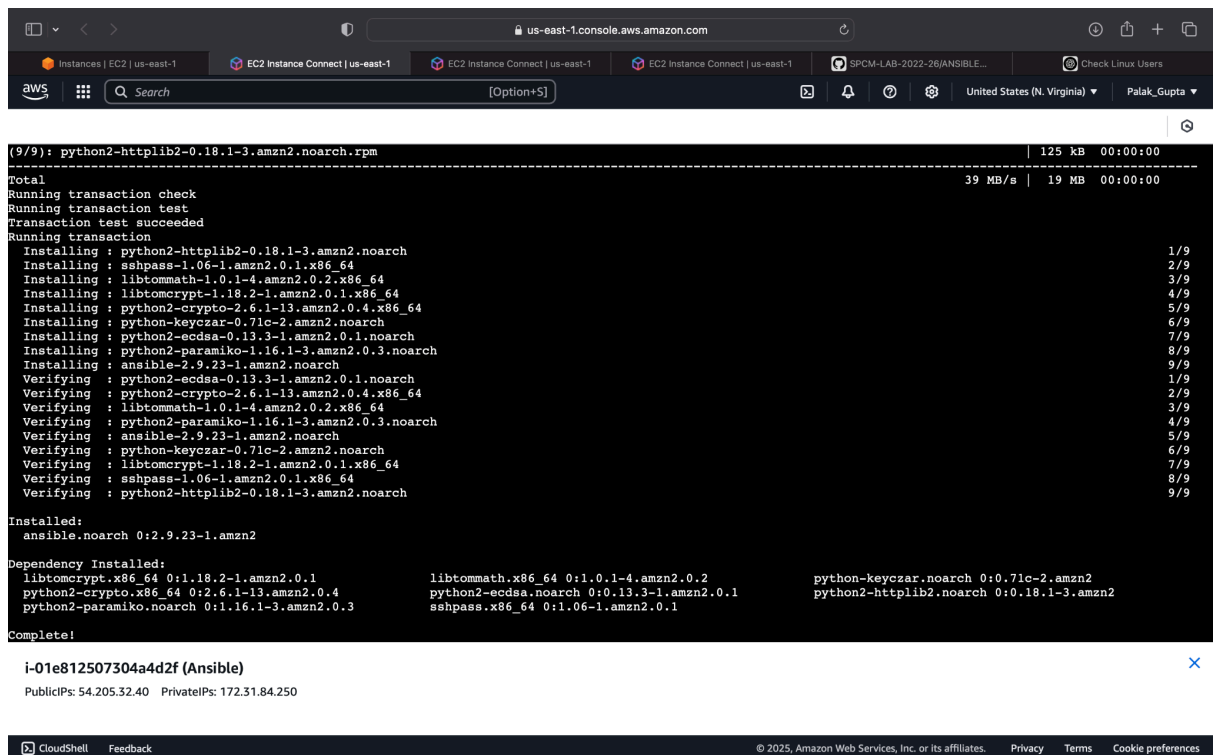
i-01e812507304a4d2f (Ansible)

PublicIPs: 54.205.32.40 PrivateIPs: 172.31.84.250

```
Now you can install:
# yum clean metadata
# yum install ansible
[devops@ip-172-31-84-250 devops]#
[devops@ip-172-31-84-250 devops]# sudo yum install ansible -y
Loaded plugins: extras_suggestions, langpacks, priorities, update-motd
amzn2extra-ansible2
amzn2extra-docker
amzn2extra-kernel-5.10
(1/2): amzn2extra-ansible2/2/x86_64/updateinfo
(2/2): amzn2extra-ansible2/2/x86_64/primary_db
Resolving Dependencies
--> Running transaction check
--> Package ansible.noarch 0:2.9.23-1.amzn2 will be installed
--> Processing Dependency: python-crypto for package: ansible-2.9.23-1.amzn2.noarch
--> Processing Dependency: python-httplib2 for package: ansible-2.9.23-1.amzn2.noarch
--> Processing Dependency: python-keyczar for package: ansible-2.9.23-1.amzn2.noarch
--> Processing Dependency: python-paramiko for package: ansible-2.9.23-1.amzn2.noarch
--> Processing Dependency: sshpass for package: ansible-2.9.23-1.amzn2.noarch
--> Running transaction check
--> Package python-keyczar.noarch 0:0.71c-2.amzn2 will be installed
--> Package python2-crypto.x86_64 0:2.6.1-13.amzn2.0.4 will be installed
--> Processing Dependency: libtomcrypt.so.1()(64bit) for package: python2-crypto-2.6.1-13.amzn2.0.4.x86_64
--> Package python2-httplib2.noarch 0:0.18.1-3.amzn2 will be installed
--> Package python2-paramiko.noarch 0:1.16.1-3.amzn2.0.3 will be installed
--> Processing Dependency: python2-ecdsa for package: python2-paramiko-1.16.1-3.amzn2.0.3.noarch
--> Package sshpass.x86_64 0:1.06-1.amzn2.0.1 will be installed
--> Running transaction check
--> Package libtomcrypt.x86_64 0:1.18.2-1.amzn2.0.1 will be installed
--> Processing Dependency: libtommath >= 1.0 for package: libtomcrypt-1.18.2-1.amzn2.0.1.x86_64
--> Processing Dependency: libtommath.so.1()(64bit) for package: libtomcrypt-1.18.2-1.amzn2.0.1.x86_64
--> Package python2-ecdsa.noarch 0:0.13.3-1.amzn2.0.1 will be installed
--> Running transaction check
--> Package libtommath.x86_64 0:1.0.1-4.amzn2.0.2 will be installed
--> Finished Dependency Resolution
```

i-01e812507304a4d2f (Ansible)

PublicIPs: 54.205.32.40 PrivateIPs: 172.31.84.250



```
(9/9): python2-httplib2-0.18.1-3.amzn2.noarch.rpm | 125 kB 00:00:00
-----
Total | 39 MB/s | 19 MB 00:00:00
Running transaction check
Running transaction test
Transaction test succeeded
Running transaction
Installing : python2-httplib2-0.18.1-3.amzn2.noarch 1/9
Installing : sshpass-1.06-1.amzn2.0.1.x86_64 2/9
Installing : libtommath-1.0.1-4.amzn2.0.2.x86_64 3/9
Installing : libtomcrypt-1.18.2-1.amzn2.0.1.x86_64 4/9
Installing : python2-crypto-2.6.1-13.amzn2.0.4.x86_64 5/9
Installing : python-keyczar-0.71c-2.amzn2.noarch 6/9
Installing : python2-ecdsa-0.13.3-1.amzn2.0.1.noarch 7/9
Installing : python2-paramiko-1.16.1-3.amzn2.0.3.noarch 8/9
Installing : ansible-2.9.23-1.amzn2.noarch 9/9
Verifying : python2-ecdsa-0.13.3-1.amzn2.0.1.noarch 1/9
Verifying : python2-crypto-2.6.1-13.amzn2.0.4.x86_64 2/9
Verifying : libtommath-1.0.1-4.amzn2.0.2.x86_64 3/9
Verifying : python2-paramiko-1.16.1-3.amzn2.0.3.noarch 4/9
Verifying : ansible-2.9.23-1.amzn2.noarch 5/9
Verifying : python-keyczar-0.71c-2.amzn2.noarch 6/9
Verifying : libtomcrypt-1.18.2-1.amzn2.0.1.x86_64 7/9
Verifying : sshpass-1.06-1.amzn2.0.1.x86_64 8/9
Verifying : python2-httplib2-0.18.1-3.amzn2.noarch 9/9

Installed:
  ansible.noarch 0:2.9.23-1.amzn2

Dependency Installed:
  libtomcrypt.x86_64 0:1.18.2-1.amzn2.0.1      libtommath.x86_64 0:1.0.1-4.amzn2.0.2      python-keyczar.noarch 0:0.71c-2.amzn2
  python2-crypto.x86_64 0:2.6.1-13.amzn2.0.4    python2-ecdsa.noarch 0:0.13.3-1.amzn2.0.1    python2-httplib2.noarch 0:0.18.1-3.amzn2
  python2-paramiko.noarch 0:1.16.1-3.amzn2.0.3    sshpass.x86_64 0:1.06-1.amzn2.0.1

Complete!

i-01e812507304a4d2f (Ansible)
PublicIPs: 54.205.32.40 PrivateIPs: 172.31.84.250

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```

## Step 3: Update the inventory or host file with the host IP address

- 3.1 Use the following command to open the Ansible inventory file and add the host localhost to it:

```
sudo vi /etc/ansible/hosts
```

```
[root@ip-172-31-84-250 devops]# vi /etc/ansible/hosts
```

- 3.2 When the file opens, add the three lines of code below to the end of the file:

```
[dbbservers]
localhost:22
172.31.5.76:22
```

**Note:** Press **esc**, then write **:wq** and press **enter** to save the file.

```
# This is the default ansible 'hosts' file.
#
# It should live in /etc/ansible/hosts
#
# - Comments begin with the '#' character
# - Blank lines are ignored
# - Groups of hosts are delimited by [header] elements
# - You can enter hostnames or ip addresses
# - A hostname/ip can be a member of multiple groups
#
# 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 'webserver' group
[spcm]
172.31.81.156
172.31.94.210
## [webserver]
## alpha.example.org
## beta.example.org
## 192.168.1.100
## 192.168.1.110
#
# If you have multiple hosts following a pattern you can specify
# them like this:
## www[001:006].example.com
#
# Ex 3: A collection of database servers in the 'dbserver' group
```



## Step 4: Establish connectivity between the hosts specified in the host file and the Ansible server

- 4.1 Run the following command to copy the public key to another node that will connect to the Ansible server:

**ansible -m ping dbbservers**

```
syedsharozsimpl@ip-172-31-44-85:~$ ansible -m ping dbbservers
```

```
[root@ip-172-31-84-250 devops]# ansible -m ping 172.31.81.156
[WARNING]: Platform linux on host 172.31.81.156 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/2.9/reference_appendices/interpreter_discovery.html for more information.
172.31.81.156 | SUCCESS => {
  "ansible_facts": {
    "discovered_interpreter_python": "/usr/bin/python"
  },
  "changed": false,
  "ping": "pong"
}
```

```
[root@ip-172-31-84-250 devops]# ansible -m ping 172.31.94.216
The authenticity of host '172.31.94.216 (172.31.94.216)' can't be established.
ECDSA key fingerprint is SHA256:Ua2WkuxaalxAXYv4K5hCPDIckJanLfaHx47octliCds.
ECDSA key fingerprint is MD5:25:92:2b:c1:79:be:0e:36:29:dd:42:1a:cc:a4:f0:dd.
Are you sure you want to continue connecting (yes/no)? yes
[WARNING]: Platform linux on host 172.31.94.216 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/2.9/reference_appendices/interpreter_discovery.html for more information.
172.31.94.216 | SUCCESS => {
  "ansible_facts": {
    "discovered_interpreter_python": "/usr/bin/python"
  },
  "changed": false,
  "ping": "pong"
}
```

```
[root@ip-172-31-84-250 devops]# ansible -m ping spcm
[WARNING]: Platform linux on host 172.31.94.216 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/2.9/reference_appendices/interpreter_discovery.html for more information.
172.31.94.216 | SUCCESS => {
  "ansible_facts": {
    "discovered_interpreter_python": "/usr/bin/python"
  },
  "changed": false,
  "ping": "pong"
}
[WARNING]: Platform linux on host 172.31.81.156 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/2.9/reference_appendices/interpreter_discovery.html for more information.
172.31.81.156 | SUCCESS => {
  "ansible_facts": {
    "discovered_interpreter_python": "/usr/bin/python"
  },
  "changed": false,
  "ping": "pong"
}
[WARNING]: Platform linux on host 172.31.84.250 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/2.9/reference_appendices/interpreter_discovery.html for more information.
172.31.84.250 | SUCCESS => {
  "ansible_facts": {
    "discovered_interpreter_python": "/usr/bin/python"
  },
  "changed": false,
  "ping": "pong"
}
```

- 4.2 Use the following command to check the number of hosts in the host file:

**ansible all --list-hosts**

```
[root@ip-172-31-84-250 devops]# ansible all --list-hosts
hosts (2):
    172.31.81.156
    172.31.94.216
[root@ip-172-31-84-250 devops]#
```

By following these steps, you have successfully created a static host inventory for managing and automating infrastructure tasks efficiently across multiple servers using Ansible.