Lesson 07 Demo 03

Implementing Dynamic Inventories

Objective: To demonstrate how to work with dynamic inventories in Ansible, enabling the automatic fetching and usage of inventory data from external sources

Tools required: Python, Ansible, Ansible Vault, and VS Code

Prerequisites: None

Steps to be followed:

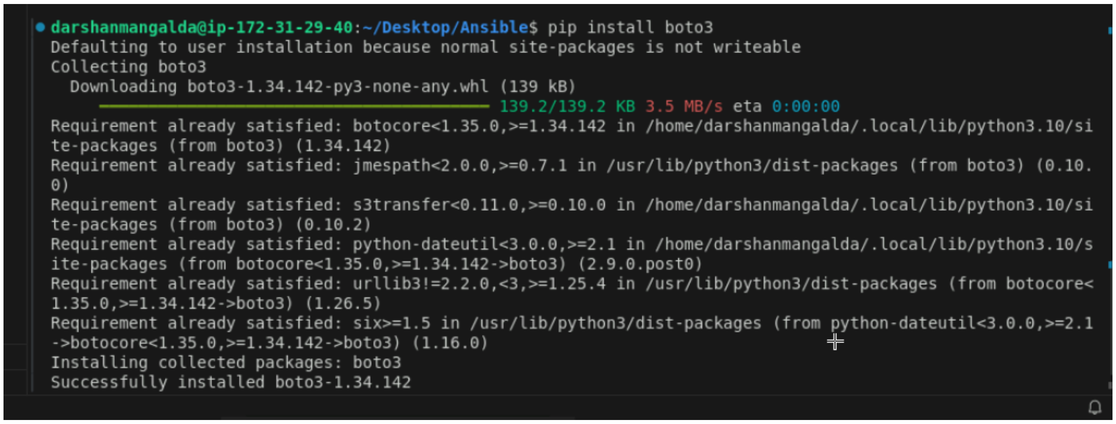
1. Install the required tools
2. Create and configure a dynamic inventory script
3. Create and execute a playbook using the dynamic inventory script

Step 1: Install the required tools

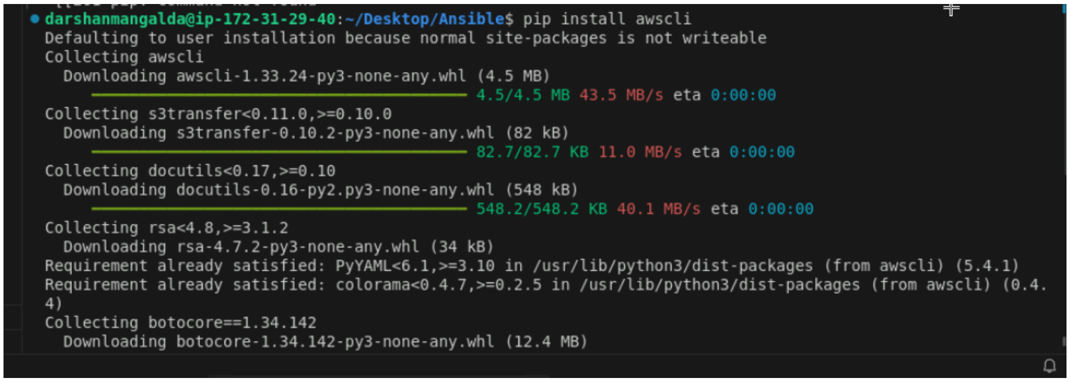
1.1 Install the necessary Python packages by running the following commands to interact with AWS services programmatically and manage AWS resources from the command line:

pip install boto3

pip install awscli



```
darshanmangalda@ip-172-31-29-40:~/Desktop/Ansible$ pip install boto3
Defaulting to user installation because normal site-packages is not writeable
Collecting boto3
  Downloading boto3-1.34.142-py3-none-any.whl (139 kB)
     ━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━ 139.2/139.2 KB 3.5 MB/s eta 0:00:00
Requirement already satisfied: botocore<1.35.0,>=1.34.142 in /home/darshanmangalda/.local/lib/python3.10/si
te-packages (from boto3) (1.34.142)
Requirement already satisfied: jmespath<2.0.0,>=0.7.1 in /usr/lib/python3/dist-packages (from boto3) (0.10.
0)
Requirement already satisfied: s3transfer<0.11.0,>=0.10.0 in /home/darshanmangalda/.local/lib/python3.10/si
te-packages (from boto3) (0.10.2)
Requirement already satisfied: python-dateutil<3.0.0,>=2.1 in /home/darshanmangalda/.local/lib/python3.10/s
ite-packages (from botocore<1.35.0,>=1.34.142->boto3) (2.9.0.post0)
Requirement already satisfied: urllib3!=2.2.0,<3,>=1.25.4 in /usr/lib/python3/dist-packages (from botocore<
1.35.0,>=1.34.142->boto3) (1.26.5)
Requirement already satisfied: six>=1.5 in /usr/lib/python3/dist-packages (from python-dateutil<3.0.0,>=2.1
->botocore<1.35.0,>=1.34.142->boto3) (1.16.0)
Installing collected packages: boto3
Successfully installed boto3-1.34.142
```

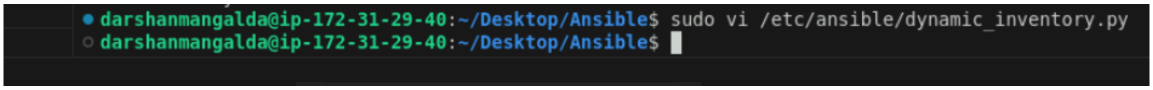


```
darshanmangalda@ip-172-31-29-40:~/Desktop/Ansible$ pip install awscli
Defaulting to user installation because normal site-packages is not writeable
Collecting awscli
  Downloading awscli-1.33.24-py3-none-any.whl (4.5 MB)
     ━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━ 4.5/4.5 MB 43.5 MB/s eta 0:00:00
Collecting s3transfer<0.11.0,>=0.10.0
  Downloading s3transfer-0.10.2-py3-none-any.whl (82 kB)
     ━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━ 82.7/82.7 KB 11.0 MB/s eta 0:00:00
Collecting docutils<0.17,>=0.10
  Downloading docutils-0.16-py2.py3-none-any.whl (548 kB)
     ━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━ 548.2/548.2 KB 40.1 MB/s eta 0:00:00
Collecting rsa<4.8,>=3.1.2
  Downloading rsa-4.7.2-py3-none-any.whl (34 kB)
Requirement already satisfied: PyYAML<6.1,>=3.10 in /usr/lib/python3/dist-packages (from awscli) (5.4.1)
Requirement already satisfied: colorama<0.4.7,>=0.2.5 in /usr/lib/python3/dist-packages (from awscli) (0.4.
4)
Collecting botocore==1.34.142
  Downloading botocore-1.34.142-py3-none-any.whl (12.4 MB)
```

Step 2: Create and configure a dynamic inventory script

2.1 Execute the following command to create the dynamic inventory script file:

sudo vi /etc/ansible/dynamic_inventory.py

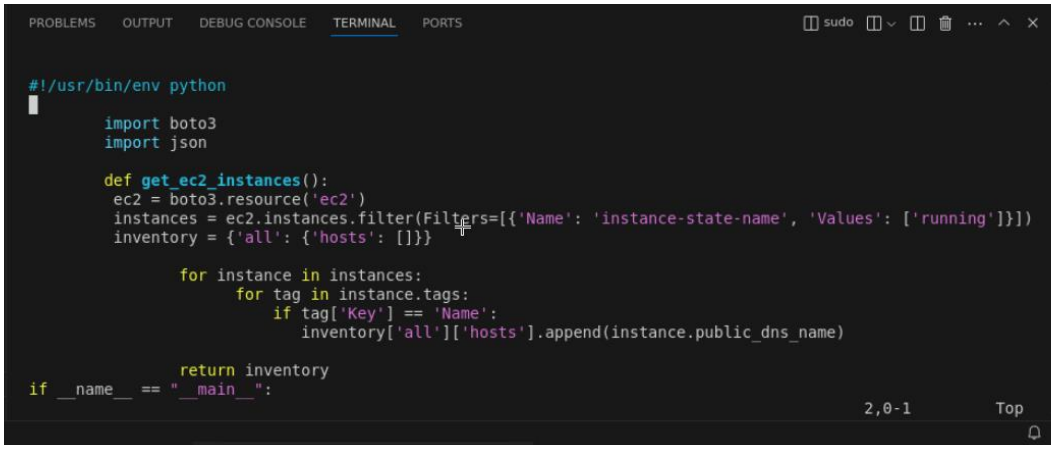


```
darshanmangalda@ip-172-31-29-40:~/Desktop/Ansible$ sudo vi /etc/ansible/dynamic_inventory.py
darshanmangalda@ip-172-31-29-40:~/Desktop/Ansible$ 
```

2.2 Add the following Python script in the **dynamic_inventory.py**:

```
#!/usr/bin/env python

import boto3
import json

def get_ec2_instances():
   ec2 = boto3.resource('ec2')
   instances = ec2.instances.filter(Filters=[{'Name': 'instance-state-name', 'Values': ['running']}])
   inventory = {'all': {'hosts': []}}

   for instance in instances:
      for tag in instance.tags:
         if tag['Key'] == 'Name':
            inventory['all']['hosts'].append(instance.public_dns_name)

   return inventory

if __name__ == "__main__":
```

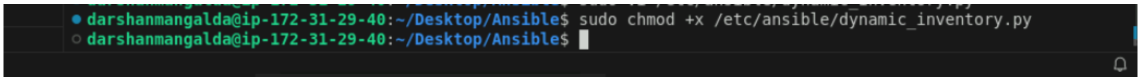
inventory = get_ec2_instances()
print(json.dumps(inventory))



```
#!/usr/bin/env python

        import boto3
        import json

        def get_ec2_instances():
         ec2 = boto3.resource('ec2')
         instances = ec2.instances.filter(Filters=[{'Name': 'instance-state-name', 'Values': ['running']}])
         inventory = {'all': {'hosts': []}}

                for instance in instances:
                      for tag in instance.tags:
                          if tag['Key'] == 'Name':
                             inventory['all']['hosts'].append(instance.public_dns_name)

                return inventory
if __name__ == "__main__":
                                                                                2,0-1         Top
```

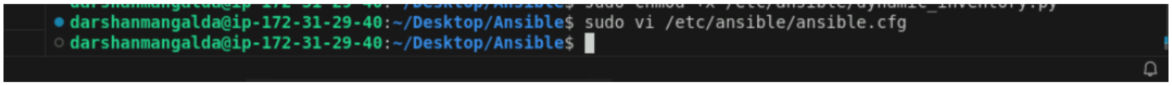
This script retrieves the public DNS names of all running EC2 instances from AWS and formats them into an Ansible-compatible inventory structure.

2.3 Run the following command to make the script executable:
sudo chmod +x /etc/ansible/dynamic_inventory.py



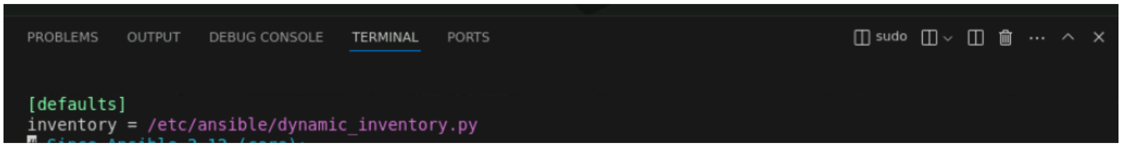
```
darshanmangalda@ip-172-31-29-40:~/Desktop/Ansible$ sudo chmod +x /etc/ansible/dynamic_inventory.py
darshanmangalda@ip-172-31-29-40:~/Desktop/Ansible$ 
```

2.4 Execute the following command to edit your Ansible configuration file to specify the inventory script:
sudo vi /etc/ansible/ansible.cfg



```
darshanmangalda@ip-172-31-29-40:~/Desktop/Ansible$ sudo vi /etc/ansible/ansible.cfg
darshanmangalda@ip-172-31-29-40:~/Desktop/Ansible$ 
```

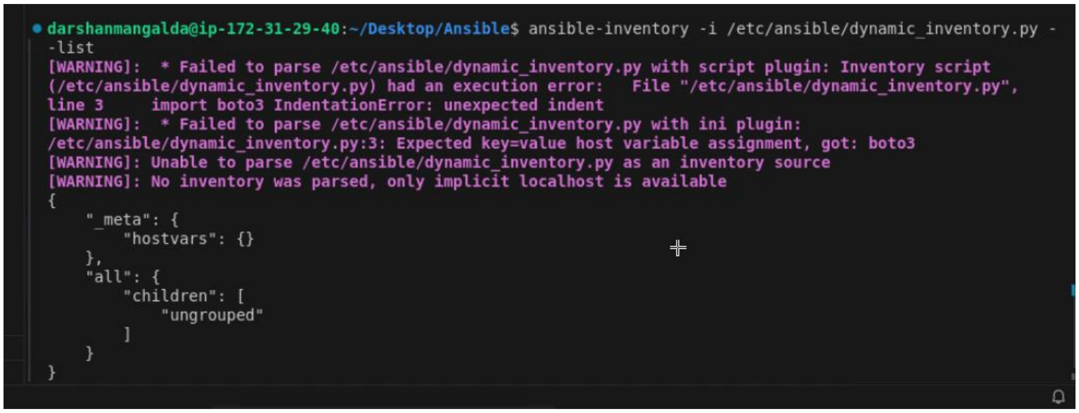
2.5 Add the following content in **ansible.cfg**:
[defaults]
inventory = /etc/ansible/dynamic_inventory.py



```
[defaults]
inventory = /etc/ansible/dynamic_inventory.py
```

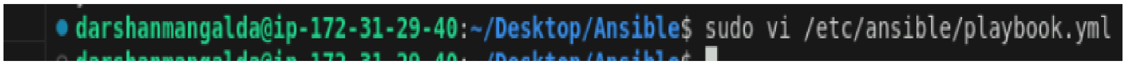
Step 3: Create and execute a playbook using the dynamic inventory script

3.1 Run the following command to display the inventory generated by a dynamic inventory script:
ansible-inventory -i /etc/ansible/dynamic_inventory.py --list



```
darshanmangalda@ip-172-31-29-40:~/Desktop/Ansible$ ansible-inventory -i /etc/ansible/dynamic_inventory.py -
-list
[WARNING]:  * Failed to parse /etc/ansible/dynamic_inventory.py with script plugin: Inventory script
(/etc/ansible/dynamic_inventory.py) had an execution error:   File "/etc/ansible/dynamic_inventory.py",
line 3     import boto3 IndentationError: unexpected indent
[WARNING]:  * Failed to parse /etc/ansible/dynamic_inventory.py with ini plugin:
/etc/ansible/dynamic_inventory.py:3: Expected key=value host variable assignment, got: boto3
[WARNING]: Unable to parse /etc/ansible/dynamic_inventory.py as an inventory source
[WARNING]: No inventory was parsed, only implicit localhost is available
{
    "_meta": {
        "hostvars": {}
    },
    "all": {
        "children": [
            "ungrouped"
        ]
    }
}
```

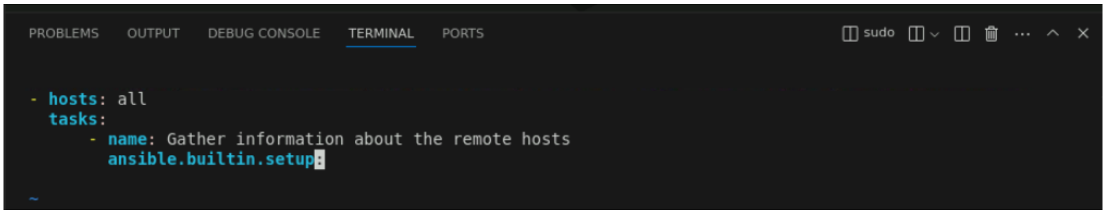
3.2 Execute the following command to create the playbook file:
sudo vi /etc/ansible/playbook.yml



```
darshanmangalda@ip-172-31-29-40:~/Desktop/Ansible$ sudo vi /etc/ansible/playbook.yml
```

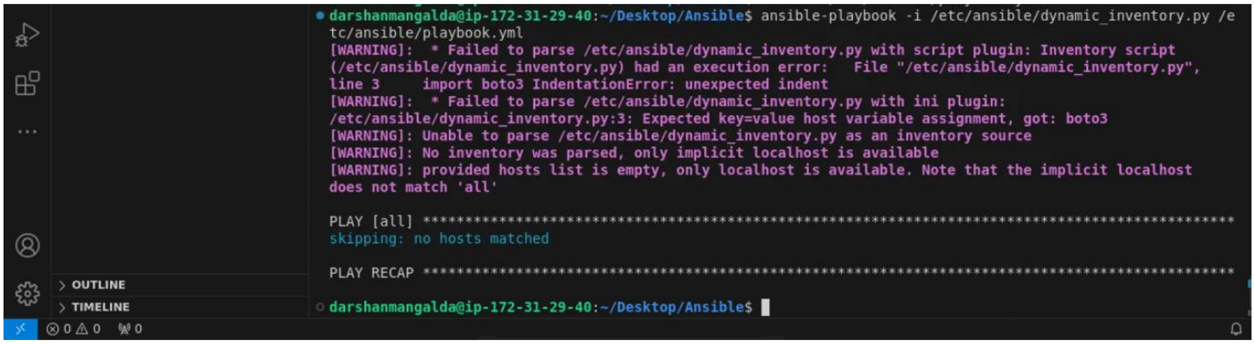
3.3 Add the following script in the **playbook.yml** file:

- hosts: all
** tasks:**
**   - name: Gather information about the remote hosts**
**   ansible.builtin.setup:**



```
- hosts: all
  tasks:
      - name: Gather information about the remote hosts
        ansible.builtin.setup:
~
```

3.4 Run the following command to execute the Ansible playbook using the dynamic inventory script:
ansible-playbook -i /etc/ansible/dynamic_inventory.py /etc/ansible/playbook.yml



```
darshanmangalda@ip-172-31-29-40:~/Desktop/Ansible$ ansible-playbook -i /etc/ansible/dynamic_inventory.py /e
tc/ansible/playbook.yml
[WARNING]:  * Failed to parse /etc/ansible/dynamic_inventory.py with script plugin: Inventory script
(/etc/ansible/dynamic_inventory.py) had an execution error:   File "/etc/ansible/dynamic_inventory.py",
line 3     import boto3 IndentationError: unexpected indent
[WARNING]:  * Failed to parse /etc/ansible/dynamic_inventory.py with ini plugin:
/etc/ansible/dynamic_inventory.py:3: Expected key=value host variable assignment, got: boto3
[WARNING]: Unable to parse /etc/ansible/dynamic_inventory.py as an inventory source
[WARNING]: No inventory was parsed, only implicit localhost is available
[WARNING]: provided hosts list is empty, only localhost is available. Note that the implicit localhost
does not match 'all'

PLAY [all] *******************************************************************************************
skipping: no hosts matched

PLAY RECAP *******************************************************************************************

darshanmangalda@ip-172-31-29-40:~/Desktop/Ansible$ 
```

By following the above steps, you have successfully created a dynamic inventory script, configured Ansible to use it, and run a playbook leveraging this dynamic inventory.