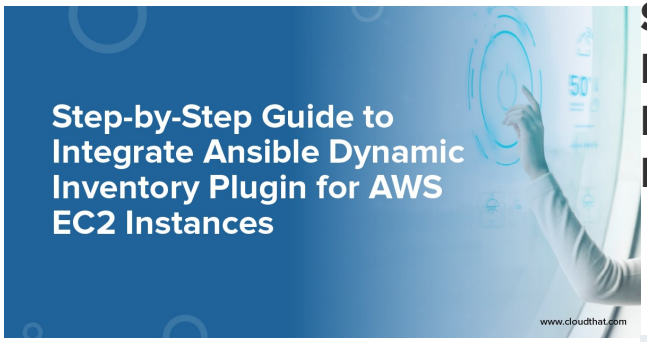
AWS, Cloud Computing, DevOps 5 Mins Read



Step-by-Step Guide to Integrate Ansible Dynamic Inventory Plugin for AWS EC2 Instances

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Voiced by Amazon Polly

By Vineet Negi September 13, 2022

Table of Contents

Overview

This blog will talk about how we configure Ansible to get inventory hosts from Amazon Web Services dynamically using the aws_ec2 plugin.

Ansible is an open-source intelligent automation tool. It is used to automate configuration, provisioning, application deployment, management, and many other manual IT processes. The ansible intelligence is on its configuration management capabilities.

Why Ansible Dynamic Inventory?

With the rapidly scaling cloud environment, it's difficult to maintain target instances just by using static inventory. Hence Ansible community came up with the concept of dynamic inventory.

We can set up dynamic inventory in two different ways:

1. inventory scripts
2. inventory plugin (recommended)

We will be using the EC2 plugin as it's more up-to-date and easier to set up and manage.

Step-by-Step Guide

Let us start working with the ec2 dynamic inventory

1. Install the aws_ec2 ansible plugin and its dependencies (boto3 and botocore)
   Now a days aws_ec2 ansible plugin is by default included in the ansible.
   Let's install the dependencies boto3 and botocore.
   $ pip3 install boto3 botocore

Note: Check the Below link for more information about the dynamic inventory

2. Setup ansible.cfg file

```
[ec2-user@ip-172-31-40-201 ansible]$ pwd
/etc/ansible
[ec2-user@ip-172-31-40-201 ansible]$ cat ansible.cfg
[defaults]
enable_plugins=aws_ec2
[ec2-user@ip-172-31-40-201 ansible]$
```

3. Create inventory aws_ec2.yml file

```
[ec2-user@ip-172-31-40-201 ansible]$ pwd
/etc/ansible
[ec2-user@ip-172-31-40-201 ansible]$ ls
ansible.cfg  aws_ec2.yml
[ec2-user@ip-172-31-40-201 ansible]$ cat aws_ec2.yml
plugin: aws_ec2
regions:
  - "ap-southeast-1"
keyed_groups:
  - key: tags.Name
filters:
  instance-state-name : running
compose:
  ansible_host: public_ip_address
[ec2-user@ip-172-31-40-201 ansible]$
```

```
plugin: aws_ec2
regions:
  - "ap-southeast-1"
keyed_groups:
  - key: tags.Name
filters:
  instance-state-name : running
compose:
  ansible_host: public_ip_address
```

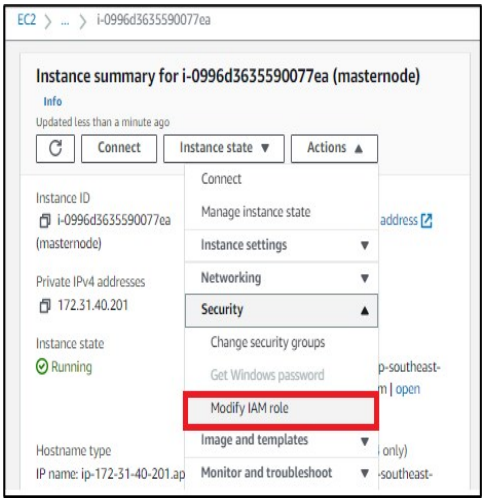
Add the above code to the file we'll be using this access the inventory information.

To use this plugin, we need credentials to access other instances. We can do this in two ways.

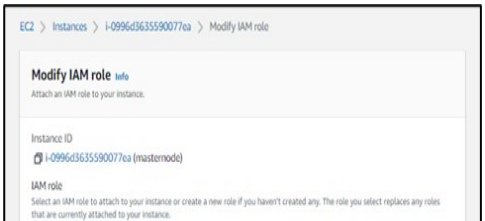
1. Attach Role (aws_profile) [Recommended]
2. AWS Credentials (aws_access_key, aws_secret_key)

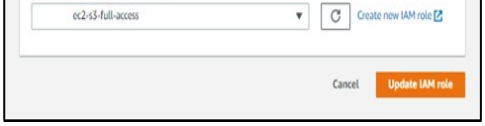
Method 1: [Attach Role with EC2 permission]

Go to –> Action – Security – Modify IAM (Identity and Access Management) role



Create And Attach role with EC2 permission



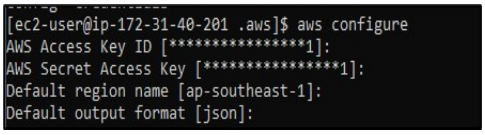


Click on Update IAM role and now your ansible have credentials to access the instances information

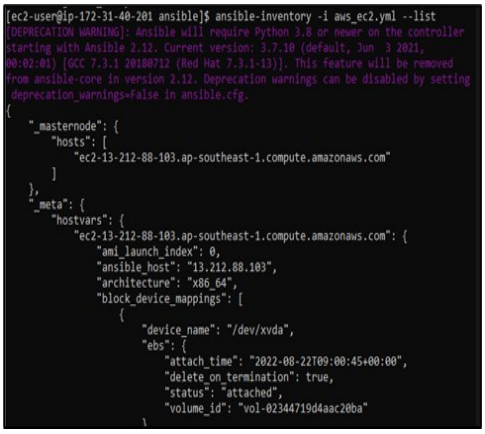

```
$ ansible-inventory -i aws_ec2.yml --list
```

Method 2: [AWS Credentials]

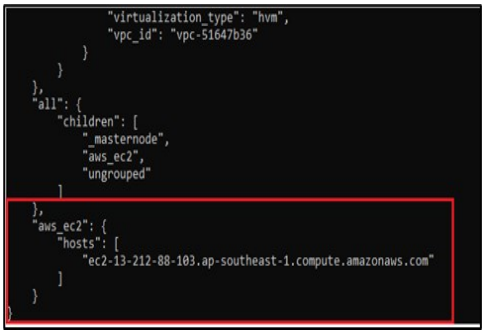
```
$ aws configure
```



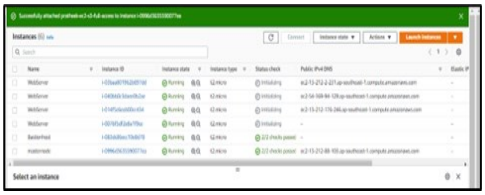
Pass your AWS credentials.




```
$ ansible-inventory -I aws_ec2.yml --list
```



Currently, in my **AWS Console** only **one instance** is running, let's launch a few more instances and check the result.



```
    "all": {
        "children": [
            "_Bastionhost",
            "_WebServer",
            "_masternode",
            "aws_ec2",
            "ungrouped"
        ]
    },
    "aws_ec2": {
        "hosts": [
            "ec2-13-212-176-246.ap-southeast-1.compute.amazonaws.com",
            "ec2-13-212-2-231.ap-southeast-1.compute.amazonaws.com",
            "ec2-13-212-88-103.ap-southeast-1.compute.amazonaws.com",
            "ec2-54-169-94-129.ap-southeast-1.compute.amazonaws.com",
            "ip-11-0-1-118.ap-southeast-1.compute.internal",
            "ip-11-0-2-169.ap-southeast-1.compute.internal"
        ]
    }
}
[ec2-user@ip-172-31-40-201 ansible]$
```

Dynamic Inventory is a working file in this we can see under all we have multiple children these are nothing but tags you are passing to the instances with aws_ec2 for plugin and ungrouped is by-default children.

To see the graph view for ansible inventory, use this command

```
$ ansible-inventory -I aws_ec2.yml --graph
```

```
[ec2-user@ip-172-31-40-201 ansible]$ ansible-inventory -i aws_ec2.yml --graph
[DEPRECATION WARNING]: Ansible will require Python 3.8 or newer on the controller
starting with Ansible 2.12. Current version: 3.7.10 (default, Jun  3 2021,
00:02:01) [GCC 7.3.1 20180712 (Red Hat 7.3.1-13)]. This feature will be removed
from ansible-core in version 2.12. Deprecation warnings can be disabled by setting
 deprecation_warnings=False in ansible.cfg.
@all:
  |--@_AppServer:
  |  |--ip-11-0-3-33.ap-southeast-1.compute.internal
  |--@_Bastionhost:
  |  |--ip-11-0-1-118.ap-southeast-1.compute.internal
  |--@_WebServer:
  |  |--ec2-13-212-176-246.ap-southeast-1.compute.amazonaws.com
  |  |--ec2-13-212-2-231.ap-southeast-1.compute.amazonaws.com
  |  |--ec2-54-169-94-129.ap-southeast-1.compute.amazonaws.com
  |  |--ip-11-0-2-169.ap-southeast-1.compute.internal
  |--@_masternode:
  |  |--ec2-13-212-88-103.ap-southeast-1.compute.amazonaws.com
  |--@aws_ec2:
  |  |--ec2-13-212-176-246.ap-southeast-1.compute.amazonaws.com
  |  |--ec2-13-212-2-231.ap-southeast-1.compute.amazonaws.com
  |  |--ec2-13-212-88-103.ap-southeast-1.compute.amazonaws.com
  |  |--ec2-54-169-94-129.ap-southeast-1.compute.amazonaws.com
  |  |--ip-11-0-1-118.ap-southeast-1.compute.internal
  |  |--ip-11-0-2-169.ap-southeast-1.compute.internal
  |  |--ip-11-0-3-33.ap-southeast-1.compute.internal
  |--@ungrouped:
```


Let's connect the inventory with an ansible configuration file.

```
[ec2-user@ip-172-31-40-201 ansible]$ [ec2-user@ip-172-31-40-201 ansible]$ pwd
/etc/ansible
[ec2-user@ip-172-31-40-201 ansible]$ tree
.
├── ansible.cfg
└── aws_ec2.yml

0 directories, 2 files
[ec2-user@ip-172-31-40-201 ansible]$ cat ansible.cfg
[defaults]
enable_plugins=aws_ec2
inventory=aws_ec2.yml
[ec2-user@ip-172-31-40-201 ansible]$
```

Open **ansible.cfg** file and add **inventory= <location_of_inventory_file>**

In my case, config file and dynamic inventory file are in the same location. Hence in the **ansible.cfg** file I have added **inventory=aws_ec2.yml**.

Let's check whether inventory connects to the configuration file

```
$ ansible all –list-hosts
```

The above command lists all the hosts available in the inventory

```
[ec2-user@ip-172-31-40-201 ansible]$ ansible all --list-hosts
```

```
starting with Ansible 2.12. Current version: 3.7.10 (default, Jun  3 2021,
00:02:01) [GCC 7.3.1 20180712 (Red Hat 7.3.1-13)]. This feature will be removed
from ansible-core in version 2.12. Deprecation warnings can be disabled by setting
deprecation_warnings=False in ansible.cfg.
 hosts (7):
   ec2-13-212-193-61.ap-southeast-1.compute.amazonaws.com
   ec2-13-212-176-246.ap-southeast-1.compute.amazonaws.com
   ec2-13-212-2-231.ap-southeast-1.compute.amazonaws.com
   ec2-54-169-94-129.ap-southeast-1.compute.amazonaws.com
   ec2-54-169-225-198.ap-southeast-1.compute.amazonaws.com
   ec2-13-212-88-103.ap-southeast-1.compute.amazonaws.com
   ec2-13-212-113-36.ap-southeast-1.compute.amazonaws.com
[ec2-user@ip-172-31-40-201 ansible]$
```

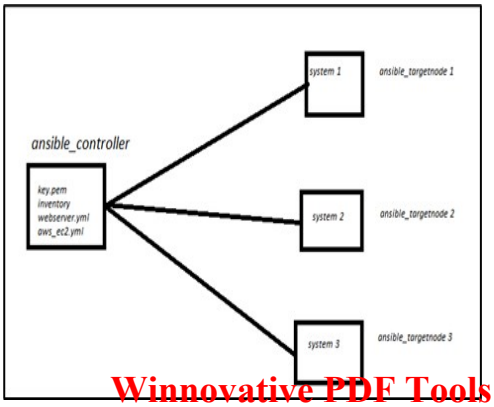
We can even use tags to list the hosts

```
1  $ ansible <tag_name> --list-hosts
```

```
[ec2-user@ip-172-31-40-201 ansible]$ ansible _WebServer --list-hosts
[DEPRECATION WARNING]: Ansible will require Python 3.8 or newer on the controller
starting with Ansible 2.12. Current version: 3.7.10 (default, Jun  3 2021,
00:02:01) [GCC 7.3.1 20180712 (Red Hat 7.3.1-13)]. This feature will be removed
from ansible-core in version 2.12. Deprecation warnings can be disabled by setting
deprecation_warnings=False in ansible.cfg.
 hosts (4):
   ec2-13-212-193-61.ap-southeast-1.compute.amazonaws.com
   ec2-13-212-176-246.ap-southeast-1.compute.amazonaws.com
   ec2-13-212-2-231.ap-southeast-1.compute.amazonaws.com
   ec2-54-169-94-129.ap-southeast-1.compute.amazonaws.com
[ec2-user@ip-172-31-40-201 ansible]$
```

As we can use all the results from the **tag_name Webserver**.

Let's configure the web server on Ansible_TargetNode Diagram




```
[root@ip-172-31-45-101 ansible]# ansible-inventory -i aws_ec2.yml --graph[DE
controller starting with Ansible 2.12. Current version: 3.7.10 (default, Jun
 2021, 00:02:01) [GCC 7.3.1 20180712 (Red Hat 7.3.1-13)]. This feature will
removed from ansible-core in version 2.12. Deprecation warnings can be disab
 by setting deprecation_warnings=False in ansible.cfg.
@all:
  |--@_Ansible_Controller_NodeB:
  |  |--ec2-18-141-228-229.ap-southeast-1.compute.amazonaws.com
  |--@_Ansible_TargetNode:
  |  |--ec2-13-213-13-10.ap-southeast-1.compute.amazonaws.com
  |  |--ec2-54-254-228-184.ap-southeast-1.compute.amazonaws.com
  |  |--ec2-54-255-228-106.ap-southeast-1.compute.amazonaws.com
  |--@aws_ec2:
  |  |--ec2-13-213-13-10.ap-southeast-1.compute.amazonaws.com
  |  |--ec2-18-141-228-229.ap-southeast-1.compute.amazonaws.com
  |  |--ec2-54-254-228-184.ap-southeast-1.compute.amazonaws.com
  |  |--ec2-54-255-228-106.ap-southeast-1.compute.amazonaws.com
  |--@ungrouped:
```

```
[root@ip-172-31-45-101 ansible]# tree
.
├── ansible.cfg
├── aws_ec2.yml
├── key.pem
└── webserver.yml
```

As above it is visible that I have a private key file name key.pem which helps me to login into the target node as well as configure the web server on the target node.

Webserver.yml is a playbook where the instruction is defined.

```
[defaults]
```

```
inventory=./aws_ec2.yml
host_key_checking=false
remote_user=ec2-user
private_key_file=key.pem

[privilege_escalation]
become=true
become_method=sudo
become_user=root
```

The above file is **ansible.cfg** here the remote_user helps you to connect with the target with this username and private_key_file helps to authenticate the user.

The challenge is to configure the webserver we need root permissions and ec2_user is not a root user hence we are using privilege escalation to use Sudo. Hence with this, we can configure the web server in the target node.

```
- hosts: _Ansible_TargetNode
  tasks:
    - name: install apache webserver
      package:
        name: httpd
        state: present

    - name: add data to website
      copy:
        content: "Hello from Ansible Controller Node"
        dest: "/var/www/html/index.html"

    - name: Start the service
      service:
        name: httpd
        state: started
```

The above file is **webserver.yml.** Used to decide where to run this playbook at the top. We it's visible in the screen shot we are running this playbook on Ansible_TargetNode.

In the Task part, all the instructions are written like installing the Apache webserver to starting the Apache service.

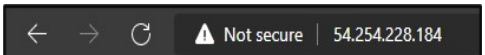
Now let's run the playbook.

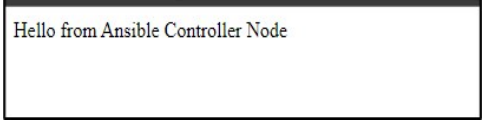
```
1  $ ansible-playbook webserver.yml
```

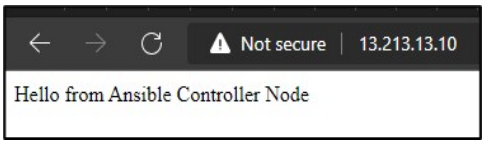
```
[root@ip-172-31-45-101 ansible]# ansible-playbook webserver.yml
[DEPRECATION WARNING]: Ansible will require Python 3.8 or newer on the
controller starting with Ansible 2.12. Current version: 3.7.10 (default, Jun  3
2021, 00:02:01) [GCC 7.3.1 20180712 (Red Hat 7.3.1-13)]. This feature will be
removed from ansible-core in version 2.12. Deprecation warnings can be disabled
by setting deprecation_warnings=False in ansible.cfg.

PLAY [_Ansible_TargetNode] ***************************************************

TASK [Gathering Facts] *******************************************************
[WARNING]: Platform linux on host ec2-54-254-228-184.ap-
southeast-1.compute.amazonaws.com is using the discovered Python interpreter at
/usr/bin/python, but future installation of another Python interpreter could
change the meaning of that path. See https://docs.ansible.com/ansible-
core/2.11/reference_appendices/interpreter_discovery.html for more information.
ok: [ec2-54-254-228-184.ap-southeast-1.compute.amazonaws.com]
[WARNING]: Platform linux on host ec2-13-213-13-10.ap-
southeast-1.compute.amazonaws.com is using the discovered Python interpreter at
/usr/bin/python, but future installation of another Python interpreter could
change the meaning of that path. See https://docs.ansible.com/ansible-
core/2.11/reference_appendices/interpreter_discovery.html for more information.
ok: [ec2-13-213-13-10.ap-southeast-1.compute.amazonaws.com]
[WARNING]: Platform linux on host ec2-54-255-228-106.ap-
southeast-1.compute.amazonaws.com is using the discovered Python interpreter at
/usr/bin/python, but future installation of another Python interpreter could
change the meaning of that path. See https://docs.ansible.com/ansible-
core/2.11/reference_appendices/interpreter_discovery.html for more information.
ok: [ec2-54-255-228-106.ap-southeast-1.compute.amazonaws.com]
```

```
TASK [install apache webserver] **********************************************
changed: [ec2-54-255-228-106.ap-southeast-1.compute.amazonaws.com]
changed: [ec2-54-254-228-184.ap-southeast-1.compute.amazonaws.com]
changed: [ec2-13-213-13-10.ap-southeast-1.compute.amazonaws.com]

TASK [add data to website] ***************************************************
changed: [ec2-54-255-228-106.ap-southeast-1.compute.amazonaws.com]
changed: [ec2-54-254-228-184.ap-southeast-1.compute.amazonaws.com]
changed: [ec2-13-213-13-10.ap-southeast-1.compute.amazonaws.com]

TASK [Start the service] *****************************************************
changed: [ec2-13-213-13-10.ap-southeast-1.compute.amazonaws.com]
changed: [ec2-54-255-228-106.ap-southeast-1.compute.amazonaws.com]
changed: [ec2-54-254-228-184.ap-southeast-1.compute.amazonaws.com]

PLAY RECAP *******************************************************************
ec2-13-213-13-10.ap-southeast-1.compute.amazonaws.com : ok=4    changed=3    unreachable=0    failed=0    skipped=0    rescued=0    ignored=0
ec2-54-254-228-184.ap-southeast-1.compute.amazonaws.com : ok=4    changed=3    unreachable=0    failed=0    skipped=0    rescued=0    ignored=0
ec2-54-255-228-106.ap-southeast-1.compute.amazonaws.com : ok=4    changed=3    unreachable=0    failed=0    skipped=0    rescued=0    ignored=0
```

Results of the above command.







In all the target node webserver is configured successfully.

Conclusion

We learned how to configure dynamic inventory for AWS instances. And how we can use tags to filter the results according to our requirements. Nowadays, dynamic inventory is widely used in many environments as it is automating the inventory. We can also use the dynamic inventory concept in any of the clouds like Azure, GCP, and even for DevOps tools like Docker and Kubernetes. We just need to know the right plugin.

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Vineet Negi is a Research Associate at CloudThat. He is part of the Kubernetes vertical and has worked on DevOps and many other Cloud Computing technologies. He is an enthusiastic individual who is passionate about exploring all the latest technologies from a learning perspective.

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