

IN730 Special Topic - Network Automation

Lab2 - Ansible Playbooks (Cloud Version)

The purpose of this lab is to create more useful playbooks that will be able to pull information from the GNS3 network as well as configure the GNS3 network which will allow for the routers to have a uniform configuration, at the very end a playbook will be created that will allow for the deployment of virtual machines in Azure.

In order to achieve this the following will be covered in this lab

Backups

- Create a directory that will be used to store configuration files
- Create a playbook to pull configuration from the GNS3 routers
- Deploy the backup playbook and verify it worked correctly

Configuration

- Create a playbook to send configuration to the GNS3 routers
- Deploy the configuration playbook
- SSH onto the routers to verify the configuration worked

Azure VM Creation

- Download and install the Azure CLI tool
- Login to the Azure using the Azure CLI tool
- Verify correct Azure subscription is being used
- Download and install additional software required to use Azure with Ansible
- Create a playbook that will deploy Azure VM's
- Deploy the creation playbook
- Open the Azure website and verify your VM is there

Requirements

- Completion of lab 1
- Azure Subscription
- Terminal Emulator

Disclaimer

If you stopped your virtual machine that was running your gns3server and you didnt make your tap1 and ip routes persistent then you will need to run the following commands again to recreate those

```
sudo tuncctl -t tap1
sudo ifconfig tap1 192.168.1.254 netmask 255.255.255.0 up
sudo ip route add 192.168.1.0/24 via 192.168.1.254 dev tap1
sudo ip route add 192.168.2.0/30 via 192.168.1.254 dev tap1
```

Ansible playbook to pull device information

We will create an ansible playbook that will pull configuration from our routers that we can use as a backup

In order to achieve this, a directory needs to be created to store the backups of the router's configuration

This will create a directory in our home directory

```
sudo mkdir ~/ansible-backups
```

Now we will create a playbook called backup.yaml

```
sudo vim /etc/ansible/backup.yaml
```

Insert the following

- Do note, make sure to edit the following

<YOUR HOME DIRECTORY> with the home directory of your user account your using

```
---
- hosts: localhost

  tasks:
    - name: Get Date/Time
      setup:
        filter: "ansible_date_time"
        gather_subset: "!all"

    - name: Store Date/Time
      set_fact:
        DTG: "{{ansible_date_time.date }}"

    - name: Create Directory {{hostvars.localhost.DTG}}
      file:
        path: /home/<YOUR HOME DIRECTORY>/ansible-
backups/{{hostvars.localhost.DTG}}
        state: directory

    run_once: true

- hosts: routers
  connection: local
  remote_user: admin
  gather_facts: false
  tasks:
```

```
- name: backup running config
  block:
    - name:
      ios_command:
        commands: show running-config
      register: config

    - name: save running config to backup folder
      copy:
        content: "{{config.stdout[0]}}"
        dest: "/home/<YOUR HOME DIRECTORY>/ansible-
backups/{{hostvars.localhost.DTG}}/{{inventory_hostname}}-
{{hostvars.localhost.DTG}}-config.txt"
```

You can run your ansible playbooks by being located in the directory where its located by using

```
ansible-playbook backup.yaml
```

Or you can provide the path to the playbook

```
ansible-playbook /etc/ansible/backup.yaml
```

Now that we have pulled the configuration and stored it on our machine lets confirm that it is there

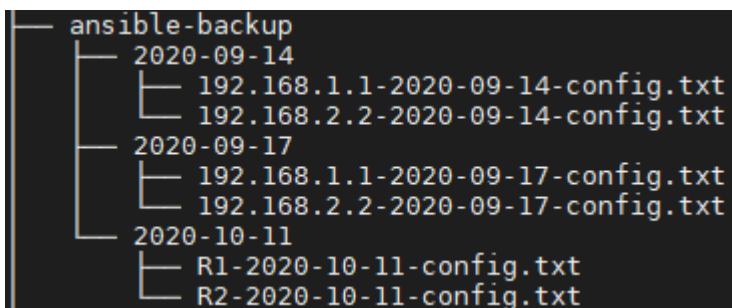
I order to do this we will download and install an application called tree which will help with displaying the contents of our directories

```
sudo apt-get install tree -y
```

We can now use the following command to list the home directory

```
tree ~/ansible-backup
```

you should have an output similar to the following



```
├── ansible-backup
│   ├── 2020-09-14
│   │   ├── 192.168.1.1-2020-09-14-config.txt
│   │   └── 192.168.2.2-2020-09-14-config.txt
│   ├── 2020-09-17
│   │   ├── 192.168.1.1-2020-09-17-config.txt
│   │   └── 192.168.2.2-2020-09-17-config.txt
│   └── 2020-10-11
│       ├── R1-2020-10-11-config.txt
│       └── R2-2020-10-11-config.txt
```

Here we can see that ansible managed to pull configuration from the routers

Ansible playbooks to deploy configuration

For this section we will create a playbook that will push configuration to our routers this will allow us to maintain a uniform environment across many devices

```
sudo vim /etc/ansible/motd.yaml
```

Insert the following into our playbook

```
---
- name: testbook
  hosts: network
  connection: local
  remote_user: admin
  gather_facts: false
  tasks:
    - name: configure login banner
      ios_banner:
        banner: login
        text: |
            Here
            Is
            A
            Test
            Configuration
            Banner
      state: present
```

The purpose of this playbook is to setup a banner so that when we ssh onto our routers we will see it, you can use this banner to warn unauthorized users

You can run your ansible playbooks by being located in the directory where its located by using

```
ansible-playbook motd.yaml
```

Or you can provide the path to the playbook

```
ansible-playbook /etc/ansible/motd.yaml
```

Now let's connect to our router to see and verify if the change we made took effect

- Do note that due to issues with gns3 and cloud we need to add a few additional options to our ssh command

```
ssh -oKexAlgorithms=+diffie-hellman-group1-sha1 -c 3des-cbc admin@<router IP>
```

We should see the following when we connect

```
gns3server@gns3vm:/etc/ansible$ ssh -oKexAlgorithms=+diffie-hellman-group1-sha1 -c 3des-cbc admin@192.168.1.1
Here
Is
A
Test
Configuration
Banner
admin@192.168.1.1's password: █
```

Create additional VM's using Ansible

In order to create VM's in azure using ansible we need to download and install additional software

We will download curl which we require in order to get the azure command line

```
sudo apt install curl
```

Download and install azure command line

```
curl -sL https://aka.ms/InstallAzureCLIDeb | sudo bash
sudo apt install azure-cli
```

Now that the azure command line has been downloaded and installed, it is time to connect to it

```
az login
```

```
gns3server@gns3vm:/etc/ansible$ az login
To sign in, use a web browser to open the page https://microsoft.com/devicelogin and enter the code PKZZS6HFN to authenticate.
```

Follow the on screen prompt and input the code it provides on the website then select your microsoft account that you used for the previous lab

After you have logged in you will be given an output that contains the information about your microsoft azure account

```

gns3server@gns3vm:/etc/ansible$ az account list
A few accounts are skipped as they don't have 'Enabled' state. Use '--all' to display them.
[
  {
    "cloudName": "AzureCloud",
    "homeTenantId": [REDACTED],
    "id": [REDACTED],
    "isDefault": false,
    "managedByTenants": [
      {
        "tenantId": [REDACTED]
      }
    ],
    "name": "Enterprise",
    "state": "Enabled",
    "tenantId": [REDACTED],
    "user": {
      "name": [REDACTED],
      "type": "user"
    }
  },
  {
    "cloudName": "AzureCloud",
    "homeTenantId": [REDACTED],
    "id": [REDACTED],
    "isDefault": true,
    "managedByTenants": [],
    "name": "Azure School of ICT",
    "state": "Enabled",
    "tenantId": [REDACTED],
    "user": {
      "name": [REDACTED],
      "type": "user"
    }
  }
]

```

When you use azure cli it will assign anything you create to your default subscription so if you have multiple subscriptions on your account we will need to set this

To change your default subscription is a quick task

```
az account set --subscription <ID>
```

After changing your subscription, you wont be given a notification so you will need to verify that it has changed by using the following command

```
az account list
```

- `sudo apt-get install python-pip`
- `pip install packaging`
- `pip install msrestazure`
- `pip install ansible[azure]`

We will now create a playbook that will create a virtual machine in azure

```
sudo vim /etc/ansible/create.yaml
```

Insert the following into the playbook

```
---
- name: Create Azure VM
  hosts: localhost
  connection: local

  vars:
    vm_offer: "UbuntuServer"
    vm_pub: "Canonical"
    vm_sku: "18.04-LTS"

    vm_size: "Standard_E2s_v3"

    az: "australiaeast"
    net: "Ansible"
    vm_net: "AnsibleVNet"
    vm_subnet: "AnsibleSubnet"

    vm_publicIP: "AnsiblePublicIP"
    vm_NSG: "AnsibleNSG"
    vm_NIC: "AnsibleNIC"
    vm_Name: "ansibletest"

    resource_group: "ansible"

    vm_peer: "AnsiblePeer"

    os_user: "ansible"
    os_pass: "ansible@ssw0rd"

  tasks:

    - name: Create virtual network
      azure_rm_virtualnetwork:
        resource_group: "{{ resource_group }}"
        name: "{{ vm_net }}"
        address_prefixes: "10.0.0.0/16"

    - name: Add subnet
      azure_rm_subnet:
        resource_group: "{{ resource_group }}"
        name: "{{ vm_subnet }}"
        address_prefix: "10.0.1.0/24"
        virtual_network: "{{ vm_net }}"

    - name: Create public IP address
      azure_rm_publicipaddress:
        resource_group: "{{ resource_group }}"
        allocation_method: Static
        name: "{{ vm_publicIP }}"
```

```

    domain_name: gitlab-test
    register: reg_publicIP

- debug: var=reg_publicIP

- name: Create Network Security Group that allows SSH
  azure_rm_securitygroup:
    resource_group: "{{ resource_group }}"
    name: "{{ vm_NSG }}"
    rules:
      - name: SSH
        protocol: Tcp
        destination_port_range: 22
        access: Allow
        priority: 1001
        direction: Inbound
      - name: HTTP
        protocol: Tcp
        destination_port_range: 80
        access: Allow
        priority: 1002
        direction: Inbound
      - name: HTTPS
        protocol: Tcp
        destination_port_range: 443
        access: Allow
        priority: 1003
        direction: Inbound

- name: Create virtual network interface card
  azure_rm_networkinterface:
    resource_group: "{{ resource_group }}"
    name: "{{ vm_NIC }}"
    virtual_network: "{{ vm_net }}"
    subnet: "{{ vm_subnet }}"
    public_ip_name: "{{ vm_publicIP }}"
    security_group: "{{ vm_NSG }}"

- name: Create VM
  azure_rm_virtualmachine:
    resource_group: "{{ resource_group }}"
    name: "{{ vm_Name }}"
    vm_size: "{{ vm_size }}"
    admin_username: "{{ os_user }}"
    admin_password: "{{ os_pass }}"
    ssh_password_enabled: true
    network_interfaces: "{{ vm_NIC }}"
    image:
      offer: "{{ vm_offer }}"
      publisher: "{{ vm_pub }}"
      sku: "{{ vm_sku }}"
      version: latest

```


Now run the playbook

- Do note that it will take roughly 3 minutes to deploy

```
ansible-playbook create.yaml
```

While these virtual machines were created in azure, this same concept can be applied to other cloud vendors as Ansible has modules for a range of cloud providers, the list of modules can be found here https://docs.ansible.com/ansible/2.9/modules/list_of_cloud_modules.html