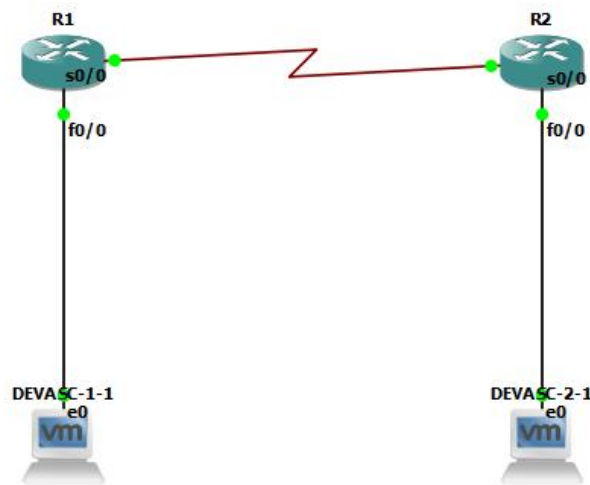Dalistan, Anazel Bridget C.

CPE 028 – CPE41S1

Final Case Study | Network Automation and Programmability

Topology

Address Table

Device	Interface	Address	Subnet Mask
R1	s0/0	10.10.1.1	255.255.255.252
	f0/0	192.168.10.11	255.255.255.0
R2	s0/0	10.10.1.2	255.255.255.252
	f0/0	192.168.20.11	255.255.255.0
DEVASC 1-1		192.168.10.12	255.255.255.0
DEVASC 2-1		192.168.20.12	255.255.255.0

Objectives

Part 1: Designing the Topology

Part 2: Router Configuration

Part 3: Configure IPv4 Static and Floating Static Default Routes

Part 4: Implement OSPF using Ansible

Part 5: Create backup using Ansible

Part 6: Test the Network through pyATS

Background / Scenario

In this task, you will design a laboratory activity that discusses the three network topics excluding basic configuration, IP address, and show commands regarding network automation or network programmability. Also, you will use pyATS to test the network.

Required Resources

- 1 PC with operating system of your choice
- Virtual Box or VMWare
- DEVASC Virtual Machine
- GNS3

Instructions

Part 1: Designing the Topology

Launch the GNS3 software application and create the topology in the first part.

Step 1: Create a new project

In the GNS3 software, click File and click new blank project.

Step 2: Create the topology

Drag the devices from the left window and put it into the workspace. The design consists of two routers, and two DEVASC PCs. Connect the two routers with a serial cable and connect R1 to DEVASC 1-1 with Fast Ethernet and R2 to DEVASC 2-1 with Fast Ethernet.

Part 2: Router Configuration

Step 1: Basic Configuration and Encrypt Communications

Perform basic configuration to R1 and R2. Set the username, password, IP domain name and generate secure keys.

a. Set username, password, and banner
```
Device(config)# username cisco privilege 15 password cisco123
Device(config)# service password-encryption
Device(config)#  banner  motd  $Only  Authorized  Access  is
Allowed$
```

b. Configure the domain name to be www.casestudy.com
```
Device(config)# ip domain-name www.casestudy.com
```

c. Secure keys with the use of RSA keys

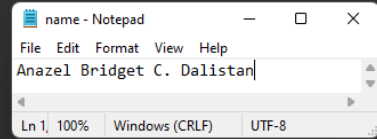```
Device(config)# crypto key generate rsa

How many bits in the modulus [512]: 1024
```



```
R1(config)#username cisco privilege 15 password cisco123
R1(config)#service password-encryption
R1(config)#banner motd $Only Authorized Access is Allowed$
R1(config)#ip domain-name www.casestudy.com
R1(config)#crypto key generate rsa
% You already have RSA keys defined named R1.www.casestudy.com.
% Do you really want to replace them? [yes/no]: yes
Choose the size of the key modulus in the range of 360 to 2048 for your
  General Purpose Keys. Choosing a key modulus greater than 512 may take
  a few minutes.

How many bits in the modulus [512]: 102
*Mar 1 00:41:26.919: %SSH-5-DISABLED: SSH 2.0 has been disabled
1024
% Generating 1024 bit RSA keys, keys will be non-exportable...
*Mar 1 00:41:33.075: %SYS-3-CPUHOG: Task is running for (2024)msecs, more than (2000)msecs (0/0),process = crypto sw pk pro
c.
-Traceback= 0x62B26498 0x62F8AAA4 0x62FB71B0 0x62FB7CBC 0x62FB548C 0x62FB686C 0x62B1E28C 0x62B1E270 [OK]

R1(config)#
*Mar 1 00:41:36.375: %SSH-5-ENABLED: SSH 2.0 has been enabled
R1(config)#
```
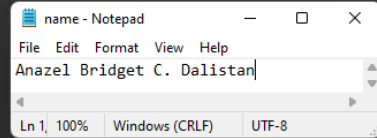
name - Notepad — □ ×
File Edit Format View Help
Anazel Bridget C. Dalistan
Ln 1, 100%   Windows (CRLF)   UTF-8

```
R2(config)#username cisco privilege 15 password cisco123
R2(config)#service password-encryption
R2(config)#banner motd $Only Authorized Access is Allowed$
R2(config)#ip domain-name www.casestudy.com
R2(config)#crypto key generate rsa
% You already have RSA keys defined named R2.www.casestudy.com.
% Do you really want to replace them? [yes/no]: yes
Choose the size of the key modulus in the range of 360 to 2048 for your
  General Purpose Keys. Choosing a key modulus greater than 512 may take
  a few minutes.

How many bits in the modulus [512]: 10
*Mar 1 00:40:59.571: %SSH-5-DISABLED: SSH 2.0 has been disabled
1024
% Generating 1024 bit RSA keys, keys will be non-exportable...
*Mar 1 00:41:05.823: %SYS-3-CPUHOG: Task is running for (2024)msecs, more than (2000)msecs (1/1),process = crypto sw pk pro
c.
-Traceback= 0x62B26498 0x62F8AAA4 0x62FB71A0 0x62FB7CBC 0x62FB548C 0x62FB686C 0x62B1E28C 0x62B1E270 [OK]

R2(config)#
*Mar 1 00:41:11.575: %SSH-5-ENABLED: SSH 2.0 has been enabled
R2(config)#
```
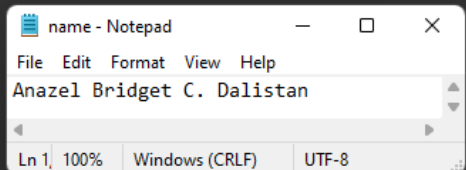
name - Notepad — □ ×
File Edit Format View Help
Anazel Bridget C. Dalistan
Ln 1, 100%   Windows (CRLF)   UTF-8

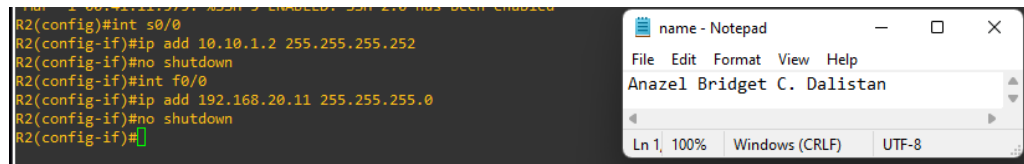## Step 2: Assign IP address

a. Set the IP address of the Routers.

```
R1(config)# int s0/0
R1(config)# ip add 10.10.1.1 255.255.255.252
R1(config)# no shutdown
R1(config)# int f0/0
R1(config)# ip add 192.168.10.11 255.255.255.0
```

```
R1(config)#interface s0/0
R1(config-if)#ip add 10.10.1.1 255.255.255.252
R1(config-if)#no shutdown
R1(config-if)#interface f0/0
R1(config-if)#ip add 192.168.10.11 255.255.255.0
R1(config-if)#no shutdown
R1(config-if)#
```

name - Notepad — □ ×
File Edit Format View Help
Anazel Bridget C. Dalistan
Ln 1, 100%   Windows (CRLF)   UTF-8

```
R2(config)# int s0/0
R2(config)# ip add 10.10.1.2 255.255.255.252
R2(config)# no shutdown
R2(config)# int f0/0
```

```
R2(config)# ip add 192.168.20.11 255.255.255.0
```
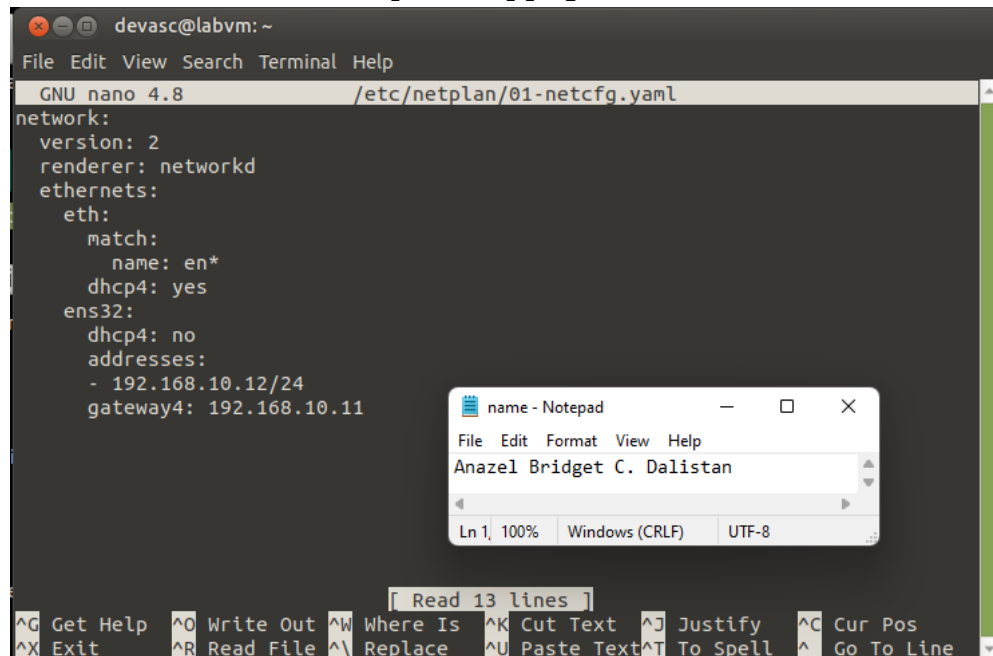


```
R2(config)#int s0/0
R2(config-if)#ip add 10.10.1.2 255.255.255.252
R2(config-if)#no shutdown
R2(config-if)#int f0/0
R2(config-if)#ip add 192.168.20.11 255.255.255.0
R2(config-if)#no shutdown
R2(config-if)#
```

name - Notepad

File Edit Format View Help

Anazel Bridget C. Dalistan

Ln 1, 100%   Windows (CRLF)   UTF-8

b. **Set the IP address of PCs.**

```
DEVASC 1-1
devasc@labvm:~$ sudo nano /etc/netplan/01-netcfg.yaml

network:
  version: 2
  renderer: networkd
  ethernets:
    eth:
      match:
        name: en*
      dhcp4: yes
    ens32:
      dhcp4: no
      addresses:
      - 192.168.10.12/24
      gateway4: 192.168.10.11
devasc@labvm:~$ sudo netplan apply
```

DEVASC 2-1
devasc@labvm:~$ sudo nano /etc/netplan/01-netcfg.yaml

```
network:
  version: 2
  renderer: networkd
  ethernets:
    eth:
      match:
        name: en*
      dhcp4: yes
    ens32:
      dhcp4: no
      addresses:
      - 192.168.20.12/24
      gateway4: 192.168.20.11
```
devasc@labvm:~$ sudo netplan apply

```
devasc@labvm:~

File Edit View Search Terminal Help

  GNU nano 4.8                    /etc/netplan/01-netcfg.yaml
network:
  version: 2
  renderer: networkd
  ethernets:
    eth:
      match:
        name: en*
      dhcp4: yes
    ens32:
      dhcp4: no
      addresses:
      - 192.168.20.12/24
      gateway4: 192.168.20.11
```

name - Notepad

File Edit Format View Help

Anazel Bridget C. Dalistan

Ln 1, 100%   Windows (CRLF)   UTF-8

```
                          [ Read 13 lines ]
^G Get Help   ^O Write Out  ^W Where Is   ^K Cut Text   ^J Justify    ^C Cur Pos
^X Exit       ^R Read File  ^\ Replace    ^U Paste Text ^T To Spell   ^  Go To Line
```

```
devasc@labvm:~

File Edit View Search Terminal Help
devasc@labvm:~$ sudo nano /etc/netplan/01-netcfg.yaml
devasc@labvm:~$ sudo netplan apply
devasc@labvm:~$ ifconfig
docker0: flags=4099<UP,BROADCAST,MULTICAST>  mtu 1500
        inet 172.17.0.1  netmask 255.255.0.0  broadcast 172.17.255.255
        ether 02:42:4a:46:02:b5  txqueuelen 0  (Ethernet)
        RX packets 0  bytes 0 (0.0 B)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 0  bytes 0 (0.0 B)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0

dummy0: flags=195<UP,BROADCAST,RUNNING,NOARP>  mtu 1500
        inet 192.0.2.1  netmask 255.255.255.255  broadcast 0.0.0.0
        inet6 fe80::cc16:1bff:feac:3cf2  prefixlen 64  scopeid 0x20<link>
        ether ce:16:1b:ac:3c:f2  txqueuelen 1000  (Ethernet)
        RX packets 0  bytes 0 (0.0 B)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 10  bytes 700 (700.0 B)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0

ens32: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
        inet 192.168.20.12  netmask 255.255.255.0  broadcast 192.168.20.255
        inet6 fe80::20c:29ff:fed3:c872  prefixlen 64  scopeid 0x20<link>
        ether 00:0c:29:d3:c8:72  txqueuelen 1000  (Ethernet)
        RX packets 42  bytes 4697 (4.6 KB)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 102  bytes 11315 (11.3 KB)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0

lo: flags=73<UP,LOOPBACK,RUNNING>  mtu 65536
        inet 127.0.0.1  netmask 255.0.0.0
        inet6 ::1  prefixlen 128  scopeid 0x10<host>
        loop  txqueuelen 1000  (Local Loopback)
        RX packets 8300  bytes 591130 (591.1 KB)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 8300  bytes 591130 (591.1 KB)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0

virbr0: flags=4099<UP,BROADCAST,MULTICAST>  mtu 1500
        inet 192.168.122.1  netmask 255.255.255.0  broadcast 192.168.122.255
        ether 52:54:00:8f:66:34  txqueuelen 1000  (Ethernet)
```

name - Notepad
File Edit Format View Help
Anazel Bridget C. Dalistan
Ln 1, 100%   Windows (CRLF)   UTF-8

Step 3: SSH Configuration

a. Configure the VTY lines of routers and switches to check the local username database for login credentials and to only allow SSH for remote access.

```
Device(config)# ip ssh ver 2
Device(config)# line vty 0 15
Device(config)# login local
Device(config)# transport input ssh
```



```
R1(config)#
*Mar  1 00:31:13.547: %SSH-5-ENABLED: SSH 1.99 has been enabled
R1(config)#ip ssh ver 2
R1(config)#line vty 0 15
R1(config-line)#login local
R1(config-line)#transport input ssh
```

name - Notepad
File Edit Format View Help
Anazel Bridget C. Dalistan

Step 4: Verify Connection and SSH

a. Ping R1 from DEVASC 1-1

```
devasc@labvm:~$ ping 192.168.10.11
PING 192.168.10.11 (192.168.10.11) 56(84) bytes of data.
64 bytes from 192.168.10.11: icmp_seq=1 ttl=255 time=17.6 ms
64 bytes from 192.168.10.11: icmp_seq=2 ttl=255 time=4.39 ms
64 bytes from 192.168.10.11: icmp_seq=3 ttl=255 time=16.0 ms
64 bytes from 192.168.10.11: icmp_seq=4 ttl=255 time=14.4 ms
64 bytes from 192.168.10.11: icmp_seq=5 ttl=255 time=15.2 ms
^C
--- 192.168.10.11 ping statistics ---
5 packets transmitted, 5 received, 0% packet loss, time 4005ms
rtt min/avg/max/mdev = 4.387/13.523/17.575/4.684 ms
```
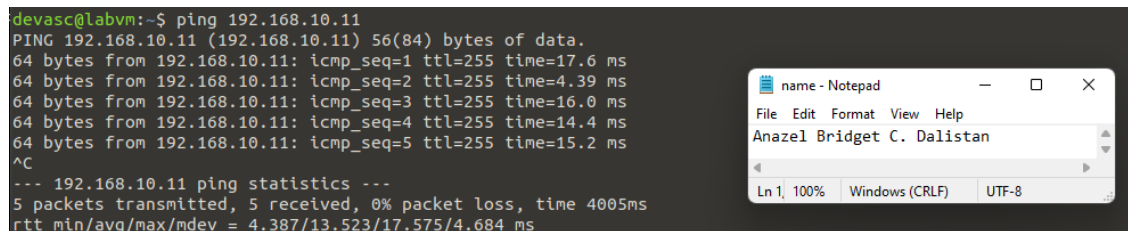

b. Ping R2 from DEVASC 2-1

```
devasc@labvm:~$ ping 192.168.20.11
PING 192.168.20.11 (192.168.20.11) 56(84) bytes of data.
64 bytes from 192.168.20.11: icmp_seq=1 ttl=255 time=25.1 ms
64 bytes from 192.168.20.11: icmp_seq=2 ttl=255 time=5.73 ms
64 bytes from 192.168.20.11: icmp_seq=3 ttl=255 time=2.76 ms
64 bytes from 192.168.20.11: icmp_seq=4 ttl=255 time=3.87 ms
```

```
64 bytes from 192.168.20.11: icmp_seq=5 ttl=255 time=8.34 ms

64 bytes from 192.168.20.11: icmp_seq=6 ttl=255 time=2.21 ms

^C

--- 192.168.20.11 ping statistics ---

6 packets transmitted, 6 received, 0% packet loss, time 5010ms

rtt min/avg/max/mdev = 2.207/8.007/25.137/7.927 ms
```
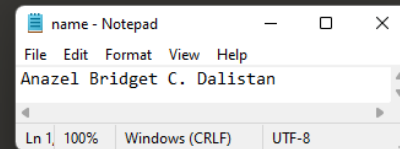

c. Attempt to login using SSH. Access telnet session of R1

```
devasc@labvm:~$ ssh cisco@192.168.10.11
Warning: Permanently added '192.168.10.11' (RSA) to the list
of known hosts.
Password:
Only Authorized Access is Allowed
R1#
```



```
devasc@labvm:~$ ssh cisco@10.10.1.1
Warning: Permanently added '10.10.1.1' (RSA) to the list of
known hosts.
Password:
Only Authorized Access is Allowed
R1#
```


d. Attempt to login using SSH. Access telnet session of R2

```
devasc@labvm:~$ ssh cisco@192.168.20.11
Warning: Permanently added '192.168.20.11' (RSA) to the list
of known hosts.
Password:
Only Authorized Access is Allowed
R2#
```
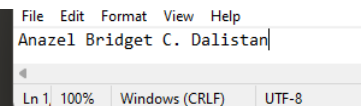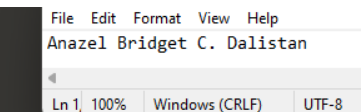
devasc@labvm:~$ ssh cisco@10.10.1.2
Warning: Permanently added '10.10.1.2' (RSA) to the list of
known hosts.
Password:
Only Authorized Access is Allowed
R2#

Part 3: Configure IPv4 Static and Floating Static Default Routes

Step 1: Configure an IPv4 static default route

a. Configure a directly connected IPv4 default static route

```
R1(config)#ip route 0.0.0.0 0.0.0.0 10.10.1.2
```

R1(config)#ip route 0.0.0.0 0.0.0.0 10.10.1.2
R1(config)#

name - Notepad
File Edit Format View Help
Anazel Bridget C. Dalistan

solarwinds   Solar-PuTTY free tool

```
R2(config)#ip route 0.0.0.0 0.0.0.0 10.10.1.1
```

R2(config)#ip route 0.0.0.0 0.0.0.0 10.10.1.1
R2(config)#

name - Notepad
File Edit Format View Help
Anazel Bridget C. Dalistan

solarwinds   Solar-PuTTY free tool

Step 2: Verify Connection between Routers

a. Ping R2 from DEVASC 1-1

```
devasc@labvm:~$ ping 10.10.1.2
PING 10.10.1.2 (10.10.1.2) 56(84) bytes of data.
64 bytes from 10.10.1.2: icmp_seq=1 ttl=254 time=17.1 ms
64 bytes from 10.10.1.2: icmp_seq=2 ttl=254 time=15.2 ms
64 bytes from 10.10.1.2: icmp_seq=3 ttl=254 time=12.7 ms
64 bytes from 10.10.1.2: icmp_seq=4 ttl=254 time=9.95 ms
^C
--- 10.10.1.2 ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time
3006ms
rtt min/avg/max/mdev = 9.947/13.739/17.097/2.694 ms
```

```
devasc@labvm:~$ ping 192.168.20.11
PING 192.168.20.11 (192.168.20.11) 56(84) bytes of data.
64 bytes from 192.168.20.11: icmp_seq=1 ttl=254 time=16.8
ms
64 bytes from 192.168.20.11: icmp_seq=2 ttl=254 time=10.3
ms
64 bytes from 192.168.20.11: icmp_seq=3 ttl=254 time=8.30
ms
64 bytes from 192.168.20.11: icmp_seq=4 ttl=254 time=14.0
ms
^C
--- 192.168.20.11 ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time
3006ms
rtt min/avg/max/mdev = 8.303/12.350/16.786/3.289 ms
devasc@labvm:~$
```
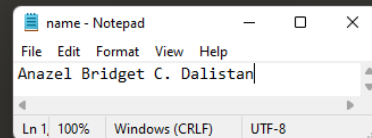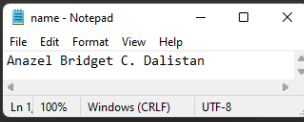

b. Log in using SSH

```
devasc@labvm:~$ ssh cisco@192.168.20.11
Warning: Permanently added '192.168.20.11' (RSA) to the
list of known hosts.
Password:
Only Authorized Access is Allowed
R2#exit
Connection to 192.168.20.11 closed.
devasc@labvm:~$ ssh cisco@10.10.1.2
Warning: Permanently added '10.10.1.2' (RSA) to the list of
known hosts.
Password:
Only Authorized Access is Allowed
R2#
```

Part 4: Implement OSPF using Ansible

Step 1: Configure Ansible files

a. Create the files needed for ansible specifically ansible.cfg, and hosts.txt.

ansible.cfg

```
#Config file for R1
[defaults]

inventory=./hosts
host_key_checking = False # Don't worry about RSA
Fingerprints
retry_files_enabled = False # Do not create them
deprecation_warnings = False # Do not show warnings
interpreter_python = /usr/bin/python3
```


hosts

```
# Hosts or devices for Ansible playbooks

R1       ansible_user=cisco       ansible_password=cisco123
ansible_host=192.168.10.11
```

```
1    # Hosts or devices for Ansible playbooks
2
3    R1 ansible_user=cisco ansible_password=cisco123 ansible_host=192.168.10.11
4
5
```

name - Notepad — □ ×
File Edit Format View Help
Anazel Bridget C. Dalistan
Ln 1, 100%   Windows (CRLF)   UTF-8

```
1    # Hosts or devices for Ansible playbooks
2
3    R2 ansible_user=cisco ansible_password=cisco123 ansible_host=192.168.20.11
4
5
```

name - Notepad — □ ×
File Edit Format View Help
Anazel Bridget C. Dalistan
Ln 1, 100%   Windows (CRLF)   UTF-8

Step 2: Create your Ansible playbook

a. In VS Code, create a new file in the CaseStudy directory with the following name:
yaml

b. Add the following information to the file.

DEVASC 1-1

```
---

- name: OSPF ACTIVATION

  hosts: R1

  gather_facts: false

  connection: local


  tasks:

   - name: ACTIVATE OSPF USING NETWORK STATEMENTS

     ios_config:

       parents: "router ospf 1"

       lines:

         - router-id 1.1.1.1
```

```
        - network 192.168.10.10 0.0.0.255 area 0

        - network 10.10.1.0 0.0.0.3 area 0


    - name: ACTIVATE OSPF FAST ETHERNET 0/0

      ios_config:

        parents: "interface FastEthernet0/0"

        lines:

          - ip ospf 1 area 0


    - name: ACTIVATE OSPF in SERIAL 0/0

      ios_config:

        parents: "interface Serial0/0"

        lines:

          - ip ospf 1 area 0
```

```yaml
1   ---
2   - name: OSPF ACTIVATION
3     hosts: R1
4     gather_facts: false
5     connection: local
6
7     tasks:
8       - name: ACTIVATE OSPF USING NETWORK STATEMENTS
9         ios_config:
10          parents: "router ospf 1"
11          lines:
12            - router-id 1.1.1.1
13            - network 192.168.10.10 0.0.0.255 area 0
14            - network 10.10.1.0 0.0.0.3 area 0
15
16      - name: ACTIVATE OSPF FAST ETHERNET 0/0
17        ios_config:
18          parents: "interface FastEthernet0/0"
19          lines:
20            - ip ospf 1 area 0
21
22      - name: ACTIVATE OSPF in SERIAL 0/0
23        ios_config:
24          parents: "interface Serial0/0"
25          lines:
26            - ip ospf 1 area 0
```

name - Notepad

File Edit Format View Help

Anazel Bridget C. Dalistan

Ln 1, 100%   Windows (CRLF)   UTF-8

==DEVASC 2-1==

```
---

- name: OSPF ACTIVATION

  hosts: R2

  gather_facts: false

  connection: local
```

```yaml
tasks:
 - name: ACTIVATE OSPF USING NETWORK STATEMENTS
   ios_config:
     parents: "router ospf 1"
     lines:
       - router-id 2.2.2.2
       - network 192.168.20.10 0.0.0.255 area 0
       - network 10.10.1.1 0.0.0.3 area 0

 - name: ACTIVATE OSPF FAST ETHERNET 0/0
   ios_config:
     parents: "interface FastEthernet0/0"
     lines:
       - ip ospf 1 area 0

 - name: ACTIVATE OSPF in SERIAL 0/0
   ios_config:
     parents: "interface Serial0/0"
     lines:
       - ip ospf 1 area 0
```

```
1    ---
2    - name: OSPF ACTIVATION
3      hosts: R2
4      gather_facts: false
5      connection: local
6
7      tasks:
8        - name: ACTIVATE OSPF USING NETWORK STATEMENTS
9          ios_config:
10             parents: "router ospf 1"
11             lines:
12               - router-id 2.2.2.2
13               - network 192.168.20.10 0.0.0.255 area 0
14               - network 10.10.1.1 0.0.0.3 area 0
15
16        - name: ACTIVATE OSPF FAST ETHERNET 0/0
17          ios_config:
18             parents: "interface FastEthernet0/0"
19             lines:
20               - ip ospf 1 area 0
21
22        - name: ACTIVATE OSPF in SERIAL 0/0
23          ios_config:
24             parents: "interface Serial0/0"
25             lines:
26               - ip ospf 1 area 0
```

name - Notepad
File Edit Format View Help
Anazel Bridget C. Dalistan
Ln 1, 100%   Windows (CRLF)   UTF-8

Step 3: Run the Ansible backup Playbook

a. Run the Ansible playbook using the ansible-playbook command:

```
devasc@labvm:~/Ansible/CaseStudy$          ansible-playbook
ospf_configuration_R1.yaml

PLAY                          [OSPF                    ACTIVATION]
******************************************************************
*******************************************

TASK      [ACTIVATE    OSPF    USING    NETWORK    STATEMENTS]
******************************************************************
********************
changed: [R1]

TASK      [ACTIVATE    OSPF    FAST    ETHERNET    0/0]
******************************************************************
**************************
ok: [R1]

TASK      [ACTIVATE    OSPF    in    SERIAL    0/0]
******************************************************************
******************************
ok: [R1]

PLAY                                                      RECAP
******************************************************************
*********************************************************
R1                        : ok=3    changed=1    unreachable=0
failed=0    skipped=0    rescued=0    ignored=0
```

```
devasc@labvm:~/Ansible/CaseStudy$ ansible-playbook ospf_configuration_R1.yaml

PLAY [OSPF ACTIVATION] ***************************************************************************

TASK [ACTIVATE OSPF USING NETWORK STATEMENTS] ***************************************************
changed: [R1]

TASK [ACTIVATE OSPF FAST ETHERNET 0/0] *********************************************************
ok: [R1]

TASK [ACTIVATE OSPF in SERIAL 0/0] ************************************************************
ok: [R1]

PLAY RECAP **************************************************************************************
R1                         : ok=3    changed=1    unreachable=0    failed=0    skipped=0    rescued=0    ignored=0
```
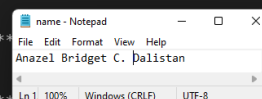
devasc@labvm:~/CPE41S1/ansible/CaseStudy$ **ansible-playbook ospf_configuration_R2.yaml**

PLAY   [OSPF   ACTIVATION]
****
****

TASK   [ACTIVATE   OSPF   USING   NETWORK   STATEMENTS]
****
****
changed: [R2]

TASK   [ACTIVATE   OSPF   FAST   ETHERNET   0/0]
****
****
ok: [R2]

TASK   [ACTIVATE   OSPF   in   SERIAL   0/0]
****
****
ok: [R2]

PLAY   RECAP
****
****
R2   : ok=3   changed=1   unreachable=0
failed=0   skipped=0   rescued=0   ignored=0

```
devasc@labvm:~/CPE41S1/ansible/CaseStudy$ ansible-playbook ospf_configuration_R2.yaml

PLAY [OSPF ACTIVATION] **********************************************************************************

TASK [ACTIVATE OSPF USING NETWORK STATEMENTS] **********************************************************
changed: [R2]

TASK [ACTIVATE OSPF FAST ETHERNET 0/0] ***************************************************************
ok: [R2]

TASK [ACTIVATE OSPF in SERIAL 0/0] *******************************************************************
ok: [R2]

PLAY RECAP *********************************************************************************************
R2                         : ok=3    changed=1    unreachable=0    failed=0    skipped=0    rescued=0    ignored=0
```

name - Notepad

File Edit Format View Help

Anazel Bridget C. Dalistan

Ln 1, 100%   Windows (CRLF)   UTF-8

Step 4: Examine the Routers in GNS3

a. Issue the command `show ip route` and `show ip protocols` to verify that the OSPF is activated.

```
R1#show ip protocols
Routing Protocol is "ospf 1"
  Outgoing update filter list for all interfaces is not set
  Incoming update filter list for all interfaces is not set
  Router ID 1.1.1.1
  Number of areas in this router is 1. 1 normal 0 stub 0 nssa
  Maximum path: 4
  Routing for Networks:
    10.10.1.0 0.0.0.3 area 0
    192.168.10.0 0.0.0.255 area 0
  Routing on Interfaces Configured Explicitly (Area 0):
    FastEthernet0/0
    Serial0/0
 Reference bandwidth unit is 100 mbps
  Routing Information Sources:
    Gateway         Distance      Last Update
    2.2.2.2              110      00:56:52
  Distance: (default is 110)

R1#show ip route
Codes: C - connected, S - static, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2
       i - IS-IS, su - IS-IS summary, L1 - IS-IS level-1, L2 - IS-IS level-2
       ia - IS-IS inter area, * - candidate default, U - per-user static route
       o - ODR, P - periodic downloaded static route

Gateway of last resort is 10.10.1.2 to network 0.0.0.0

C    192.168.10.0/24 is directly connected, FastEthernet0/0
O    192.168.20.0/24 [110/74] via 10.10.1.2, 00:57:53, Serial0/0
     10.0.0.0/30 is subnetted, 1 subnets
C       10.10.1.0 is directly connected, Serial0/0
S*   0.0.0.0/0 [1/0] via 10.10.1.2
R1#
```
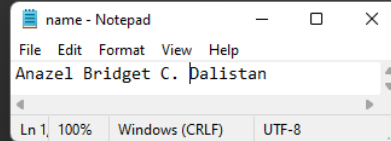
name - Notepad

File Edit Format View Help

Anazel Bridget C. Dalistan

Ln 1, 100%   Windows (CRLF)   UTF-8

```
R2#show ip protocols
Routing Protocol is "ospf 1"
  Outgoing update filter list for all interfaces is not set
  Incoming update filter list for all interfaces is not set
  Router ID 2.2.2.2
  Number of areas in this router is 1. 1 normal 0 stub 0 nssa
  Maximum path: 4
  Routing for Networks:
    10.10.1.0 0.0.0.3 area 0
    192.168.20.0 0.0.0.255 area 0
  Routing on Interfaces Configured Explicitly (Area 0):
    FastEthernet0/0
    Serial0/0
 Reference bandwidth unit is 100 mbps
  Routing Information Sources:
    Gateway         Distance      Last Update
    1.1.1.1             110       00:57:05
  Distance: (default is 110)

R2#show ip route
Codes: C - connected, S - static, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2
       i - IS-IS, su - IS-IS summary, L1 - IS-IS level-1, L2 - IS-IS level-2
       ia - IS-IS inter area, * - candidate default, U - per-user static route
       o - ODR, P - periodic downloaded static route

Gateway of last resort is 10.10.1.1 to network 0.0.0.0

O    192.168.10.0/24 [110/74] via 10.10.1.1, 01:01:25, Serial0/0
C    192.168.20.0/24 is directly connected, FastEthernet0/0
     10.0.0.0/30 is subnetted, 1 subnets
C       10.10.1.0 is directly connected, Serial0/0
S*   0.0.0.0/0 [1/0] via 10.10.1.1
R2#
```

name - Notepad

File   Edit   Format   View   Help

Anazel Bridget C. Dalistan

Ln 1, 100%   Windows (CRLF)   UTF-8

Part 5: Create backup using Ansible

Step 1: Create your Ansible playbook

a. In VS Code, create a new file in the ansible directory with the following name: yaml

b. Add the following information to the file

```
---
- name: CREATING A BACKUP FOR R1
  hosts: R1
  gather_facts: false
  connection: local

  tasks:
    - name: DISPLAYING THE STARTUP RUNNING
CONFIGURATION
      ios_command:
        commands:
          - show startup-config
      register: startupconfig
```
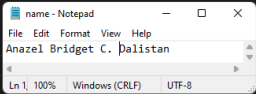
```
- name: SAVE OUTPUT TO ./backups/
  copy:
    content: "{{ startupconfig.stdout[0] }}"
    dest: "backups/startup_backup_R1.txt"

- name: DISPLAYING THE RUNNING CONFIGURATION
  ios_command:
    commands:
      - show running-config
  register: config

- name: SAVE OUTPUT TO ./backups/
  copy:
    content: "{{ config.stdout[0] }}"
    dest: "backups/backup_R1.txt"
```



```
---
- name: CREATING A BACKUP FOR R2

  hosts: R2

  gather_facts: false

  connection: local


  tasks:

    - name: DISPLAYING THE STARTUP RUNNING CONFIGURATION
```

```yaml
    ios_command:

      commands:

        - show startup-config

    register: startupconfig


- name: SAVE OUTPUT TO ./backups/

  copy:

    content: "{{ startupconfig.stdout[0] }}"

    dest: "backups/startup_backup_R2.txt"


- name: DISPLAYING THE RUNNING CONFIGURATION

  ios_command:

    commands:

      - show running-config

  register: config


- name: SAVE OUTPUT TO ./backups/

  copy:

    content: "{{ config.stdout[0] }}"

    dest: "backups/backup_R2.txt"
```

```
 6
 7    tasks:
 8     - name: DISPLAYING THE STARTUP RUNNING CONFIGURATION
 9       ios_command:
10         commands:
11           - show startup-config
12       register: startupconfig
13
14     - name: SAVE OUTPUT TO ./backups/
15       copy:
16         content: "{{ startupconfig.stdout[0] }}"
17         dest: "backups/startup_backup_R2.txt"
18
19     - name: DISPLAYING THE RUNNING CONFIGURATION
20       ios_command:
21         commands:
22           - show running-config
23       register: config
24
25     - name: SAVE OUTPUT TO ./backups/
26       copy:
27         content: "{{ config.stdout[0] }}"
28         dest: "backups/backup_R2.txt"
29
30
```

name - Notepad

File Edit Format View Help

Anazel Bridget C. Dalistan

Ln 1, 100%   Windows (CRLF)   UTF-8

Step 2: Run the Ansible backup Playbook

a. Run the Ansible playbook using the ansible-playbook command:

```
devasc@labvm:~/Ansible/CaseStudy$ ansible-playbook
backup_R1.yaml

PLAY [CREATING A BACKUP FOR R1]
************************************************************
**********************************

TASK [DISPLAYING THE STARTUP RUNNING CONFIGURATION]
************************************************************
***************
ok: [R1]

TASK [SAVE OUTPUT TO ./backups/]
************************************************************
********************************
changed: [R1]

TASK [DISPLAYING THE RUNNING CONFIGURATION]
************************************************************
**********************
ok: [R1]

TASK [SAVE OUTPUT TO ./backups/]
************************************************************
*******************************
changed: [R1]
```
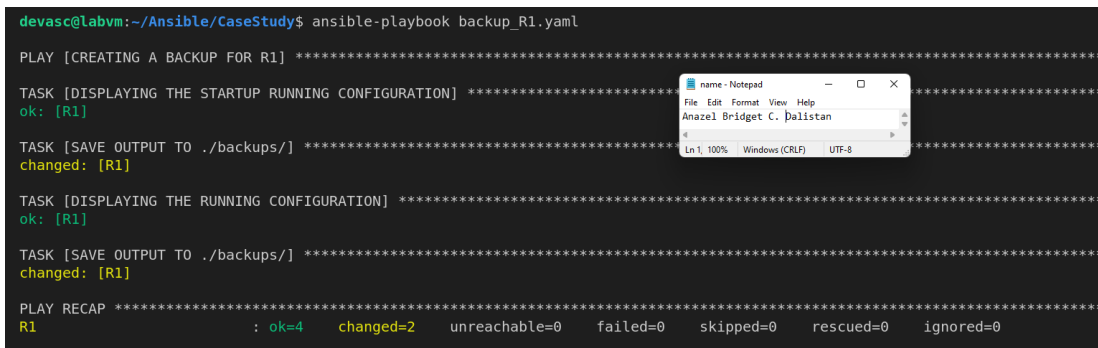
PLAY RECAP
****
****
R1   : ok=4   changed=2
unreachable=0   failed=0   skipped=0   rescued=0
ignored=0

devasc@labvm:~/CPE41S1/ansible/CaseStudy$ ansible-playbook
backup_R2.yaml

PLAY   [CREATING   A   BACKUP   FOR   R2]
****
****

TASK   [DISPLAYING   THE   STARTUP   RUNNING   CONFIGURATION]
****
****

ok: [R2]

TASK   [SAVE   OUTPUT   TO   ./backups/]
****
****

changed: [R2]

TASK   [DISPLAYING   THE   RUNNING   CONFIGURATION]
****
****

ok: [R2]

```
TASK          [SAVE          OUTPUT          TO          ./backups/]
********************************************************************
******************************************

changed: [R2]



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

   R2                          : ok=4     changed=2     unreachable=0
failed=0     skipped=0     rescued=0     ignored=0
```



```
PLAY [CREATING A BACKUP FOR R2] *************************************************
TASK [DISPLAYING THE STARTUP RUNNING CONFIGURATION] ****************
ok: [R2]

TASK [SAVE OUTPUT TO ./backups/] **********************************
changed: [R2]

TASK [DISPLAYING THE RUNNING CONFIGURATION] ************************
ok: [R2]

TASK [SAVE OUTPUT TO ./backups/] **********************************
changed: [R2]

PLAY RECAP ********************************************************************
R2                     : ok=4    changed=2    unreachable=0    failed=0    skipped=0    rescued=0    ignored=0
```

b. Verify the backup file. Check the backups folder if the text file is created.
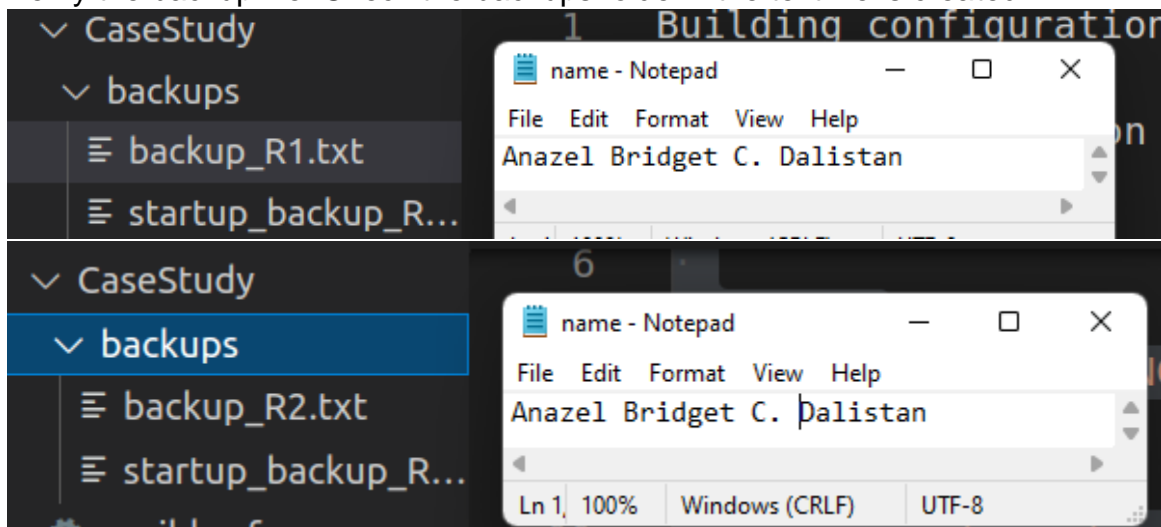
backup_R1.txt
Building configuration...

```
Current configuration : 1923 bytes
!
version 12.4
service timestamps debug datetime msec
service timestamps log datetime msec
service password-encryption
!
hostname R1
!
boot-start-marker
boot-end-marker
!
!
no aaa new-model
memory-size iomem 5
no ip icmp rate-limit unreachable
ip cef
!
!
!
!
no ip domain lookup
ip domain name www.casestudy.com
!
multilink bundle-name authenticated
!
!
!
!
!
!
!
!
!
!
!
!
!
!
!
!
!
!
```
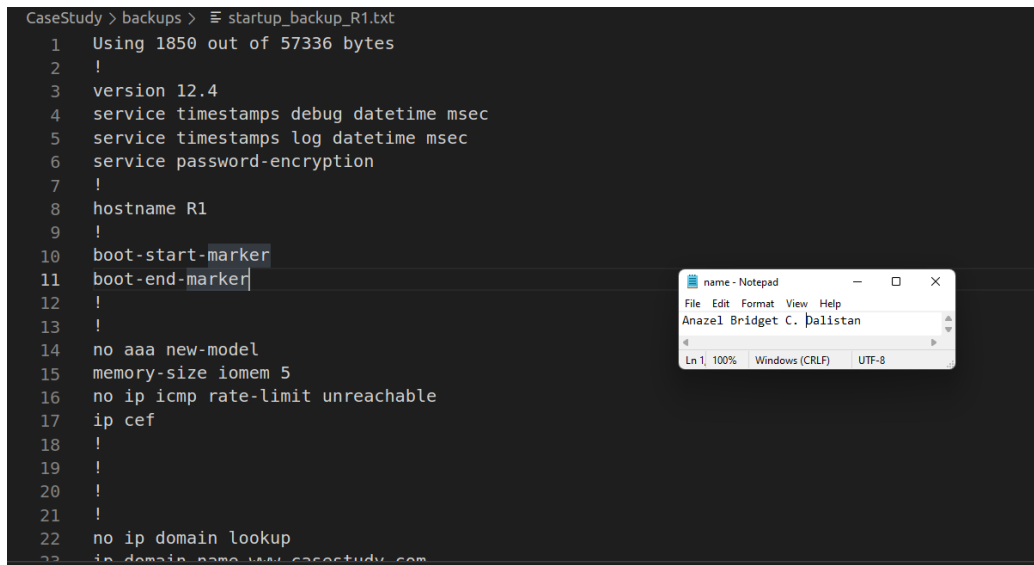
```
!
!
!
username cisco privilege 15 password 7 121A0C0411045D5679
archive
 log config
  hidekeys
!
!
!
!
ip tcp synwait-time 5
ip ssh version 2
!
!
!
!
interface FastEthernet0/0
 ip address 192.168.10.11 255.255.255.0
 ip ospf 1 area 0
 duplex auto
 speed auto
!
interface Serial0/0
 ip address 10.10.1.1 255.255.255.252
 ip ospf 1 area 0
 clock rate 2000000
!
interface FastEthernet0/1
 no ip address
 shutdown
 duplex auto
 speed auto
!
interface Serial0/1
 no ip address
 shutdown
 clock rate 2000000
!
interface Serial0/2
 no ip address
 shutdown
 clock rate 2000000
!
```

```
interface FastEthernet1/0
 no ip address
 shutdown
 duplex auto
 speed auto
!
interface Serial2/0
 no ip address
 shutdown
 serial restart-delay 0
!
interface Serial2/1
 no ip address
 shutdown
 serial restart-delay 0
!
interface Serial2/2
 no ip address
 shutdown
 serial restart-delay 0
!
interface Serial2/3
 no ip address
 shutdown
 serial restart-delay 0
!
router ospf 1
 router-id 1.1.1.1
 log-adjacency-changes
 network 10.10.1.0 0.0.0.3 area 0
 network 192.168.10.0 0.0.0.255 area 0
!
ip forward-protocol nd
ip route 0.0.0.0 0.0.0.0 10.10.1.2
!
!
no ip http server
no ip http secure-server
!
no cdp log mismatch duplex
!
!
!
!
```

```
!
!
control-plane
!
!
!
!
!
!
!
!
!
banner motd ^COnly Authorized Access is Allowed^C
!
line con 0
 exec-timeout 0 0
 privilege level 15
 logging synchronous
line aux 0
 exec-timeout 0 0
 privilege level 15
 logging synchronous
line vty 0 4
 login local
 transport input ssh
line vty 5 15
 login local
 transport input ssh
!
!
end
```

```
1    Building configuration...
2
3    Current configuration : 1923 bytes
4    !
5    version 12.4
6    service timestamps debug datetime msec
7    service timestamps log datetime msec
8    service password-encryption
9    !
10   hostname R1
11   !
12   boot-start-marker
13   boot-end-marker
14   !
15   !
16   no aaa new-model
17   memory-size iomem 5
18   no ip icmp rate-limit unreachable
19   ip cef
20   !
21   !
22   !
```

name - Notepad

File Edit Format View Help

Anazel Bridget C. Dalistan

Ln 1 100%   Windows (CRLF)   UTF-8
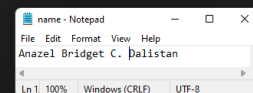
Using 1850 out of 57336 bytes
!
version 12.4
service timestamps debug datetime msec
service timestamps log datetime msec
service password-encryption
!
hostname R1
!
boot-start-marker
boot-end-marker
!
!
no aaa new-model
memory-size iomem 5
no ip icmp rate-limit unreachable
ip cef
!
!
!
!
no ip domain lookup
ip domain name www.casestudy.com
!
multilink bundle-name authenticated
!
!
!
!
!
!
!
!
!
!
!
!
!
!
!
!
!
!

```
!
!
!
username cisco privilege 15 password 7 121A0C0411045D5679
archive
 log config
  hidekeys
!
!
!
!
ip tcp synwait-time 5
ip ssh version 2
!
!
!
!
interface FastEthernet0/0
 ip address 192.168.10.11 255.255.255.0
 ip ospf 1 area 0
 duplex auto
 speed auto
!
interface Serial0/0
 ip address 10.10.1.1 255.255.255.252
 ip ospf 1 area 0
 clock rate 2000000
!
interface FastEthernet0/1
 no ip address
 shutdown
 duplex auto
 speed auto
!
interface Serial0/1
 no ip address
 shutdown
 clock rate 2000000
!
interface Serial0/2
 no ip address
 shutdown
 clock rate 2000000
!
```

```
interface FastEthernet1/0
 no ip address
 shutdown
 duplex auto
 speed auto
!
interface Serial2/0
 no ip address
 shutdown
 serial restart-delay 0
!
interface Serial2/1
 no ip address
 shutdown
 serial restart-delay 0
!
interface Serial2/2
 no ip address
 shutdown
 serial restart-delay 0
!
interface Serial2/3
 no ip address
 shutdown
 serial restart-delay 0
!
router ospf 1
 router-id 1.1.1.1
 log-adjacency-changes
!
ip forward-protocol nd
ip route 0.0.0.0 0.0.0.0 10.10.1.2
!
!
no ip http server
no ip http secure-server
!
no cdp log mismatch duplex
!
!
!
!
!
!
```

```
control-plane
!
!
!
!
!
!
!
!
!
banner motd ^COnly Authorized Access is Allowed^C
!
line con 0
 exec-timeout 0 0
 privilege level 15
 logging synchronous
line aux 0
 exec-timeout 0 0
 privilege level 15
 logging synchronous
line vty 0 4
 login local
 transport input ssh
line vty 5 15
 login local
 transport input ssh
!
!
end
```

```
CaseStudy > backups > ≡ startup_backup_R1.txt
   1    Using 1850 out of 57336 bytes
   2    !
   3    version 12.4
   4    service timestamps debug datetime msec
   5    service timestamps log datetime msec
   6    service password-encryption
   7    !
   8    hostname R1
   9    !
  10    boot-start-marker
  11    boot-end-marker
  12    !
  13    !
  14    no aaa new-model
  15    memory-size iomem 5
  16    no ip icmp rate-limit unreachable
  17    ip cef
  18    !
  19    !
  20    !
  21    !
  22    no ip domain lookup
  23    ip domain name www.casestudy.com
```

name - Notepad
File   Edit   Format   View   Help
Anazel Bridget C. Palistan

Ln 1, 100%   Windows (CRLF)   UTF-8

Part 6: Implement ACL using Ansible

Step 1: Create your Ansible playbook
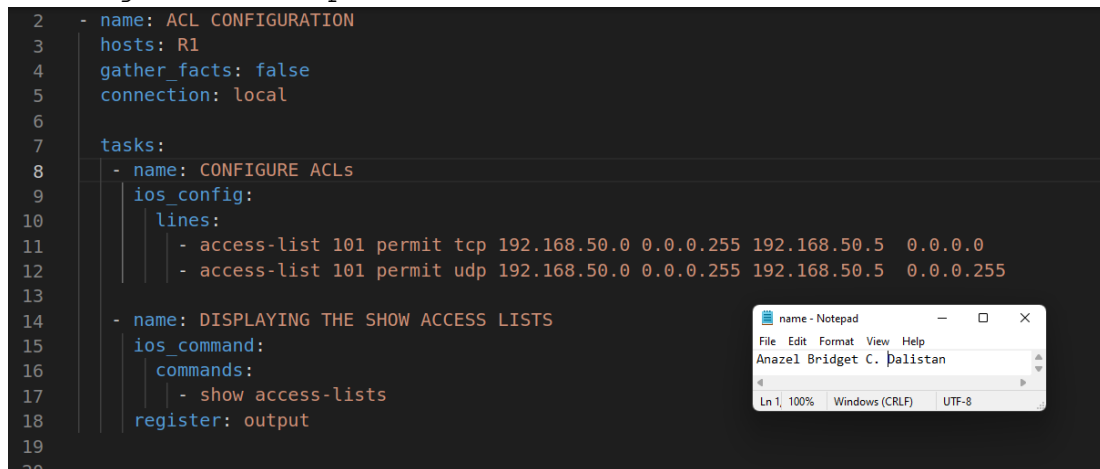
a. In VS Code, create a new file in the ansible directory with the following name:
yaml

b. Add the following information to the file

```
---
- name: ACL CONFIGURATION
  hosts: R1
  gather_facts: false
  connection: local

  tasks:
   - name: CONFIGURE ACLs
     ios_config:
       lines:
          - access-list 101 permit tcp 192.168.50.0 0.0.0.255
192.168.50.5  0.0.0.0
          - access-list 101 permit udp 192.168.50.0 0.0.0.255
192.168.50.5  0.0.0.255

    - name: DISPLAYING THE SHOW ACCESS LISTS
      ios_command:
        commands:
          - show access-lists
      register: output
```

```
 2    - name: ACL CONFIGURATION
 3      hosts: R1
 4      gather_facts: false
 5      connection: local
 6
 7      tasks:
 8       - name: CONFIGURE ACLs
 9         ios_config:
10           lines:
11             - access-list 101 permit tcp 192.168.50.0 0.0.0.255 192.168.50.5  0.0.0.0
12             - access-list 101 permit udp 192.168.50.0 0.0.0.255 192.168.50.5  0.0.0.255
13
14        - name: DISPLAYING THE SHOW ACCESS LISTS
15          ios_command:
16            commands:
17              - show access-lists
18          register: output
19
20
```

name - Notepad — □ ×
File Edit Format View Help
Anazel Bridget C. Dalistan
Ln 1, 100% Windows (CRLF) UTF-8

```
---
- name: ACL CONFIGURATION
  hosts: R2
  gather_facts: false
```

```
connection: local

tasks:
 - name: CONFIGURE ACLs
   ios_config:
     lines:
       - access-list 101 permit tcp 192.168.60.0 0.0.0.255
192.168.60.2  0.0.0.0
       - access-list 101 permit udp 192.168.60.0 0.0.0.255
192.168.60.2  0.0.0.255

 - name: DISPLAYING THE SHOW ACCESS LISTS
   ios_command:
     commands:
       - show access-lists
   register: output
```

```
 2   - name: ACL CONFIGURATION
 3     hosts: R2
 4     gather_facts: false
 5     connection: local
 6
 7     tasks:
 8      - name: CONFIGURE ACLs
 9        ios_config:
10          lines:
11            - access-list 101 permit tcp 192.168.60.0 0.0.0.255 192.168.60.2  0.0.0.0
12            - access-list 101 permit udp 192.168.60.0 0.0.0.255 192.168.60.2  0.0.0.255
13
14      - name: DISPLAYING THE SHOW ACCESS LISTS
15        ios_command:
16          commands:
17            - show access-lists
18        register: output
19
```

name - Notepad

File Edit Format View Help

Anazel Bridget C. Dalistan

Ln 1, 100%   Windows (CRLF)   UTF-8

Step 2: Run the Ansible backup Playbook

a. Run the Ansible playbook using the ansible-playbook command:
```
devasc@labvm:~/Ansible/CaseStudy$ ansible-playbook -v
acl_configuration_R1.yaml
Using /home/devasc/Ansible/CaseStudy/ansible.cfg as config
file

PLAY [ACL CONFIGURATION]
*******************************************************
*************************************
```

```
TASK [CONFIGURE ACLs]
*********************************************************
*********************************************
changed: [R1] => changed=true
  banners: {}
  commands:
  - access-list 101 permit tcp 192.168.50.0 0.0.0.255
192.168.50.5  0.0.0.0
  - access-list 101 permit udp 192.168.50.0 0.0.0.255
192.168.50.5  0.0.0.255
  updates:
  - access-list 101 permit tcp 192.168.50.0 0.0.0.255
192.168.50.5  0.0.0.0
  - access-list 101 permit udp 192.168.50.0 0.0.0.255
192.168.50.5  0.0.0.255

TASK [DISPLAYING THE SHOW ACCESS LISTS]
*********************************************************
*************************
ok: [R1] => changed=false
  stdout:
  - |-
    Extended IP access list 101
        10 permit tcp 192.168.50.0 0.0.0.255 host
192.168.50.5
        20 permit udp 192.168.50.0 0.0.0.255 192.168.50.0
0.0.0.255
  stdout_lines: <omitted>

PLAY RECAP
*********************************************************
*******************************************************
R1                         : ok=2    changed=1
unreachable=0    failed=0    skipped=0    rescued=0
ignored=0
```

```
PLAY [ACL CONFIGURATION] *********************************************************************************

TASK [CONFIGURE ACLs] ************************************************************************************
changed: [R1] => changed=true
  banners: {}
  commands:
  - access-list 101 permit tcp 192.168.50.0 0.0.0.255 192.168.50.5  0.0.0.0
  - access-list 101 permit udp 192.168.50.0 0.0.0.255 192.168.50.5  0.0.0.255
  updates:
  - access-list 101 permit tcp 192.168.50.0 0.0.0.255 192.168.50.5  0.0.0.0
  - access-list 101 permit udp 192.168.50.0 0.0.0.255 192.168.50.5  0.0.0.255

TASK [DISPLAYING THE SHOW ACCESS LISTS] *****************************************************************
ok: [R1] => changed=false
  stdout:
  - |-
    Extended IP access list 101
        10 permit tcp 192.168.50.0 0.0.0.255 host 192.168.50.5
        20 permit udp 192.168.50.0 0.0.0.255 192.168.50.0 0.0.0.255
  stdout_lines: <omitted>

PLAY RECAP *********************************************************************************************
R1                         : ok=2    changed=1    unreachable=0    failed=0    skipped=0    rescued=0    ignored=0
```

name - Notepad
File Edit Format View Help
Anazel Bridget C. Dalistan
Ln 1, 100%   Windows (CRLF)   UTF-8

devasc@labvm:~/CPE41S1/ansible/CaseStudy$ ansible-playbook
-v acl_configuration.yaml
Using /home/devasc/CPE41S1/ansible/CaseStudy/ansible.cfg as
config file

PLAY [ACL CONFIGURATION]
****
****

TASK [CONFIGURE ACLs]
****
****

changed: [R2] => {"banners": {}, "changed": true,
"commands": ["access-list 101 permit tcp 192.168.60.0
0.0.0.255 192.168.60.2 0.0.0.0", "access-list 101 permit
udp 192.168.60.0 0.0.0.255 192.168.60.2 0.0.0.255"],
"updates": ["access-list 101 permit tcp 192.168.60.0
0.0.0.255 192.168.60.2 0.0.0.0", "access-list 101 permit
udp 192.168.60.0 0.0.0.255 192.168.60.2 0.0.0.255"]}

TASK [DISPLAYING THE SHOW ACCESS LISTS]
****
****

ok: [R2] => {"changed": false, "stdout": ["Extended IP
access list 101\n   10 permit tcp 192.168.60.0 0.0.0.255
host 192.168.60.2\n   20 permit udp 192.168.60.0 0.0.0.255
192.168.60.0 0.0.0.255"], "stdout_lines": [["Extended IP
access list 101", "   10 permit tcp 192.168.60.0 0.0.0.255
host 192.168.60.2", "   20 permit udp 192.168.60.0
0.0.0.255 192.168.60.0 0.0.0.255"]]}

```
PLAY RECAP
****************************************************************
**********************************************************
R2                              : ok=2      changed=1
unreachable=0      failed=0      skipped=0      rescued=0
ignored=0
```

b. Verify the ACL. Issue the command `show access-list`
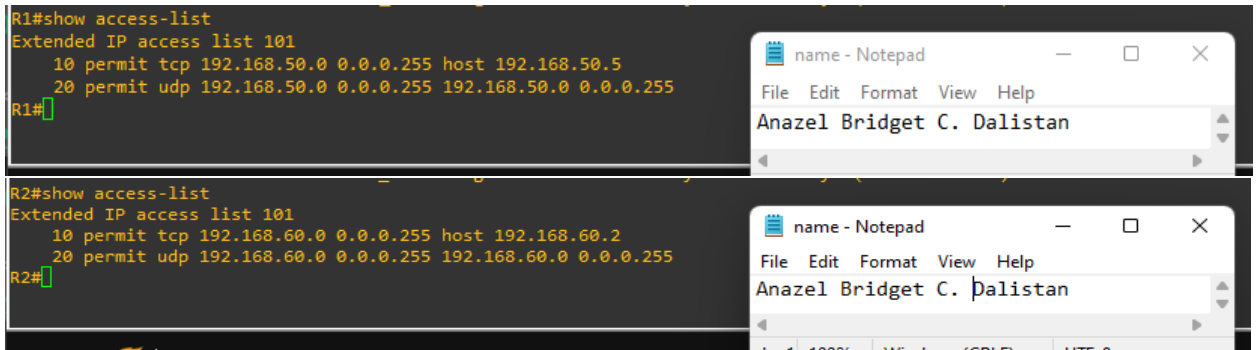
Part 6: Test the Network through pyATS

Step 1: Create a pyATS folder and python file.

a. In VS code, create a python file named pyats.py and job.py in both PCs
b. Add the following code from the previous lab (Automated testing using pyATS):

pyats.py
```python
import logging

from pyats import aetest

log = logging.getLogger(__name__)

##################################################################
##
###                    COMMON SETUP SECTION
###
##################################################################
##

class common_setup(aetest.CommonSetup):
    """ Common Setup section """

    # First subsection
    @aetest.subsection
    def sample_subsection_1(self):
        """ Common Setup subsection """
        log.info("Aetest Common Setup ")
```

```python
    # Second subsection
    @aetest.subsection
    def sample_subsection_2(self, section):
        """ Common Setup subsection """
        log.info("Inside %s" % (section))

        log.info("Inside class %s" % (self.uid))


###############################################################
##
###                       TESTCASES SECTION
###
###############################################################
##

class tc_one(aetest.Testcase):
    """ This is user Testcases section """

    @aetest.setup
    def prepare_testcase(self, section):
        """ Testcase Setup section """
        log.info("Preparing the test")
        log.info(section)

    # First test section
    @ aetest.test
    def simple_test_1(self):
        """ Sample test section. Only print """
        log.info("First test section ")

    # Second test section
    @ aetest.test
    def simple_test_2(self):
        """ Sample test section. Only print """
        log.info("Second test section ")

    # This is how to create a cleanup section
    @aetest.cleanup
    def clean_testcase(self):
        """ Testcase cleanup section """
        log.info("Pass testcase cleanup")

# Testcase name : tc_two
class tc_two(aetest.Testcase):
    """ This is user Testcases section """

    @ aetest.test
    def simple_test_1(self):
```

```python
        """ Sample test section. Only print """
        log.info("First test section ")
        self.failed('This is an intentional failure')

    # Second test section
    @ aetest.test
    def simple_test_2(self):
        """ Sample test section. Only print """
        log.info("Second test section ")

    # This is how to create a cleanup section
    @aetest.cleanup
    def clean_testcase(self):
        """ Testcase cleanup section """
        log.info("Pass testcase cleanup")

#################################################################
####
####                        COMMON CLEANUP SECTION
###
#################################################################
####

class common_cleanup(aetest.CommonCleanup):
    """ Common Cleanup for Sample Test """

    @aetest.subsection
    def clean_everything(self):
        """ Common Cleanup Subsection """
        log.info("Aetest Common Cleanup ")

if __name__ == '__main__':
    result = aetest.main()
    aetest.exit_cli_code(result)
```

job.py
```python
import os
from pyats.easypy import run

def main():

    test_path = os.path.dirname(os.path.abspath(__file__))
    testscript = os.path.join(test_path, 'pyats.py')

    run(testscript=testscript)
```

```python
import logging

from pyats import aetest

log = logging.getLogger(__name__)

###############################################################
###                  COMMON SETUP SECTION                  ###
###############################################################

class common_setup(aetest.CommonSetup):
    """ Common Setup section """

    # First subsection
    @aetest.subsection
    def sample_subsection_1(self):
        """ Common Setup subsection """
        log.info("Aetest Common Setup ")

    # Second subsection
    @aetest.subsection
    def sample_subsection_2(self, section):
        """ Common Setup subsection """
        log.info("Inside %s" % (section))

            ("Inside class %s" % (self.uid))
```

```python
import os
from pyats.easypy import run

def main():

    test_path = os.path.dirname(os.path.abspath(__file__))
    testscript = os.path.join(test_path, 'pyats.py')

    run(testscript=testscript)
```

Step 1: Run pyATS manually

a. Run the job.py with this command:

```
devasc@labvm:~/Ansible/CaseStudy$ pyats run job job.py
```

```
devasc@labvm:~/Ansible/CaseStudy/pyATS$ pyats run job job.py
2022-01-17T05:45:15: %EASYPY-INFO: Starting job run: job
2022-01-17T05:45:15: %EASYPY-INFO: Runinfo directory: /home/devasc/.pyats/runinfo/job.2022Jan17_05:45:14.667782
2022-01-17T05:45:15: %EASYPY-INFO: -----------------------------------------------------------------
2022-01-17T05:45:18: %EASYPY-INFO: Starting task execution: Task-1
2022-01-17T05:45:18: %EASYPY-INFO:      test harness = pyats.aetest
2022-01-17T05:45:18: %EASYPY-INFO:      testscript   = /home/devasc/Ansible/CaseStudy/pyATS/pyats.py
2022-01-17T05:45:18: %AETEST-INFO: +-----------------------------------------------------------------+
2022-01-17T05:45:18: %AETEST-INFO: |                     Starting common setup                       |
2022-01-17T05:45:18: %AETEST-INFO: +-----------------------------------------------------------------+
2022-01-17T05:45:18: %AETEST-INFO: +-----------------------------------------------------------------+
2022-01-17T05:45:18: %AETEST-INFO: |             Starting subsection sample_subsection_1             |
2022-01-17T05:45:18: %AETEST-INFO: +-----------------------------------------------------------------+
2022-01-17T05:45:18: %SCRIPT-INFO: Aetest Common Setup
2022-01-17T05:45:18: %AETEST-INFO: The result of subsection sample_subsection_1 is => PASSED
2022-01-17T05:45:18: %AETEST-INFO: +-----------------------------------------------------------------+
2022-01-17T05:45:18: %AETEST-INFO: |             Starting subsection sample_subsection_2             |
2022-01-17T05:45:18: %AETEST-INFO: +-----------------------------------------------------------------+
2022-01-17T05:45:18: %SCRIPT-INFO: Inside subsection sample_subsection_2
2022-01-17T05:45:18: %SCRIPT-INFO: Inside class common_setup
2022-01-17T05:45:    The result of subsection sample_subsection_2 is => PASSED
2022-01-17T05:45:    The result of common setup is => PASSED
```

```
2022-01-17T05:45:19: %EASYPY-INFO:     Elapsed time : 0.156777
2022-01-17T05:45:19: %EASYPY-INFO:     Archive      : /home/devasc/.pyats/archive/22-Jan/job.2022Jan17_05:45:14.667782.zip
2022-01-17T05:45:19: %EASYPY-INFO:
2022-01-17T05:45:19: %EASYPY-INFO: Total Tasks   : 1
2022-01-17T05:45:19: %EASYPY-INFO:
2022-01-17T05:45:19: %EASYPY-INFO: Overall Stats
2022-01-17T05:45:19: %EASYPY-INFO:     Passed     : 3
2022-01-17T05:45:19: %EASYPY-INFO:     Passx      : 0
2022-01-17T05:45:19: %EASYPY-INFO:     Failed     : 1
2022-01-17T05:45:19: %EASYPY-INFO:     Aborted    : 0
2022-01-17T05:45:19: %EASYPY-INFO:     Blocked    : 0
2022-01-17T05:45:19: %EASYPY-INFO:     Skipped    : 0
2022-01-17T05:45:19: %EASYPY-INFO:     Errored    : 0
2022-01-17T05:45:19: %EASYPY-INFO:
2022-01-17T05:45:19: %EASYPY-INFO:     TOTAL      : 4
2022-01-17T05:45:19: %EASYPY-INFO:
2022-01-17T05:45:19: %EASYPY-INFO: Success Rate  : 75.00 %
2022-01-17T05:45:19: %EASYPY-INFO:
2022-01-17T05:45:19: %EASYPY-INFO: +------------------------------------------------------------------------+
2022-01-17T05:45:19: %EASYPY-INFO: |                          Task Result Summary                           |
2022-01-17T05:45:19: %EASYPY-INFO: +------------------------------------------------------------------------+
2022-01-17T05:45:19: %EASYPY-INFO: Task-1: pyats.common_setup                                        PASSED
2022-01-17T05:45:19: %EASYPY-INFO: Task-1: pyats.tc_one                                              PASSED
```

name - Notepad
File Edit Format View Help
Anazel Bridget C. Dalistan
Ln 1, 100%   Windows (CRLF)   UTF-8
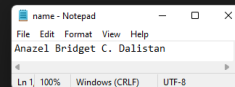
```
TERMINAL                                                                              BASH - PYATS  + ∨  ⬜ 🗑

2022-01-17T06:00:45: %EASYPY-INFO: +------------------------------------------------------------------------+
2022-01-17T06:00:45: %EASYPY-INFO: |                          Task Result Details                           |
2022-01-17T06:00:45: %EASYPY-INFO: +------------------------------------------------------------------------+
2022-01-17T06:00:45: %EASYPY-INFO: Task-1: pyats
2022-01-17T06:00:45: %EASYPY-INFO: |-- common_setup                                                   PASSED
2022-01-17T06:00:45: %EASYPY-INFO: |   |-- sample_subsection_1                                        PASSED
2022-01-17T06:00:45: %EASYPY-INFO: |   `-- sample_subsection_2                                        PASSED
2022-01-17T06:00:45: %EASYPY-INFO: |-- tc_one                                                         PASSED
2022-01-17T06:00:45: %EASYPY-INFO: |   |-- prepare_testcase                                           PASSED
2022-01-17T06:00:45: %EASYPY-INFO: |   |-- simple_test_1                                              PASSED
2022-01-17T06:00:45: %EASYPY-INFO: |   |-- simple_test_2                                              PASSED
2022-01-17T06:00:45: %EASYPY-INFO: |   `-- clean_testcase                                            PASSED
2022-01-17T06:00:45: %EASYPY-INFO: |-- tc_two                                                         FAILED
2022-01-17T06:00:45: %EASYPY-INFO: |   |-- simple_test_1                                              FAILED
2022-01-17T06:00:45: %EASYPY-INFO: |   |-- simple_test_2                                              PASSED
2022-01-17T06:00:45: %EASYPY-INFO: |   `-- clean_testcase                                            PASSED
2022-01-17T06:00:45: %EASYPY-INFO: `-- common_cleanup                                                PASSED
2022-01-17T06:00:45: %EASYPY-INFO:     `-- clean_everything                                          PASSED
2022-01-17T06:00:45: %EASYPY-INFO: Sending report email...
1-17T06:00:45: %EASYPY-INFO: Missing SMTP server configuration, or failed to reach/authenticate/send mail. Result notifi
```

name - Notepad
File Edit Format View Help
Anazel Bridget C. Dalistan
Ln 1, 100%   Windows (CRLF)   UTF-8

al Studio Code   Ln 15, Col 23   Spaces: 4   UTF-8   LF   Python 🖵 ◫
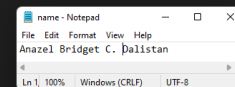
"I affirm that I shall not give or receive any unauthorized help on this case study, and that all work shall be my own."