

Lab1

Software Defined Networks

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Part 1:

Spine:

```
GNU nano 4.8                               spine1.py
#Configuration for spine routers only
from netmiko import ConnectHandler
from getpass import getpass

prompt = input('Enter 1 or 2 routers to configure: ')
#only 2 spine routers so only config one at a time or both
if prompt != '1' and prompt != '2':
    print('Retry')
else:
    if prompt == '1':
        for i in range(int(prompt)):
            host = input('Enter the host: ')          #Checks that the hostname are the only 2 routers
            if host != 'R4' and host != 'R5' and host != '192.168.122.104' and host != '192.168.122.105':
                print('Run again with either R4 or R5')
            else:
                username = input('Enter the username: ')
                device_type = input('Enter the device type: ')
                password = getpass()
                secret = input('Enter the secret password: ')

                router = {'host':host,'username':username,'device_type':device_type,'password':password,'secret':secret}
                routers = [router]

                for n in range(len(routers)):
                    net_connect = ConnectHandler(**routers[n]) #Connects to the router via telnet
                    print('Connected')
                    net_connect.enable()
                    file = input('Enter configuration filename: ') #lets user choose the configuration file
                    print('Configuring....')
                    net_connect.send_config_from_file(file)
                    print('Successful')
                    net_connect.disconnect()

    else:
        for i in range(int(prompt)):
            host = input('Enter the host: ')
            if host != 'R4' and host != 'R5' and host != '192.168.122.104' and host != '192.168.122.105':
                print('Run again with either R4 or R5')
            else:
                username = input('Enter the username: ')
                device_type = input('Enter the device type: ')
                password = getpass()
                secret = input('Enter the secret password: ')

                router = {'host':host,'username':username,'device_type':device_type,'password':password,'secret':secret}
                routers = [router]

                for n in range(len(routers)):
                    net_connect = ConnectHandler(**routers[n])
                    print('Connected')
                    net_connect.enable()
                    file = input('Enter the configuration filename: ')
                    print('Configuring....')
                    net_connect.send_config_from_file(file)
                    print('Successful')
                    net_connect.disconnect()

^G Get Help      ^O Write Out     ^W Where Is      ^K Cut Text      ^J Justify       ^C Cur Pos       M-U Undo
^X Exit          ^R Read File     ^H Replace       ^U Paste Text    ^I To Spell      ^G Go To Line    M-E Redo
Right Ctrl
```

On the router the part that is unseen is the variable secret.

Leaf:

```
GNU nano 4.8 leaf1.py Modified
#Configuration for leaf routers only
from netmiko import ConnectHandler
from getpass import getpass

prompt = input('Enter 1 or 3 routers to configure: ')
#only 3 routers so only config one at a time or all three
if prompt != '1' and prompt != '3':
    print('Retry')
else:
    if prompt == '1':
        for i in range(int(prompt)):
            host = input('Enter the hostname: ') #Checks that the hostname are the only 2 rou
            if host != 'R1' and host != 'R2' and host != 'R3':
                print('Run again with either R1, R2 or R3')
            else:
                username = input('Enter the username: ')
                device_type = input('Enter the device type: ')
                password = getpass()
                secret = input('Enter the secret password: ')

                router = {'host':host,'username':username,'device_type':device_type,'password':passw
                routers = [router]

                for n in range(len(routers)):
                    net_connect = ConnectHandler(**routers[n]) #Connects to the router via telnet
                    print('Connected')
                    net_connect.enable()
                    file = input('Enter configuration filename: ') #lets user choose the configur
                    print('Configuring....')
                    net_connect.send_config_from_file(file)
                    print('Successful')
                    net_connect.disconnect()
```

```
net_connect.disconnect()

else:
    for i in range(int(prompt)):
        host = input('Enter the hostname: ')
        if host != 'R1' and host != 'R2' and host != 'R3':
            print('Run again with either R1, R2, or R3')
        else:
            username = input('Enter the username: ')
            device_type = input('Enter the device_type: ')
            password = getpass()
            secret = input('Enter the secret password: ')

            router = {'host':host,'username':username,'device_type':device_type,'password':passw
            routers = [router]

            for n in range(len(routers)):
                net_connect = ConnectHandler(**routers[n])
                print('Connected')
                net_connect.enable()
                file = input('Enter the configuration filename: ')
                print('Configuring....')
                net_connect.send_config_from_file(file)
                print('Successful')
                net_connect.disconnect()
```

Get Help Write Out Where Is Cut Text Justify Cur Pos M-U Undo
Exit Read File Replace Paste Text To Spell Go To Line M-E Redo

Similar to the spine 1 the router configuration hidden is the variable secret

Spine 2:

```
GNU nano 4.8 spine2.py
from netmiko import ConnectHandler
from getpass import getpass
from jinja2 import Template
from inventspine import routers

password = getpass()

configuration = '''
!
interface loopback0
 ip address {{ id }} {{ subnet }}
!
{% for d in conf_data %}
!
interface {{ d.name }}
 ip address 10.0.{{ d.ip }}.2 255.255.255.252
!
{% endfor %}
!
router ospf 1
 router-id {{ id }}
{% for d in conf_data %}
 network 10.0.{{ d.ip }}.2 0.0.0.3 area 0
{% endfor %}
!
...

n1 = 3
n2 = 3

for r in routers:
    r['password'] = password
    net_connect = ConnectHandler(**r)
```

```

print('Connected')
n1 = n1 + 1
print('R{}'.format(n1))
name1 = input('Enter the interface: ')
ip1 = int(input('Enter the ip number: '))
name2 = input('Enter the second interface: ')
ip2 = int(input('Enter the second ip number: '))
name3 = input('Enter the third interface: ')
ip3 = int(input('Enter the third ip number: '))
id = input('Enter the loopback: ')
subnet = input('Enter the subnet for loopback: ')

conf_data = [{'name':name1,'ip':ip1},{'name':name2,'ip':ip2},{'name':name3,'ip':ip3}]

config = Template(configuration)

Rconf = config.render(conf_data=conf_data,id=id,subnet=subnet)

print(Rconf)

n2 = n2 + 1
with open('R{}_jinja.txt'.format(n2),'w') as f:
    f.write(Rconf)
net_connect.enable()
print('Configuring...')
send = net_connect.send_config_from_file(config_file=('R{}_jinja.txt'.format(n2)))
print('Successful')
net_connect.disconnect()

```

Leaf2:

```

GNU nano 4.8                                leaf2.py
from netmiko import ConnectHandler
from getpass import getpass
from jinja2 import Template
from inventleaf import routers

password = getpass()

configuration = '''
!
interface loopback0
 ip address {{ id }} {{ subnet }}
!
{% for d in conf_data %}
interface {{ d.name }}
 ip address 10.0.{{ d.ip }}.1 255.255.255.252
!
{% endfor %}
!
router ospf 1
 router-id {{ id }}
{% for d in conf_data %}
 network 10.0.{{ d.ip }}.1 0.0.0.3 area 0
{% endfor %}
!
interface port-channel 1
!
interface f1/0
 channel-group 1
!
{% for d in conf_data %}
interface port-channel 1.{{ d.vlan }}
 encapsulation dot1Q {{ d.vlan }}
 ip address 192.168.{{ d.num }}.1 255.255.255.0
!

```

```

    }
    {% endfor %}
'''

n1 = 0
n2 = 0

for r in routers:
    r['password'] = password
    net_connect = ConnectHandler(**r)
    print('Connected')
    n1 = n1 + 1
    print('R{}'.format(n1))
    name1 = input('Enter the interface: ')
    ip1 = int(input('Enter the ip number: '))
    name2 = input('Enter the second interface: ')
    ip2 = int(input('Enter the second ip number: '))
    id = input('Enter the loopback: ')
    subnet = input('Enter the subnet for loopback: ')
    vlan1 = input('Enter the vlan interface number: ')
    num1 = input('Enter the first vlan ip number: ')
    vlan2 = input('Enter the second vlan interface number: ')
    num2 = input('Enter the second vlan ip number: ')
    vlan3 = input('Enter the third vlan interface number: ')
    num3 = input('Enter the third vlan ip number: ')

    conf_data = [{'name':name1,'ip':ip1},{'name':name2,'ip':ip2},{'vlan':vlan1,'num':num1},{'vlan':vlan2,'num':num2},{'vlan':vlan3,'num':num3}]

    config = Template(configuration)

    Rconf = config.render(conf_data=conf_data,id=id,subnet=subnet)

```

```

print(Rconf)

n2 = n2 + 1
with open('R{}_jinja.txt'.format(n2),'w') as f:
    f.write(Rconf)
net_connect.enable()
print('Configuring...')
send = net_connect.send_config_from_file(config_file=('R{}_jinja.txt'.format(n2)))
print('Successful')
net_connect.disconnect()

```

R1:

```

GNU nano 4.8                                R1conf.txt
!
interface lo0
 ip address 1.1.1.1 255.255.255.255
!
interface f0/1
 ip address 10.0.41.1 255.255.255.252
 no shutdown
!
interface f2/0
 ip address 10.0.51.1 255.255.255.252
 no shutdown
!
interface port-channel 1
!
interface f1/0
 channel-group 1
!
interface port-channel1.11
 encapsulation dot1Q 11 native
 ip address 192.168.11.1 255.255.255.0
!
interface port-channel1.12
 encapsulation dot1Q 12
 ip address 192.168.12.1 255.255.255.0
!
interface port-channel1.13
 encapsulation dot1Q 13
 ip address 192.168.13.1 255.255.255.0
!
router ospf 1
 router-id 1.1.1.1
 network 10.0.41.1 0.0.0.3 area 0
 network 10.0.51.1 0.0.0.3 area 0

```

```

passive-interface f0/0
!

```

^G Get Help ^O Write Out ^W Where Is ^K Cut Text ^J Justify ^C Cur Pos M-U Undo
 ^X Exit ^R Read File ^_ Replace ^U Paste Text ^T To Spell ^_ Go To Line M-E Redo

 Right Ctrl

R2:

```
GNU nano 4.8 R2conf.txt
!
interface lo0
 ip address 2.2.2.2 255.255.255.255
!
interface f2/0
 ip address 10.0.52.1 255.255.255.252
 no shutdown
!
interface f0/1
 ip address 10.0.42.1 255.255.255.252
 no shutdown
!
interface port-channel 1
!
interface f1/0
 channel-group 1
!
interface port-channel 1.11
 encapsulation dot1Q 11 native
 ip address 192.168.21.1 255.255.255.0
!
interface port-channel 1.12
 encapsulation dot 1Q 12
 ip address 192.168.22.1 255.255.255.0
!
interface port-channel 1.13
 encapsulation dot1Q 13
 ip address 192.168.23.1 255.255.255.0
!
router ospf 1
 router-id 2.2.2.2
 network 10.0.42.1 0.0.0.3 area 0
 network 10.0.52.1 0.0.0.3 area 0











passive-interface f0/0
!

^G Get Help    ^O Write Out  ^W Where Is   ^K Cut Text   ^J
^X Exit        ^R Read File  ^_ Replace    ^U Paste Text ^I
```

R3:


```
GNU nano 4.8 R3conf.txt
!
interface lo0
 ip address 3.3.3.3 255.255.255.255
!
interface f0/1
 ip address 10.0.43.1 255.255.255.252
 no shutdown
!
interface f2/0
 ip address 10.0.53.1 255.255.255.252
 no shutdown
!
interface port-channel 1
!
interface f1/0
 channel-group 1
!
interface port-channel 1.11
 encapsulation dot1Q 11 native
 ip address 192.168.31.1 255.255.255.0
!
interface port-channel 1.12
 encapsulation dot1Q 12
 ip address 192.168.32.1 255.255.255.0
!
interface port-channel 1.13
 encapsulation dot1Q 13
 ip address 192.168.33.1 255.255.255.0
!
router ospf 1
 router-id 3.3.3.3
 network 10.0.43.1 0.0.0.3 area 0
 network 10.0.53.1 0.0.0.3 area 0
```

```
passive-interface f0/0
!
_
```

 Get Help	 Write Out	 Where Is	 Cut Text	
 Exit	 Read File	 Replace	 Paste Text	

R4:

```
GNU nano 4.8 R4conf.txt
!
interface lo0
 ip address 4.4.4.4 255.255.255.255
!
interface f0/1
 ip address 10.0.42.2 255.255.255.252
 no shutdown
!
interface f2/0
 ip address 10.0.41.2 255.255.255.252
 no shutdown
!
interface f1/0
 ip address 10.0.43.2 255.255.255.252
 no shutdown
!
router ospf 1
 router-id 4.4.4.4
 network 4.4.4.4 0.0.0.0 area 0
 network 10.0.41.2 0.0.0.3 area 0
 network 10.0.42.2 0.0.0.3 area 0
 network 10.0.43.2 0.0.0.3 area 0
 passive-interface f0/0
!
```

R5:

```
GNU nano 4.8 R5conf.txt
!
interface lo0
 ip address 5.5.5.5 255.255.255.255
!
interface f0/1
 ip address 10.0.52.2 255.255.255.252
 no shutdown
!
interface f2/0
 ip address 10.0.51.2 255.255.255.252
 no shutdown
!
interface f1/0
 ip address 10.0.53.2 255.255.255.252
 no shutdown
!
router ospf 1
 router-id 5.5.5.5
 network 10.0.52.2 0.0.0.3 area 0
 network 10.0.51.2 0.0.0.3 area 0
 network 10.0.53.2 0.0.0.3 area 0
 passive-interface f0/0
!
```