Laboratory Design Activity

Network Programmability using NETCONF

Intended Learning Outcomes:

- Configure OSPF routing protocol with NETCONF using Python ncclient in Cisco IOS-XE device.
- Configure an IPV4 ACL for NETCONF sessions.
- Configure IP Route with NETCONF using Python ncclient in Cisco IOS-XE device.
- Use pyATS to test your network

Resources:

- Virtual Box
- DEVASC-LABVM virtual machine
- CSR1000v virtual machine

Submitted by:

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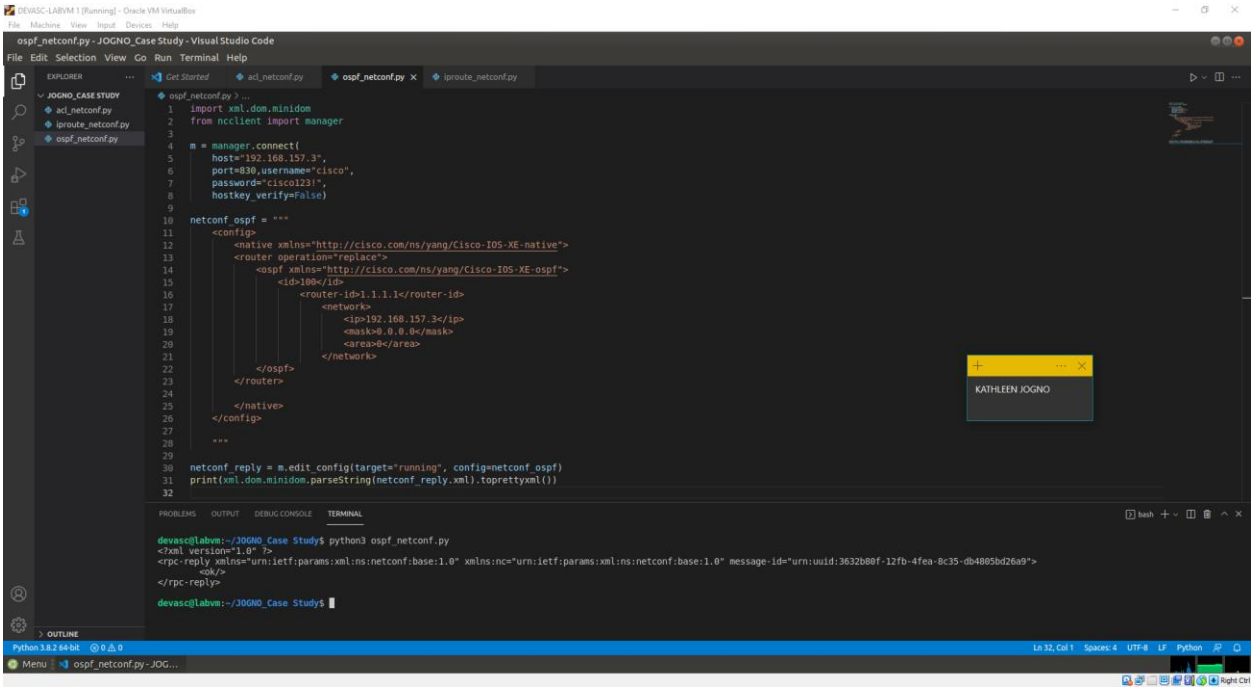
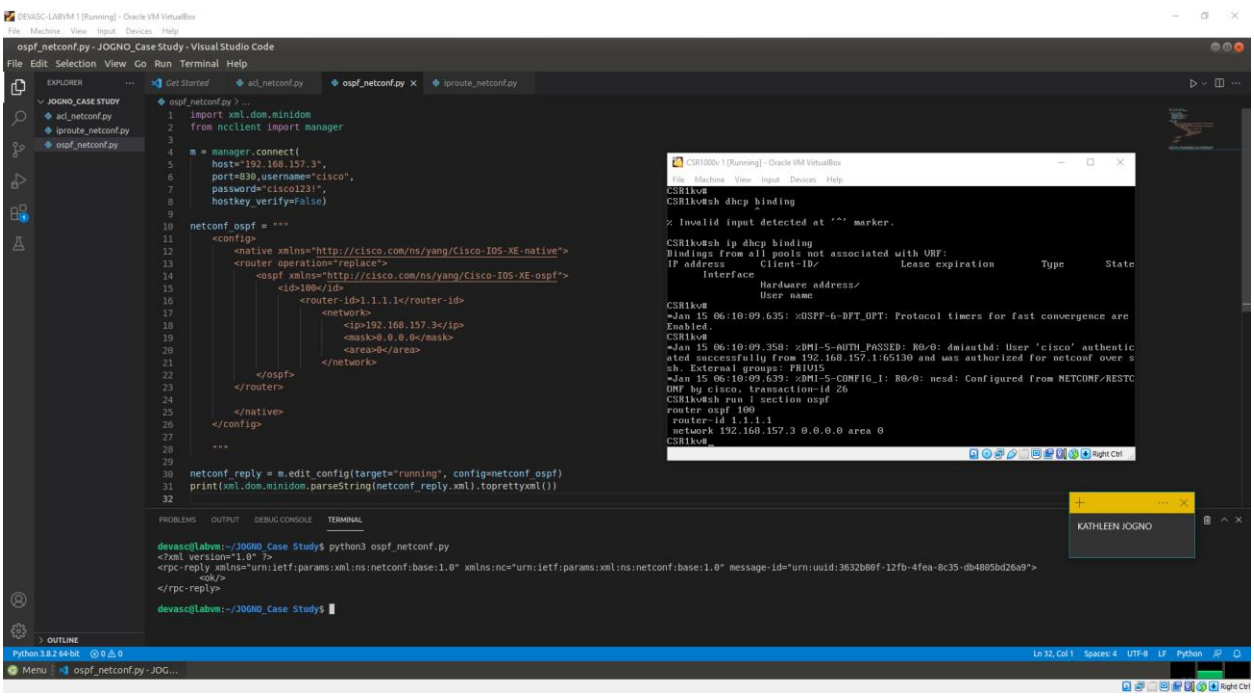
CPE41S2

Network Programmability using NETCONF

1. Start DEVASC-LABVM virtual machine
2. Configure an OSPF routing protocol with process id of 100 using NETCONF.



3. Run the file and check the output in the CSR1000v virtual machine.



4. Configure an IPV4 ACL for NETCONF sessions.

CSR1000v 1 [Running] - Oracle VM VirtualBox

File Machine View Input Devices Help

```
CSR1kv(config)#
CSR1kv(config)#
CSR1kv(config)#ip access-list standard acl1_permit
CSR1kv(config-std-nacl)#permit 192.168.255.0 0.0.0.255
CSR1kv(config-std-nacl)#deny any
CSR1kv(config-std-nacl)#e
*Jan 16 02:24:46.835: %DMI-5-SYNC_START: R0/0: syncfd: External change to runnin
g configuration detected. The running configuration will be synchronized to the
NETCONF running data store.
*Jan 16 02:24:47.866: %DMI-5-SYNC_COMPLETE: R0/0: syncfd: The running configurat
ion has been synchronized to the NETCONF running data store.
CSR1kv(config-std-nacl)#exit
```

CSR1000v 1 [Running] - Oracle VM VirtualBox

File Machine View Input Devices Help

```
CSR1kv#sh ip access-list
Standard IP access list acl1_permit
    10 permit 192.168.255.0, wildcard bits 0.0.0.255
    20 deny   any
CSR1kv#
CSR1kv#
CSR1kv#
CSR1kv#
CSR1kv#
CSR1kv#
CSR1kv#
CSR1kv#
CSR1kv#
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CSR1kv#
CSR1kv#
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CSR1kv#
CSR1kv#
CSR1kv#
```

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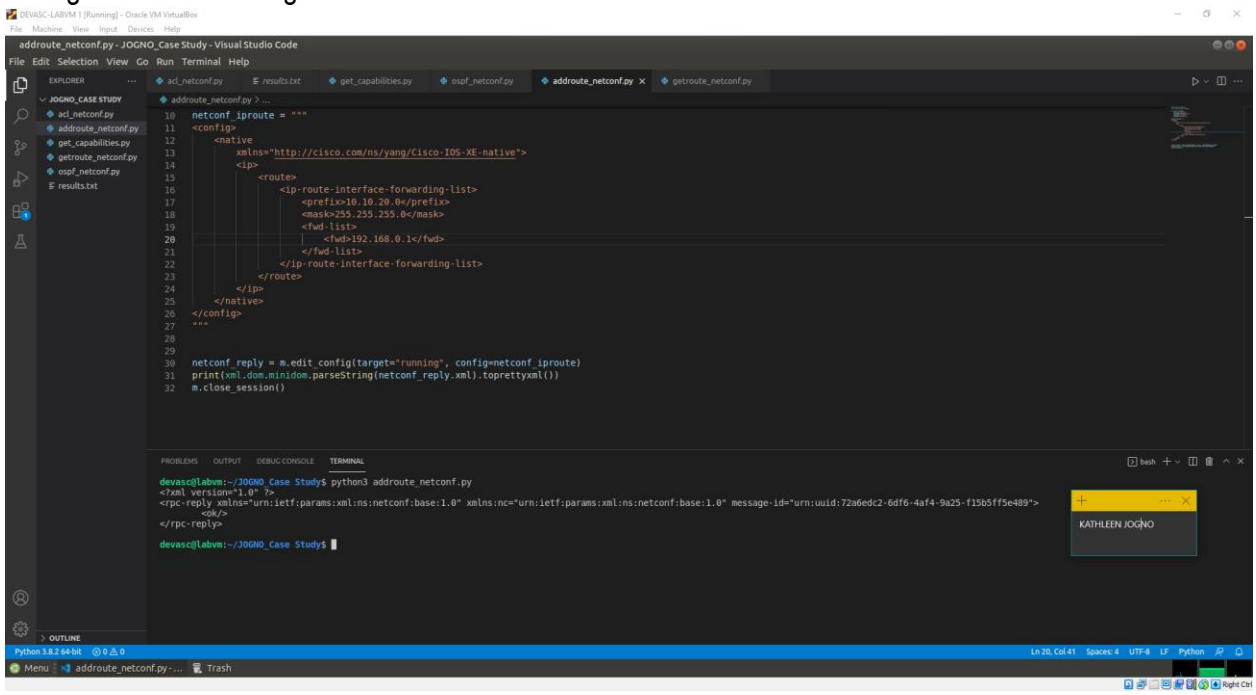
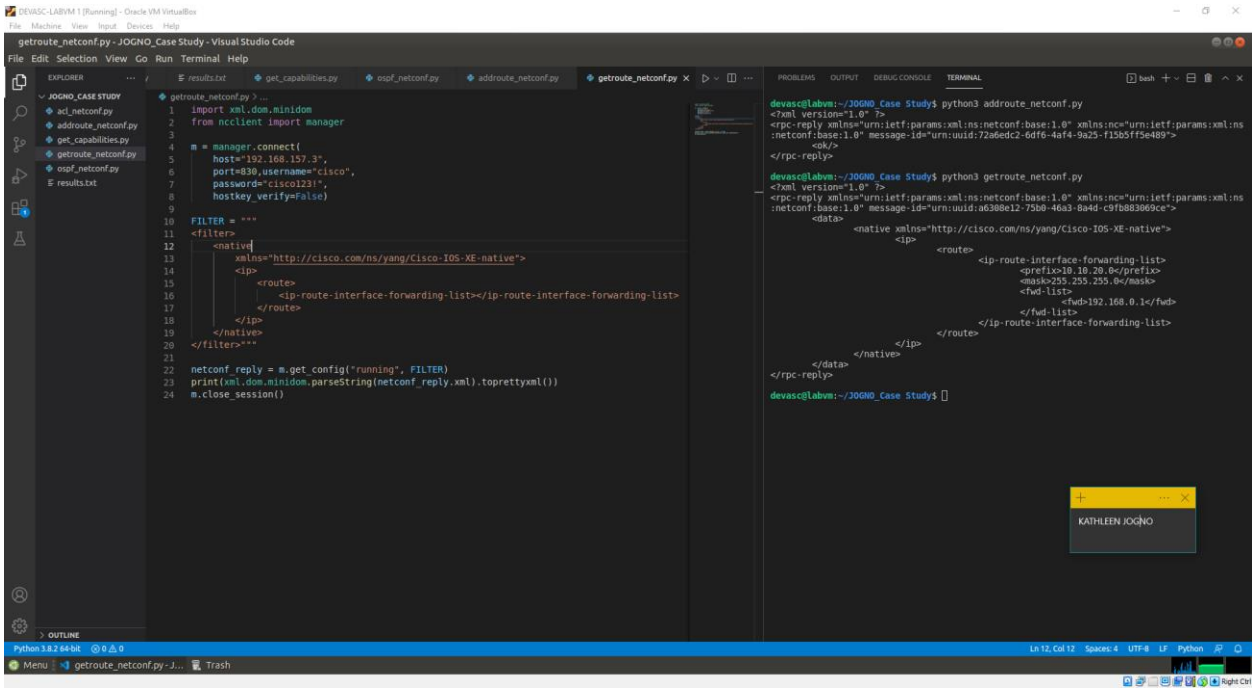
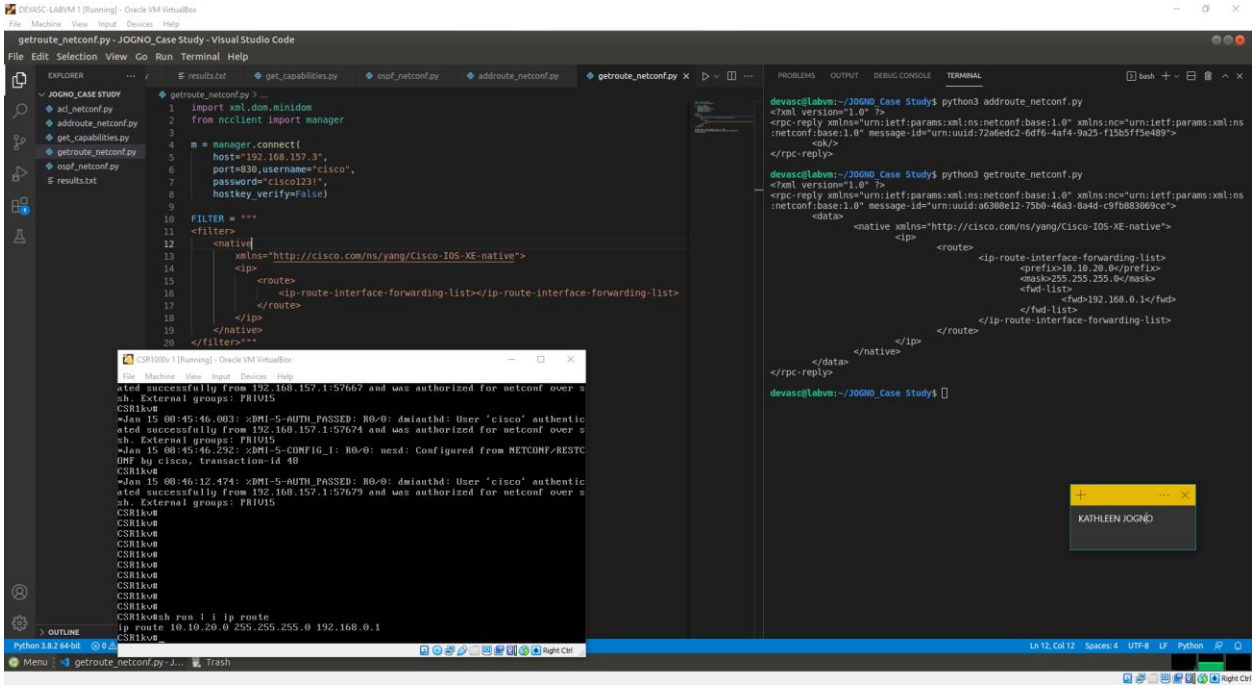
Right Ctrl

5. Configure IP Route using NETCONF.



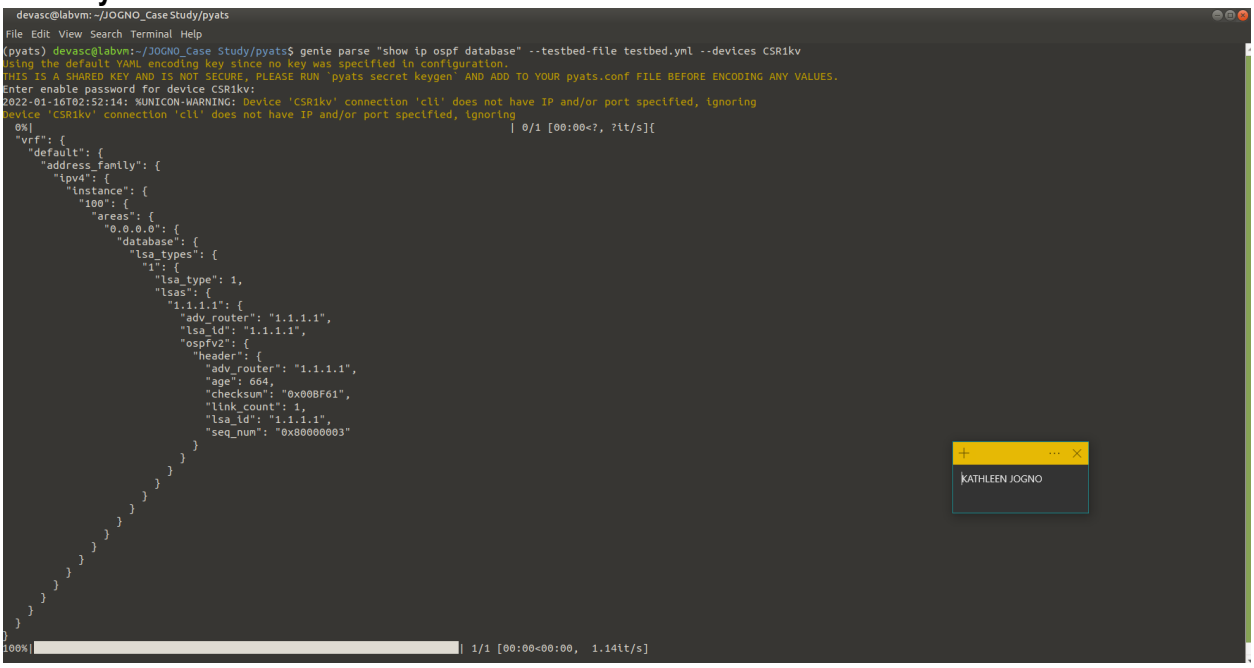
6. Run the file and check the output in the CSR1000v virtual machine.





Use PYATS to test Network

1 . Verify OSPF



2. Verify ACL

```
(pyats) devasc@labvm:~/JOGNO_Case Study/pyats$ genie parse "show ip access-lists" --testbed-file testbed.yml --devices CSR1kv
Using the default YAML encoding key since no key was specified in configuration.
THIS IS A SHARED KEY AND IS NOT SECURE, PLEASE RUN `pyats secret keygen` AND ADD TO YOUR pyats.conf FILE BEFORE ENCODING ANY VALUES.
Enter enable password for device CSR1kv:
2022-01-16T02:57:37: %UNICON-WARNING: Device 'CSR1kv' connection 'cli' does not have IP and/or port specified, ignoring
Device 'CSR1kv' connection 'cli' does not have IP and/or port specified, ignoring
  0%|                                                                                                    | 0/1 [00:00<?, ?it/s]{
  "acl1_permit": {
    "aces": {
      "10": {
        "actions": {
          "forwarding": "permit"
        },
        "matches": {
          "l3": {
            "ipv4": {
              "protocol": "ipv4",
              "source_network": {
                "192.168.255.0 0.0.0.255": {
                  "source_network": "192.168.255.0 0.0.0.255"
                }
              }
            }
          }
        },
        "name": "10"
      },
      "20": {
        "actions": {
          "forwarding": "deny"
        },
        "matches": {
          "l3": {
            "ipv4": {
              "protocol": "ipv4",
              "source_network": {
                "any": {
                  "source_network": "any"
                }
              }
            }
          }
        },
        "name": "20"
      }
    },
    "acl_type": "standard",
    "name": "acl1_permit",
    "type": "ipv4-acl-type"
  }
}
100%|                                                                                                    | 1/1 [00:00<00:00,  1.26it/s]

(pyats) devasc@labvm:~/JOGNO_Case Study/pyats$
```

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3. Verify IP Route

```
(pyats) devasc@labvm:~/JOGNO_Case Study/pyats$ genie parse "show ip route " --testbed-file testbed.yml --devices CSR1kv
Using the default YAML encoding key since no key was specified in configuration.
THIS IS A SHARED KEY AND IS NOT SECURE, PLEASE RUN `pyats secret keygen` AND ADD TO YOUR pyats.conf FILE BEFORE ENCODING ANY VALUES.
Enter enable password for device CSR1kv:
2022-01-16T03:00:22: %UNICON-WARNING: Device 'CSR1kv' connection 'cli' does not have IP and/or port specified, ignoring
Device 'CSR1kv' connection 'cli' does not have IP and/or port specified, ignoring
  0%|                                                                                                    | 0/1 [00:00<?, ?it/s]
{
  "vrf": {
    "default": {
      "address_family": {
        "ipv4": {
          "routes": {
            "192.168.157.0/24": {
              "active": true,
              "next_hop": {
                "outgoing_interface": {
                  "GigabitEthernet1": {
                    "outgoing_interface": "GigabitEthernet1"
                  }
                }
              },
              "route": "192.168.157.0/24",
              "source_protocol": "connected",
              "source_protocol_codes": "C"
            },
            "192.168.157.3/32": {
              "active": true,
              "next_hop": {
                "outgoing_interface": {
                  "GigabitEthernet1": {
                    "outgoing_interface": "GigabitEthernet1"
                  }
                }
              },
              "route": "192.168.157.3/32",
              "source_protocol": "local",
              "source_protocol_codes": "L"
            }
          }
        }
      }
    }
  }
}
100%|                                                                                                    | 1/1 [00:00<00:00,  1.24it/s]

(pyats) devasc@labvm:~/JOGNO_Case Study/pyats$
```

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