SDN/NFV Project1_310581027

Part1

Activate ONOS APPS

Q1. When ONOS activates "**org.onosproject.openflow**," what are the APPs which it also activates? **Ans.**

- org.onosproject.optical-model **(Optical Network Model)**
- org.onosproject.hostprovider **(Host Location Provider)**
- org.onosproject.lldpprovider **(LLDP Link Provider)**
- org.onosproject.openflow-base **(OpenFlow Base Provider)**

```
blacklutos@root > apps -a -s
*  17 org.onosproject.drivers              2.7.0    Default Drivers
*  24 org.onosproject.optical-model        2.7.0    Optical Network Model
*  63 org.onosproject.hostprovider         2.7.0    Host Location Provider
*  65 org.onosproject.lldpprovider         2.7.0    LLDP Link Provider
*  66 org.onosproject.openflow-base        2.7.0    OpenFlow Base Provider
*  67 org.onosproject.openflow             2.7.0    OpenFlow Provider Suite
*  90 org.onosproject.gui2                 2.7.0    ONOS GUI2
* 129 org.onosproject.fwd                  2.7.0    Reactive Forwarding
blacklutos@root > app deactivate org.onosproject.openflow
Deactivated org.onosproject.openflow
blacklutos@root > apps -a -s
*  17 org.onosproject.drivers              2.7.0    Default Drivers
*  90 org.onosproject.gui2                 2.7.0    ONOS GUI2
* 129 org.onosproject.fwd                  2.7.0    Reactive Forwarding
blacklutos@root > app activate org.onosproject.openflow
Activated org.onosproject.openflow
blacklutos@root > apps -a -s
*  17 org.onosproject.drivers              2.7.0    Default Drivers
*  24 org.onosproject.optical-model        2.7.0    Optical Network Model
*  63 org.onosproject.hostprovider         2.7.0    Host Location Provider
*  65 org.onosproject.lldpprovider         2.7.0    LLDP Link Provider
*  66 org.onosproject.openflow-base        2.7.0    OpenFlow Base Provider
*  67 org.onosproject.openflow             2.7.0    OpenFlow Provider Suite
*  90 org.onosproject.gui2                 2.7.0    ONOS GUI2
* 129 org.onosproject.fwd                  2.7.0    Reactive Forwarding
```

Q2. After activate ONOS and run P.15 command. Will H1 ping H2 successfully? Why or why not? **Ans.**

- In the first, the result would be not successful because I didn't activate **Reactivate Forwarding**. But after I activated the app, the ping result would be successful.

Observe listening port with terminal command "netstat"

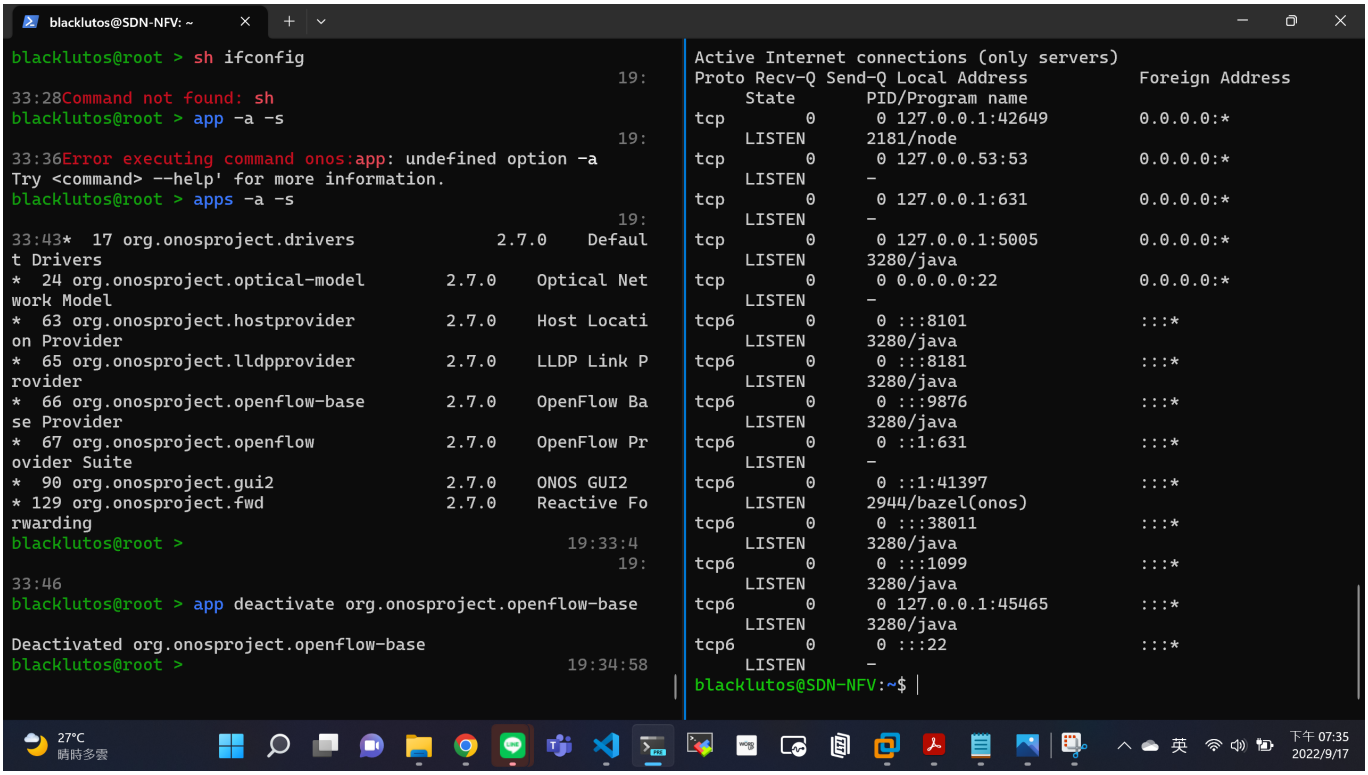
Q3. Which TCP port the controller listens for the OpenFlow connection request from the switch? screenshot **Ans.**

- **6633** and **6653**.
- In the old version of Openflow, the TCP port is **6633**, and the new version will be **6653**.

```
blacklutos@SDN-NFV:~/onos$ netstat -nlpt
(Not all processes could be identified, non-owned process info
 will not be shown, you would have to be root to see it all.)
Active Internet connections (only servers)
Proto Recv-Q Send-Q Local Address           Foreign Address         State       PID/Program name
tcp        0      0 127.0.0.1:42649         0.0.0.0:*               LISTEN      2181/node
tcp        0      0 127.0.0.53:53           0.0.0.0:*               LISTEN      -
tcp        0      0 127.0.0.1:631           0.0.0.0:*               LISTEN      -
tcp        0      0 127.0.0.1:5005          0.0.0.0:*               LISTEN      3280/java
tcp        0      0 0.0.0.0:22              0.0.0.0:*               LISTEN      -
tcp6       0      0 :::8101                 :::*                    LISTEN      3280/java
tcp6       0      0 :::8181                 :::*                    LISTEN      3280/java
tcp6       0      0 :::9876                 :::*                    LISTEN      3280/java
tcp6       0      0 ::1:631                 :::*                    LISTEN      -
tcp6       0      0 ::1:41397               :::*                    LISTEN      2944/bazel(onos)
tcp6       0      0 :::38011                :::*                    LISTEN      3280/java
tcp6       0      0 :::1099                 :::*                    LISTEN      3280/java
tcp6       0      0 127.0.0.1:45465         :::*                    LISTEN      3280/java
tcp6       0      0 :::6633                 :::*                    LISTEN      3280/java
tcp6       0      0 :::6653                 :::*                    LISTEN      3280/java
tcp6       0      0 :::22                   :::*                    LISTEN      -
```

Q4. In question 3, which APP enables the controller to listen on the TCP port? **Ans.**

- **org.onosproject.openflow-base**
- When I deactivate it, the TCP port **6633** and **6653** will disappear.



Part2

- **Add hosts**
  - Add the four hosts from h1 to h4.
- **Add switches**
  - Add the four switches from s1 to s4.
- **Add linkss**

- Link the switches and hosts.

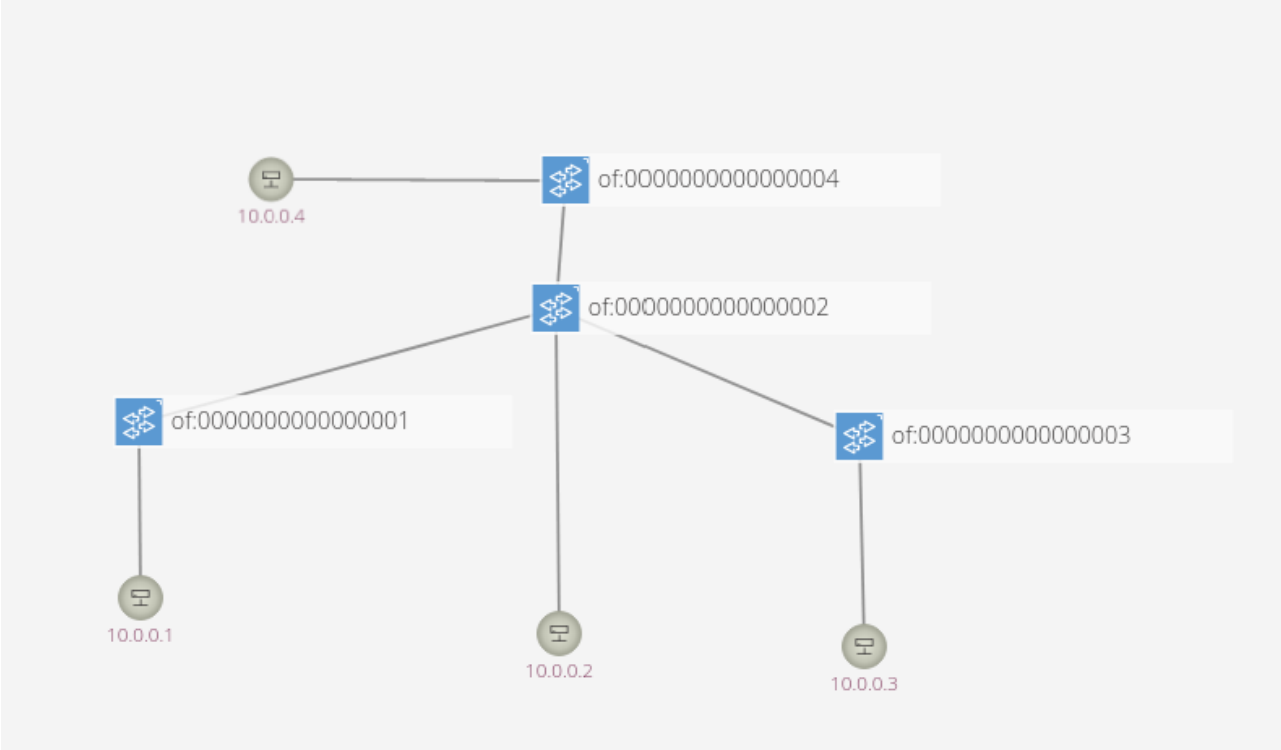
- **Code**

  - Use the order custom file and topo.

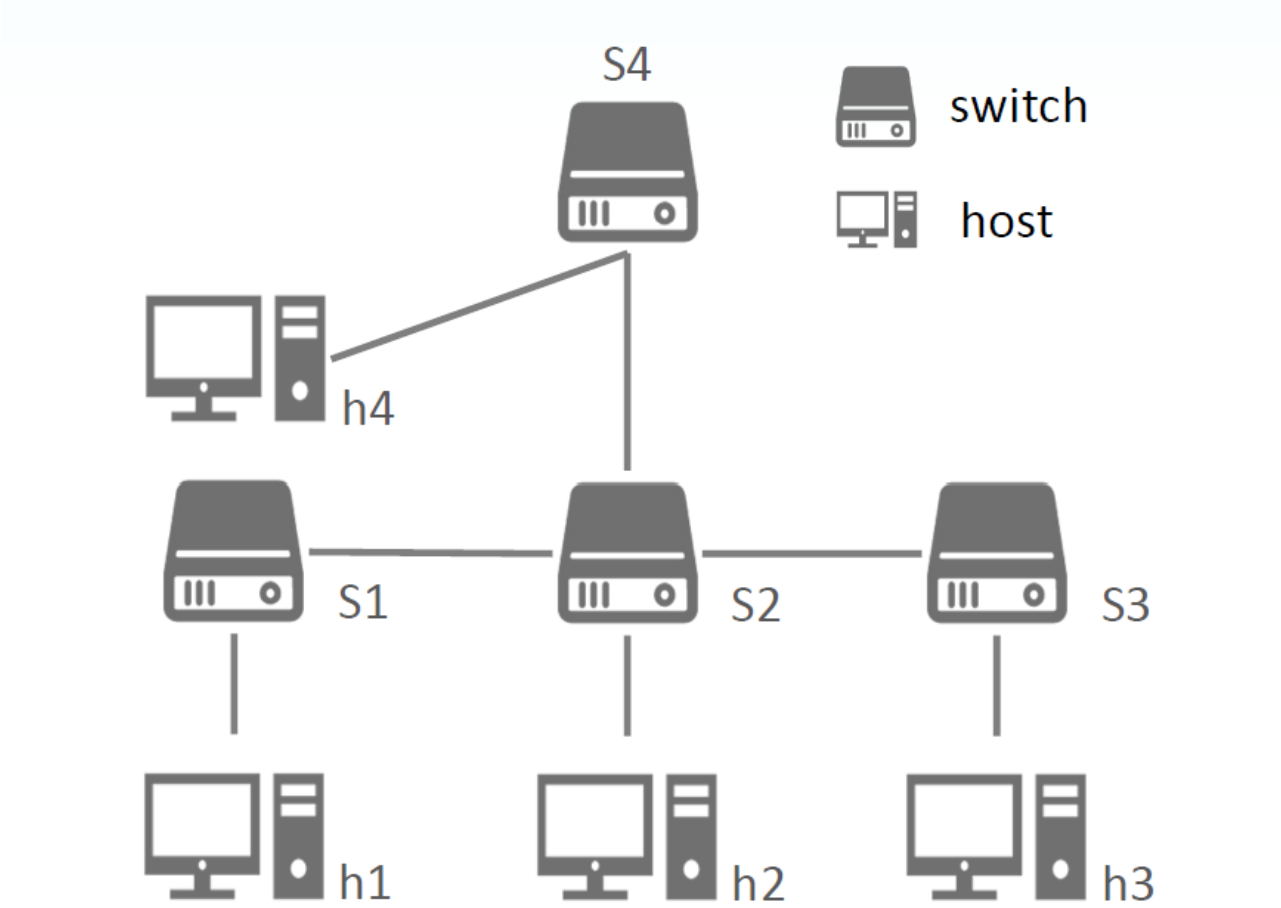
project1_310581027 > project1_part2_310581027.py

```python
from mininet.topo import Topo

class Project1_Topo_310581027( Topo ):
    def __init__( self ):
        Topo.__init__( self )

        # Add hosts
        h1 = self.addHost( 'h1' )
        h2 = self.addHost( 'h2' )
        h3 = self.addHost( 'h3' )
        h4 = self.addHost( 'h4' )

        # Add switches
        s1 = self.addSwitch( 's1' )
        s2 = self.addSwitch( 's2' )
        s3 = self.addSwitch( 's3' )
        s4 = self.addSwitch( 's4' )

        # Add links
        self.addLink( s4, h4 )
        self.addLink( s4, s2 )
        self.addLink( s1, s2 )
        self.addLink( s2, s3 )
        self.addLink( s1, h1 )
        self.addLink( s2, h2 )
        self.addLink( s3, h3 )


topos = { 'topo_part2_310581027': Project1_Topo_310581027 }
```

- **The ONOS topology graph.**



- **The topology graph.**



Part3

- **The revised part**

- Add IP address to hosts from 192.168.0.1 to 192.168.0.4.

```
# Add hosts
h1 = self.addHost( 'h1', ip='192.168.0.1/27' )
h2 = self.addHost( 'h2', ip='192.168.0.2/27' )
h3 = self.addHost( 'h3', ip='192.168.0.3/27' )
h4 = self.addHost( 'h4', ip='192.168.0.4/27' )
```

- Order the netmask would be 255.255.255.224 **(/27)**

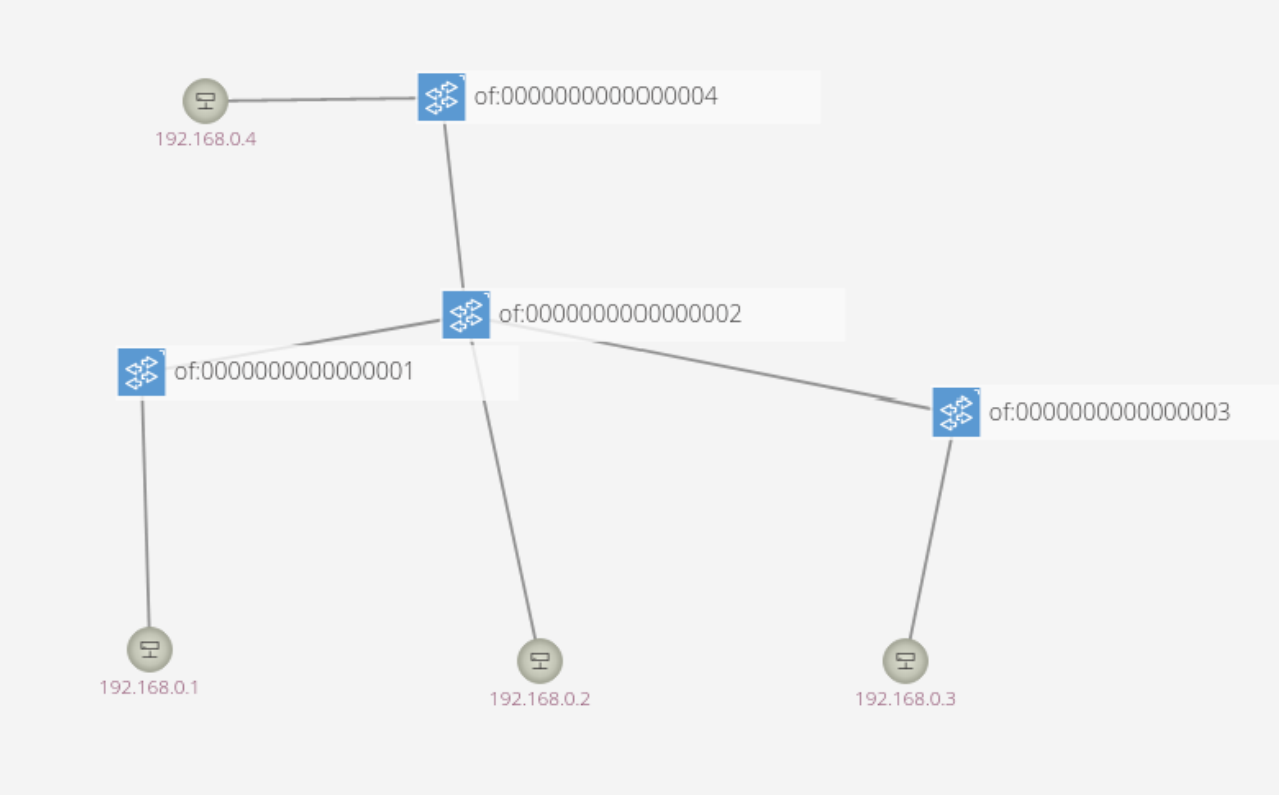
```
mininet> h1 ifconfig
h1-eth0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
        inet 192.168.0.1  netmask 255.255.255.224  broadcast 192.168.0.31
        inet6 fe80::6872:f9ff:fecd:1e92  prefixlen 64  scopeid 0x20<link>
```

```
mininet> h2 ifconfig
h2-eth0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
        inet 192.168.0.2  netmask 255.255.255.224  broadcast 192.168.0.31
        inet6 fe80::749c:69ff:fe44:976d  prefixlen 64  scopeid 0x20<link>
```

```
mininet> h3 ifconfig
h3-eth0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
        inet 192.168.0.3  netmask 255.255.255.224  broadcast 192.168.0.31
        inet6 fe80::f895:30ff:fe66:9cee  prefixlen 64  scopeid 0x20<link>
```

```
mininet> h4 ifconfig
h4-eth0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
        inet 192.168.0.4  netmask 255.255.255.224  broadcast 192.168.0.31
        inet6 fe80::9430:c2ff:fe50:9d04  prefixlen 64  scopeid 0x20<link>
```

- The onos topology graph.



What I’ve learned or solved

Learn

- I learned how to write mininet program by using python to implement the virtual network topology.
- Use the controller of onos to forward the packet in topology.

Problem

- At first, I meet a problem While I execute the command, I stop in the process which is 'starting cli', and I found that I shouldn't copy the command from TA's lab pdf file, it will have some error. After I try to manually input the command, the problem will be solved.