

Programming Assignment 2 (based on Lab 3)

INSTRUCTIONS

This lab assignment focuses on configuring OVSs using the POX controller. Design a network for the below-given topology in the Mininet/MiniEdit.

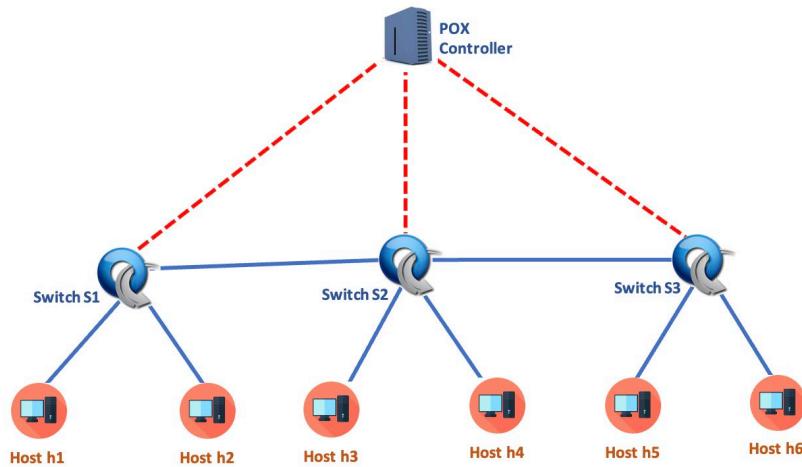


Figure 1: Topology

- The topology consists of six end-hosts named h1 to h6 and three Open vSwitches named S1 to S3. The goal of an assignment is to enable **layer2 learning on switches s1 and s3** and **load balancing on switch s2** using the POX controller.

Table 1:

Device	Function
s1	Layer-2 Learning
s2	Load Balancer
s3	Layer-2 Learning

HINT: Please follow <https://noxrepo.github.io/pox-doc/html/#forwarding-l2-multi> to find out about using “--dpi d” parameter to define the ID of the controller on which load balancing will be initiated. By default, the dpi d number for switch s1 is 1, s2 is 2 and s3 is 3.

- The host h3 and h4 connected to switch **s2 (load balancer)** will be initiated as HTTP servers using **port number 80**.

- The hosts h1, h2, h5, and h6 connected to switches s1 and s3 will send traffic toward HTTP servers and act as HTTP clients. The **virtual IP** used to send traffic to HTTP servers is **10.0.1.1**.
- The communication between s1-s2 and s3-s2 will be enabled by initiating the **layer-2 learning switch** mechanism on switches **s1** and **s3**.
- The POX controller must be configured according to Table 2.

Table 2:

Device	Port no.	IP Address	Type
c0	6633	127.0.0.1	Remote Controller

- The IP addresses for different devices and its functioning must be configured according to Table 3.

Table 3: IP Addresses

Host	Interface	IP Address	Function
h1	Eth0	10.0.0.1	HTTP client
h2	Eth0	10.0.0.2	HTTP client
h3	Eth0	10.0.0.3	HTTP Server
h4	Eth0	10.0.0.4	HTTP Server
h5	Eth0	10.0.0.5	HTTP client
h6	Eth0	10.0.0.6	HTTP client

Your lab assignment work will be assessed based on if you are able to,

- Design the above topology in the Mininet or MiniEdit and assign the IP address to each host and controller according to Table 2 and Table 3.
- Issue commands to start the HTTP servers at host h3 and h4 using port number 80 (attach the **screenshots**).
- Start the POX controller to enable the layer-2 learning switch and load balancing operation according to the above-given description (attach the **screenshots** to show the status of different switches and servers).
- Test the load balancing traffic by sending 10 curl from each client to the virtual IP (i.e., 10.0.1.1) of the servers. Attach a **screenshot** showing traffic distribution on each server's terminal.
- Issue a command to print flow entries for each switch (attach the **screenshots**).
- Finally, test connectivity by sending a ping command from any single host to all other hosts (attach the **screenshots**).

During the assignment demo,

- Demonstrate the working of the above topology.
- Show a report to the GA showing the above deliverables.
- Answer the questions asked by the GA. Please note that during the demo student will be asked to make amendments within the network and explain the changes in the network that will be observed because of those changes.