Summary of Goals:

- Create a Mininet Topology (See Lab 1 for help) to represent the above topology.
- Create a Pox controller (See Lab 3 for help) with the following features:
- All hosts are able to communicate, EXCEPT:
- Untrusted Host cannot send ICMP to Host 101-104, 201-204, or the LLM Server.
- Untrusted Host cannot send any IP traffic to the LLM Server.
- Trusted Host cannot send ICMP traffic to Host 201-204 in Department B, or the LLM Server.
- Trusted Host cannot send any IP traffic to the LLM Server.
- Hosts in Department A (Host 101-104) cannot send any ICMP traffic to the hosts in Department B (Host 201-204), and vice versa.

Testing:

You may test with mininet commands and observing packets with Wireshark inside your VM. Please have a detailed illustration (with screenshots) about how you tested your codes in the report.

Grading Rubric:

Total: 100 points

Submit both the code and PDF report.

20 points: Mininet Topology (use proper mininet commands and screenshots to justify in your report)

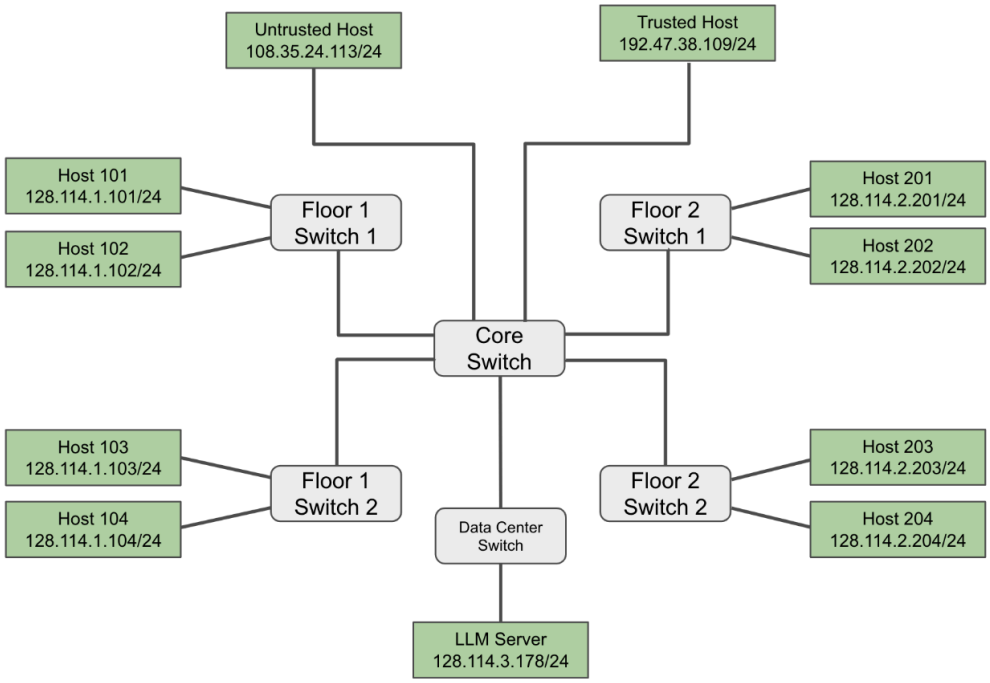
10: Devices are successfully created.

```
mininet> nodes
available nodes are:
c0 h101 h102 h103 h104 h201 h202 h203 h204 h_server h_trust h_untrust s1 s2 s3 s
4 s5 s6
```

The hosts, trusted hosts, untrusted hosts, LLM server and switches are created.

10: Links are successfully created, and the topology is correct.

```
mininet> net
h101 h101-eth0:s1-eth2
h102 h102-eth0:s1-eth3
h103 h103-eth0:s2-eth2
h104 h104-eth0:s2-eth3
h201 h201-eth0:s3-eth2
h202 h202-eth0:s3-eth3
h203 h203-eth0:s4-eth2
h204 h204-eth0:s4-eth3
h_server h_server-eth0:s6-eth2
h_trust h_trust-eth0:s5-eth6
h_untrust h_untrust-eth0:s5-eth7
s1 lo:  s1-eth1:s5-eth1 s1-eth2:h101-eth0 s1-eth3:h102-eth0
s2 lo:  s2-eth1:s5-eth2 s2-eth2:h103-eth0 s2-eth3:h104-eth0
s3 lo:  s3-eth1:s5-eth3 s3-eth2:h201-eth0 s3-eth3:h202-eth0
s4 lo:  s4-eth1:s5-eth4 s4-eth2:h203-eth0 s4-eth3:h204-eth0
s5 lo:  s5-eth1:s1-eth1 s5-eth2:s2-eth1 s5-eth3:s3-eth1 s5-eth4:s4-eth1 s5-eth5:s6-eth1 s5-eth6
eth7:h_untrust-eth0
s6 lo:  s6-eth1:s5-eth5 s6-eth2:h_server-eth0
c0
```



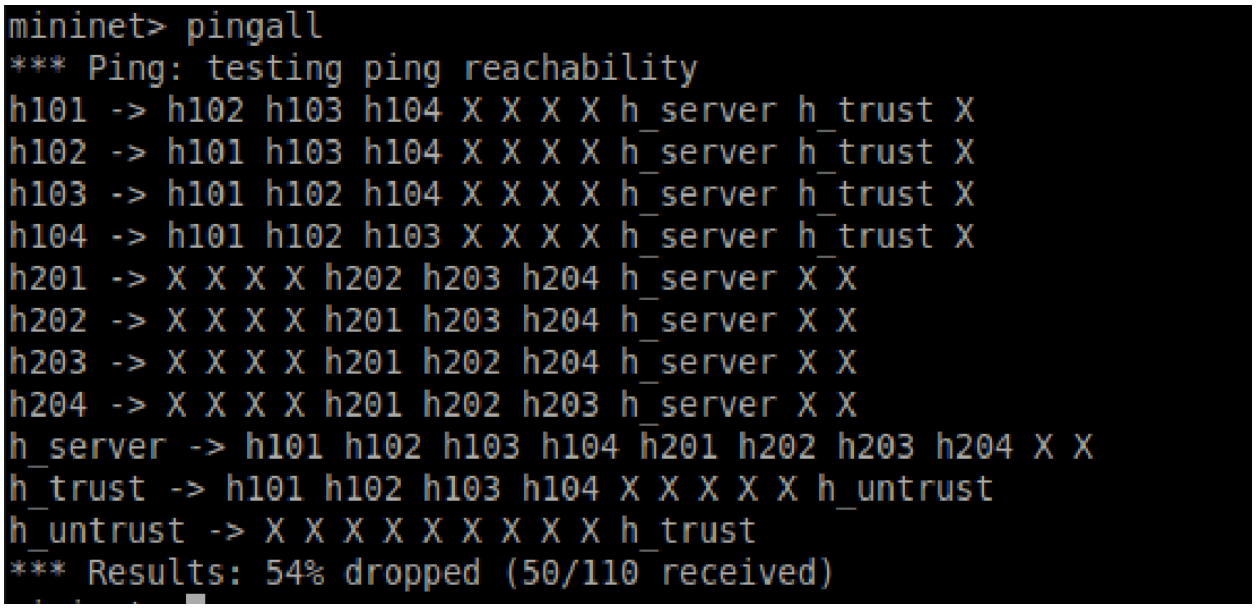
Links following the assignment technology are established.

10: IP addresses are correct.

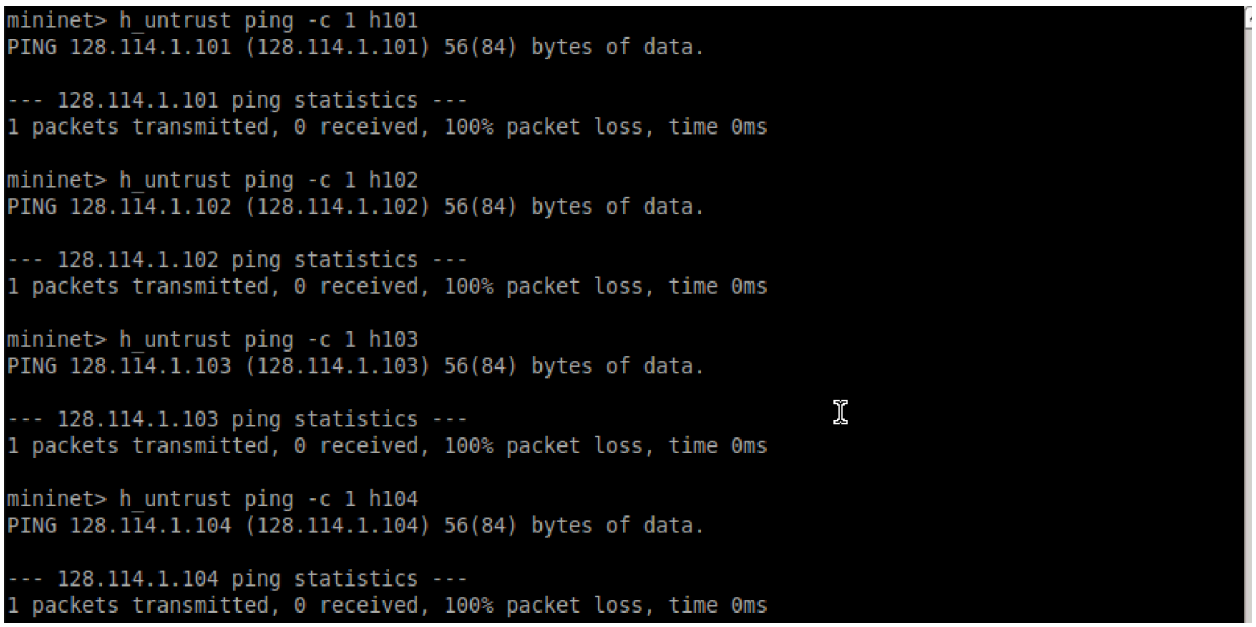
Devices have correct IP addresses.

60 points: Pox Controller (use proper mininet commands and screenshots to justify in your report)

20: Hosts can communicate.



10: Untrusted Host cannot send ICMP traffic to Host 101-104, 201-204

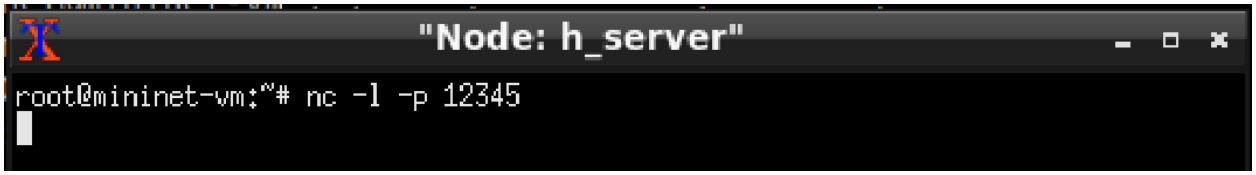


```
mininet> h_untrust ping -c 1 h201
PING 128.114.2.201 (128.114.2.201) 56(84) bytes of data.

--- 128.114.2.201 ping statistics ---
1 packets transmitted, 0 received, 100% packet loss, time 0ms

mininet> h_untrust ping -c 1 h202
PING 128.114.2.202 (128.114.2.202) 56(84) bytes of data.

--- 128.114.2.202 ping statistics ---
1 packets transmitted, 0 received, 100% packet loss, time 0ms

mininet> h_untrust ping -c 1 h203
PING 128.114.2.203 (128.114.2.203) 56(84) bytes of data.

--- 128.114.2.203 ping statistics ---
1 packets transmitted, 0 received, 100% packet loss, time 0ms

mininet> h_untrust ping -c 1 h204
PING 128.114.2.204 (128.114.2.204) 56(84) bytes of data.

--- 128.114.2.204 ping statistics ---
1 packets transmitted, 0 received, 100% packet loss, time 0ms
```

10: Untrusted/Trust Host cannot send any traffic to the LLM Server

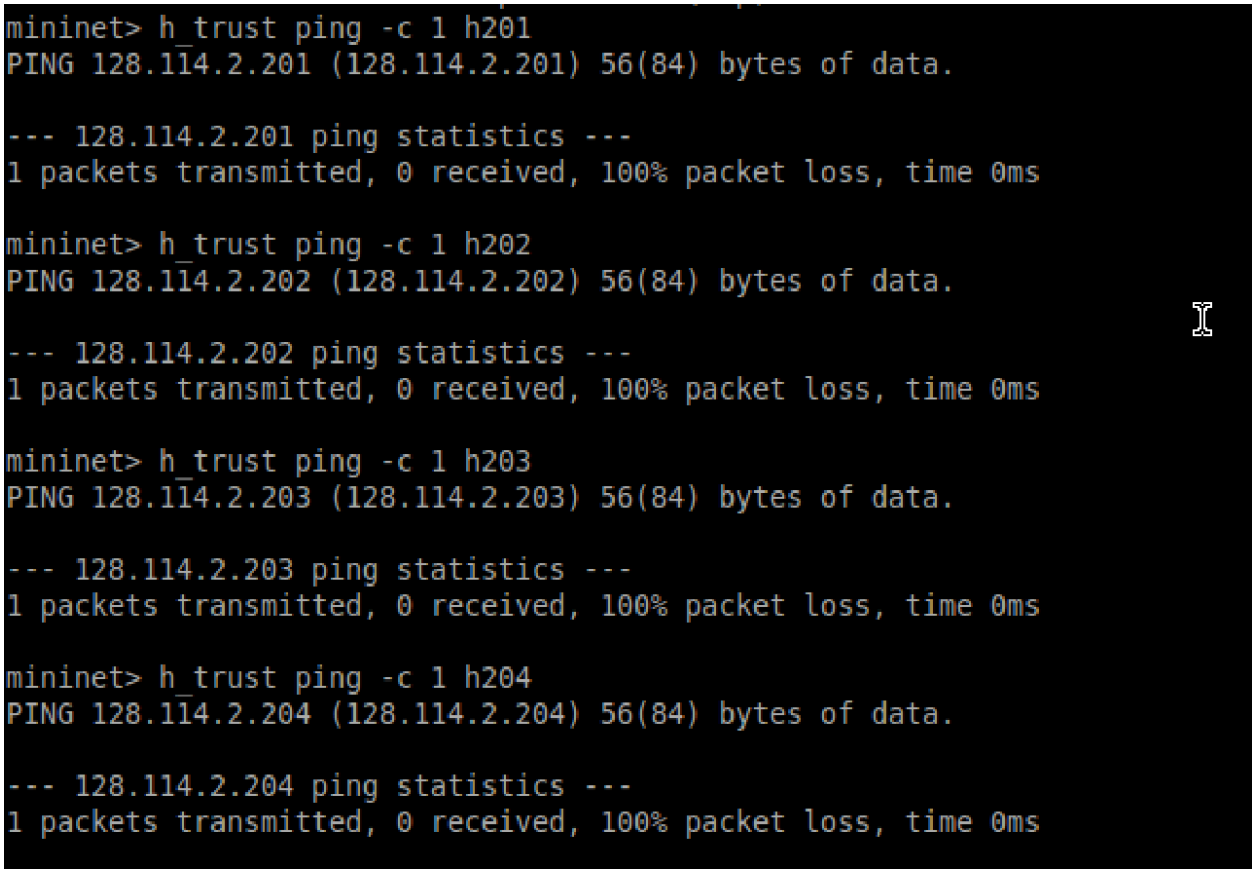
```
mininet> h_untrust ping -c 1 h_server
PING 128.114.3.178 (128.114.3.178) 56(84) bytes of data.

--- 128.114.3.178 ping statistics ---
1 packets transmitted, 0 received, 100% packet loss, time 0ms

mininet> h_trust ping -c 1 h_server
PING 128.114.3.178 (128.114.3.178) 56(84) bytes of data.

--- 128.114.3.178 ping statistics ---
1 packets transmitted, 0 received, 100% packet loss, time 0ms
```

```
mininet> xterm h_server
mininet> h_untrust nc -zv 128.114.3.178 12345
nc: connect to 128.114.3.178 port 12345 (tcp) failed: Connection timed out
mininet> h_trust nc -zv 128.114.3.178 12345
nc: connect to 128.114.3.178 port 12345 (tcp) failed: Connection timed out
```



Timeout indicating tcp traffic blocked.

10: Trusted Host cannot send ICMP traffic to Host 201 to 204



Trusted host packets being dropped when sending to hosts 201 to 204 indicating they are blocking.

10: Host 101 to 104 cannot send ICMP traffic to Host 201 to 204

```
mininet> h101 ping -c 1 h201
PING 128.114.2.201 (128.114.2.201) 56(84) bytes of data.

--- 128.114.2.201 ping statistics ---
1 packets transmitted, 0 received, 100% packet loss, time 0ms

mininet> h101 ping -c 1 h202
PING 128.114.2.202 (128.114.2.202) 56(84) bytes of data.

--- 128.114.2.202 ping statistics ---
1 packets transmitted, 0 received, 100% packet loss, time 0ms

mininet> h101 ping -c 1 h203
PING 128.114.2.203 (128.114.2.203) 56(84) bytes of data.

--- 128.114.2.203 ping statistics ---
1 packets transmitted, 0 received, 100% packet loss, time 0ms

mininet> h101 ping -c 1 h204
PING 128.114.2.204 (128.114.2.204) 56(84) bytes of data.

--- 128.114.2.204 ping statistics ---
1 packets transmitted, 0 received, 100% packet loss, time 0ms
```

```
mininet> h102 ping -c 1 h201
PING 128.114.2.201 (128.114.2.201) 56(84) bytes of data.

--- 128.114.2.201 ping statistics ---
1 packets transmitted, 0 received, 100% packet loss, time 0ms

mininet> h102 ping -c 1 h202
PING 128.114.2.202 (128.114.2.202) 56(84) bytes of data.

--- 128.114.2.202 ping statistics ---
1 packets transmitted, 0 received, 100% packet loss, time 0ms

mininet> h102 ping -c 1 h203
PING 128.114.2.203 (128.114.2.203) 56(84) bytes of data.

--- 128.114.2.203 ping statistics ---
1 packets transmitted, 0 received, 100% packet loss, time 0ms

mininet> h102 ping -c 1 h204
PING 128.114.2.204 (128.114.2.204) 56(84) bytes of data.

--- 128.114.2.204 ping statistics ---
1 packets transmitted, 0 received, 100% packet loss, time 0ms
```

```
mininet> h103 ping -c 1 h201
PING 128.114.2.201 (128.114.2.201) 56(84) bytes of data.

--- 128.114.2.201 ping statistics ---
1 packets transmitted, 0 received, 100% packet loss, time 0ms

mininet> h103 ping -c 1 h202
PING 128.114.2.202 (128.114.2.202) 56(84) bytes of data.

--- 128.114.2.202 ping statistics ---
1 packets transmitted, 0 received, 100% packet loss, time 0ms

mininet> h103 ping -c 1 h203
PING 128.114.2.203 (128.114.2.203) 56(84) bytes of data.

--- 128.114.2.203 ping statistics ---
1 packets transmitted, 0 received, 100% packet loss, time 0ms

mininet> h103 ping -c 1 h204
PING 128.114.2.204 (128.114.2.204) 56(84) bytes of data.

--- 128.114.2.204 ping statistics ---
1 packets transmitted, 0 received, 100% packet loss, time 0ms
```

```
mininet> h104 ping -c 1 h201
PING 128.114.2.201 (128.114.2.201) 56(84) bytes of data.

--- 128.114.2.201 ping statistics ---
1 packets transmitted, 0 received, 100% packet loss, time 0ms

mininet> h104 ping -c 1 h202
PING 128.114.2.202 (128.114.2.202) 56(84) bytes of data.

--- 128.114.2.202 ping statistics ---
1 packets transmitted, 0 received, 100% packet loss, time 0ms

mininet> h104 ping -c 1 h203
PING 128.114.2.203 (128.114.2.203) 56(84) bytes of data.

--- 128.114.2.203 ping statistics ---
1 packets transmitted, 0 received, 100% packet loss, time 0ms

mininet> h104 ping -c 1 h204
PING 128.114.2.204 (128.114.2.204) 56(84) bytes of data.

--- 128.114.2.204 ping statistics ---
1 packets transmitted, 0 received, 100% packet loss, time 0ms
```

Hosts in the 100 series cannot send to hosts in the 200 series as seen by the ping commands, those packets are dropped indicating they are blocking.

20 points: Quality of the report.

Credits are given based on the clarity of your illustration and result justification. You must include screenshots proving your code works. These screenshots must come from your own code. This will be tested and submitting screenshots of someone else's code can be considered an academic integrity violation. Note that for the report, we will not be telling you what commands to run to verify the assignment goals are met. Figuring out how to prove your work is a part of this assignment. A good report should comprehensively analyze the correctness of your implementation and present the results in a clear way. You could follow the "Summary of Goals" or the "Grading Rubric" to decide how to demonstrate your implementation in the report. Partial credit may be awarded for incomplete assignments based upon the submitted code and explanations in the report as to why something may not be functioning properly. If you are not

able to get the expected results, below your screenshot, explain what you think is going on (for partial credit).