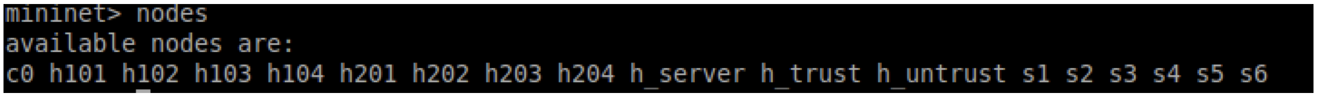
Final Project

Nodes:

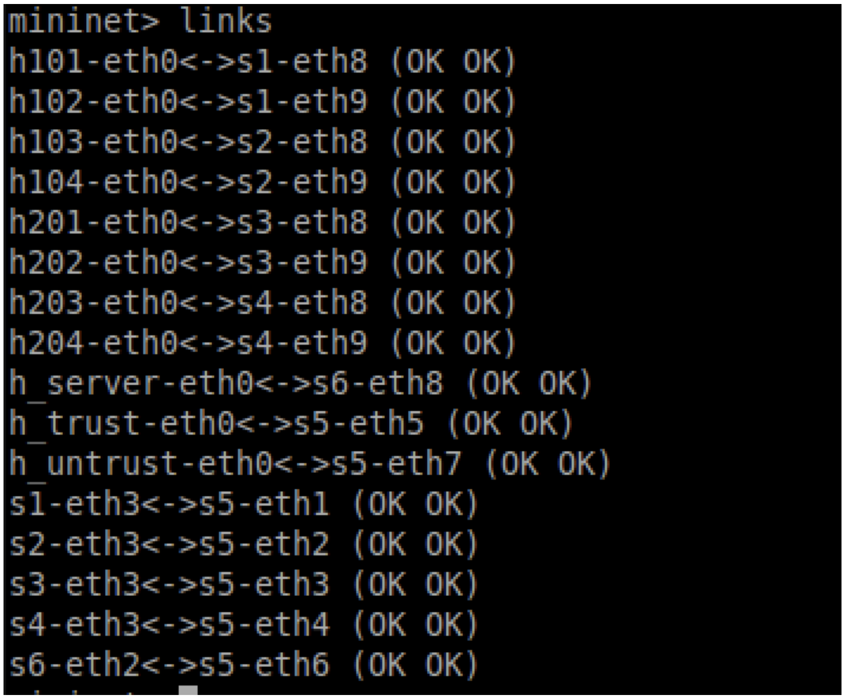


```
mininet> nodes
available nodes are:
c0 h101 h102 h103 h104 h201 h202 h203 h204 h_server h_trust h_untrust s1 s2 s3 s4 s5 s6
```

This shows that all hosts/devices were created successfully. This was done using the mininet command “node”, which lists all the nodes (hosts, switches, and the controller) in the current Mininet network.

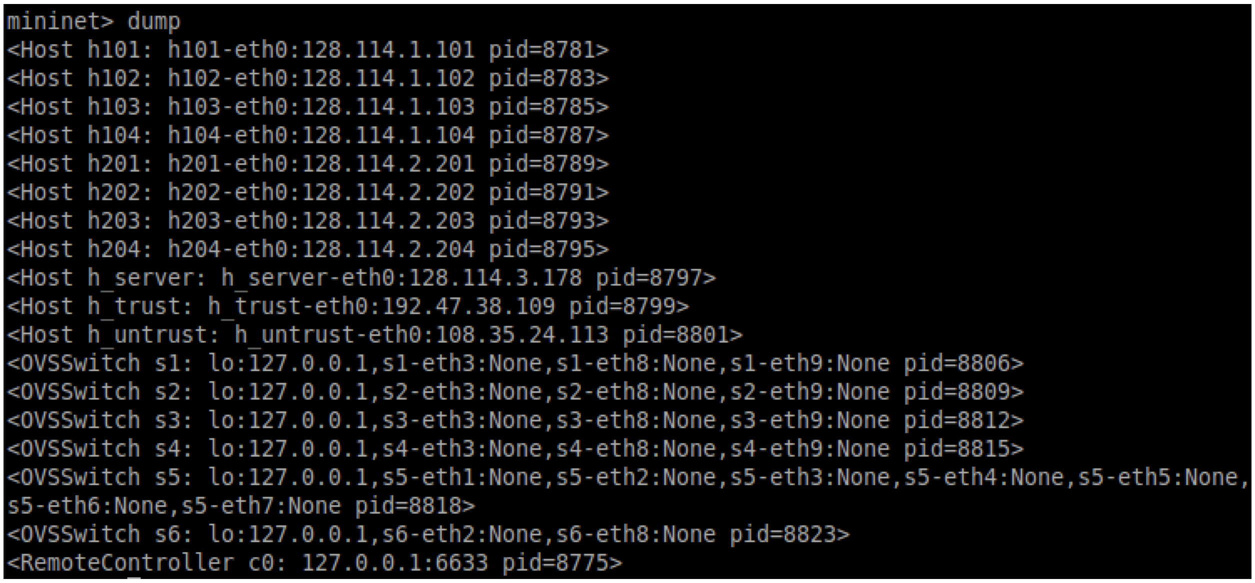
Links:

This shows that all the Links were successfully created, and the topology is correct. I did this using the “links: command which shows information about the links between switches and hosts in the emulated network.



```
mininet> links
h101-eth0<->s1-eth8 (OK OK)
h102-eth0<->s1-eth9 (OK OK)
h103-eth0<->s2-eth8 (OK OK)
h104-eth0<->s2-eth9 (OK OK)
h201-eth0<->s3-eth8 (OK OK)
h202-eth0<->s3-eth9 (OK OK)
h203-eth0<->s4-eth8 (OK OK)
h204-eth0<->s4-eth9 (OK OK)
h_server-eth0<->s6-eth8 (OK OK)
h_trust-eth0<->s5-eth5 (OK OK)
h_untrust-eth0<->s5-eth7 (OK OK)
s1-eth3<->s5-eth1 (OK OK)
s2-eth3<->s5-eth2 (OK OK)
s3-eth3<->s5-eth3 (OK OK)
s4-eth3<->s5-eth4 (OK OK)
s6-eth2<->s5-eth6 (OK OK)
```

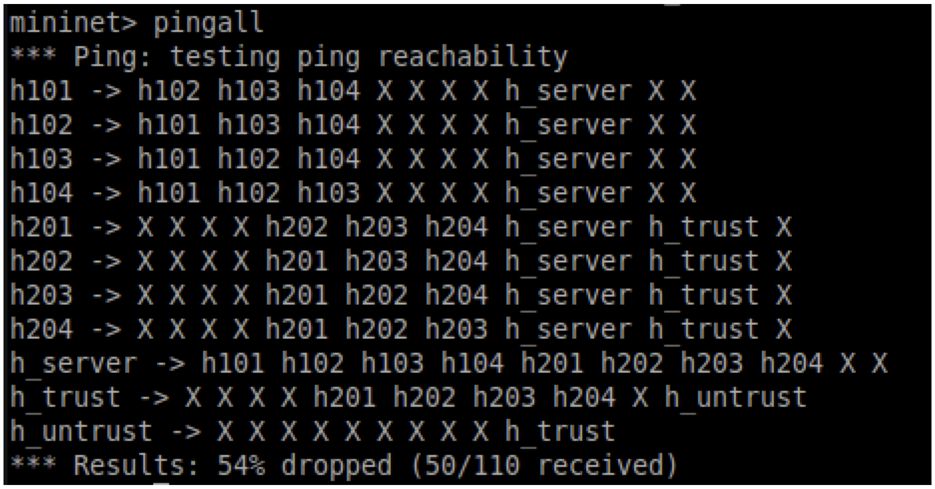
IP Addresses:



```
mininet> dump
<Host h101: h101-eth0:128.114.1.101 pid=8781>
<Host h102: h102-eth0:128.114.1.102 pid=8783>
<Host h103: h103-eth0:128.114.1.103 pid=8785>
<Host h104: h104-eth0:128.114.1.104 pid=8787>
<Host h201: h201-eth0:128.114.2.201 pid=8789>
<Host h202: h202-eth0:128.114.2.202 pid=8791>
<Host h203: h203-eth0:128.114.2.203 pid=8793>
<Host h204: h204-eth0:128.114.2.204 pid=8795>
<Host h_server: h_server-eth0:128.114.3.178 pid=8797>
<Host h_trust: h_trust-eth0:192.47.38.109 pid=8799>
<Host h_untrust: h_untrust-eth0:108.35.24.113 pid=8801>
<OVSSwitch s1: lo:127.0.0.1,s1-eth3:None,s1-eth8:None,s1-eth9:None pid=8806>
<OVSSwitch s2: lo:127.0.0.1,s2-eth3:None,s2-eth8:None,s2-eth9:None pid=8809>
<OVSSwitch s3: lo:127.0.0.1,s3-eth3:None,s3-eth8:None,s3-eth9:None pid=8812>
<OVSSwitch s4: lo:127.0.0.1,s4-eth3:None,s4-eth8:None,s4-eth9:None pid=8815>
<OVSSwitch s5: lo:127.0.0.1,s5-eth1:None,s5-eth2:None,s5-eth3:None,s5-eth4:None,s5-eth5:None,
s5-eth6:None,s5-eth7:None pid=8818>
<OVSSwitch s6: lo:127.0.0.1,s6-eth2:None,s6-eth8:None pid=8823>
<RemoteController c0: 127.0.0.1:6633 pid=8775>
```

Using the command “dump” will show all the IP addresses, and pid assigned to each host. This listing hosts like h101, h102, and switches such as s1, $2, along with their corresponding IP addresses, interface connections, and process IDs. For instance, h101 is associated with IP 128.114.1.101 and switches s1, while s1 is linked with interfaces s1-eth3, s1-eth8, and s1-eth9. This detailed breakdown assists in visualizing the network topology.

POX controller:



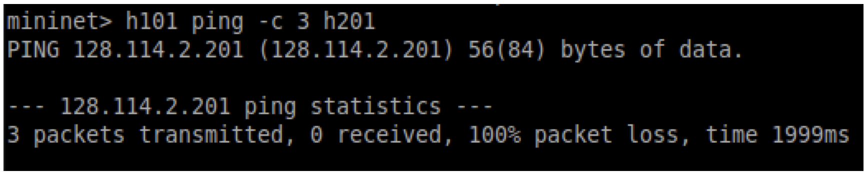
```
mininet> pingall
*** Ping: testing ping reachability
h101 -> h102 h103 h104 X X X X h_server X X
h102 -> h101 h103 h104 X X X X h_server X X
h103 -> h101 h102 h104 X X X X h_server X X
h104 -> h101 h102 h103 X X X X h_server X X
h201 -> X X X X h202 h203 h204 h_server h_trust X
h202 -> X X X X h201 h203 h204 h_server h_trust X
h203 -> X X X X h201 h202 h204 h_server h_trust X
h204 -> X X X X h201 h202 h203 h_server h_trust X
h_server -> h101 h102 h103 h104 h201 h202 h203 h204 X X
h_trust -> X X X X h201 h202 h203 h204 X h_untrust
h_untrust -> X X X X X X X X X h_trust
*** Results: 54% dropped (50/110 received)
```

This shows that the untrusted host cannot send ICMP traffic to host 101-104 and 201-204. I found this using "pingall", where pingall sends ICMP (Internet Control Message Protocol) traffic. It performs a ping test between all pairs of hosts in the network, and shows which hosts can communicate with each other. From this test we see that all hosts are able to communicate to at least one other host. The hosts 101-104 (floor 1) can only communicate with other hosts on floor 1 as well as the server. Hosts 201-204 (floor 2) can only communicate with other hosts on floor 2 as well as the server and the trusted server. The server is able to talk with all floors but not the trusted server and the untrusted server. The trusted host is able to communicate with the second floor and the untrusted host. However this is not supposed to happen, the trusted server should not be able to communicate with the second floor. I believe this is happening because of some wrong conditioning in my code. The untrusted host is able to communicate with no one except the trusted server. **All of this concludes** that all hosts are able to communicate, the untrusted host cannot send ICMP traffic to hosts 101-104 and hosts 201-204, however it can only send to the trusted host, trusted host cannot send traffic to 101-104 only to 201-204, and hosts 101-104 and hosts 201-204 are not able to communicate with each other.

Special Tests:

In this section, I am just going to be running special tests that showcase which hosts can communicate with each other. I will be using the ping command (ex. h101 ping -c 3 h104). In the example command, host 101 will send packets to host 104, and it will show if the packets were received or not.

h101 ping -c 3 h201:

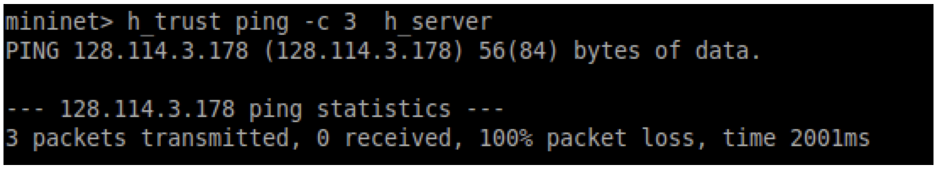


```
mininet> h101 ping -c 3 h201
PING 128.114.2.201 (128.114.2.201) 56(84) bytes of data.

--- 128.114.2.201 ping statistics ---
3 packets transmitted, 0 received, 100% packet loss, time 1999ms
```

In this we are trying to communicate with host 201 which is the second floor, and from the results it shows that we cannot communicate with floor 2. This concludes that floor 1 will not be able to communicate with floor 2 which is what we want.

H_trust ping -c 3 h_server:

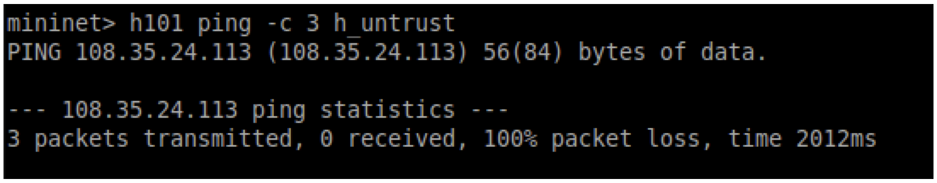


```
mininet> h_trust ping -c 3  h_server
PING 128.114.3.178 (128.114.3.178) 56(84) bytes of data.

--- 128.114.3.178 ping statistics ---
3 packets transmitted, 0 received, 100% packet loss, time 2001ms
```

In this we are pinging the trusted server to communicate with the main server. The results show that they are not able to communicate with each other, since no packets were received which is what we want.

H101 ping -c 3 h_untrust:



```
mininet> h101 ping -c 3 h_untrust
PING 108.35.24.113 (108.35.24.113) 56(84) bytes of data.

--- 108.35.24.113 ping statistics ---
3 packets transmitted, 0 received, 100% packet loss, time 2012ms
```

For this test we are going to ping the untrusted server from a host on floor 1. As we can see, they are not able to communicate with each other since no packets were received. This is what we want since we don't want a untrusted person to talk with our hosts on floor 1