Asha Anderson
Uche Osuji
Temiloluwa Anjorin

Approaches to Construct the Campus Network Topology

This document provides an overview of the methods and approaches used to discover and construct the Howard University campus network topology. It includes details on how traceroute and Scapy were employed to achieve this task.

Traceroute
We ran the traceroute commands to various IP addresses within the network. This allowed information about the network path to be taken by packets as they make their way from the source to their destination. Our collected data consisted of a list of IP addresses visited during the route and their order

Ex.

```
Current IP Address: 10.0.3.110
1 hops away: 10.41.96.1
2 hops away: 10.199.4.229
3 hops away: 10.199.3.1
Current IP Address: 10.0.3.158
4 hops away: 66.44.94.195
1 hops away: 10.41.96.1
5 hops away: 138.238.3.33
2 hops away: 10.199.4.229
6 hops away: 138.238.3.13
Current IP Address: 10.0.3.211
Current IP Address: 10.0.3.226
Current IP Address: 10.0.3.237
Current IP Address: 10.0.3.247
Current IP Address: 10.0.3.252
1 hops away: 10.41.96.1
1 hops away: 10.41.96.1
1 hops away: 10.41.96.1
1 hops away: 10.41.96.1
2 hops away: 10.199.4.229
1 hops away: 10.41.96.1
Current IP Address: 10.0.4.71
2 hops away: 10.199.4.229
2 hops away: 10.199.4.229
```

The code reads traceroute result files, extracts traceroute IP addresses, and clears any lines that are empty or irrelevant. Cleaned traceroute result data is sorted and ready for further work.
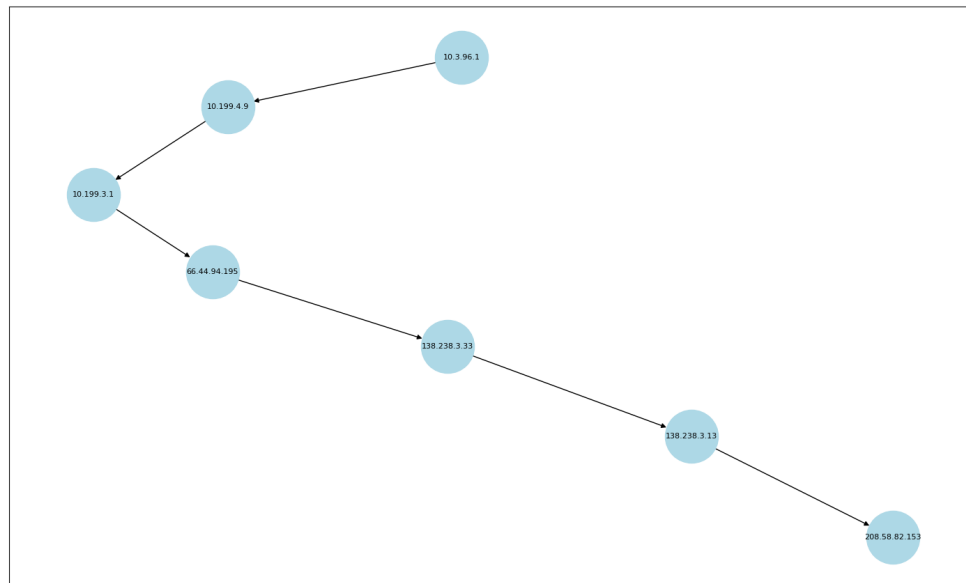
Topology

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The network topology is represented as a graph, where nodes represent IP addresses, and edges represent connections between the nodes. Our file topology.py uses the NetworkX library to create and manipulate the graph. Each IP address becomes a node in the graph. The code then compiles the topology from the cleaned Traceroute data. For each Traceroute outcome, the code determines the order of the IP addresses that were visited along the Traceroute route. Topology.py then creates edges (connections) between nodes according to the order of the Traceroute IP addresses.

Graph Visualization Example

This is the topology diagram from the mackey Building we gathered