CS212 : Computer Networks Lab
Assignment 1

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1 Question 1 - Ping

1.1 Part a

I Have obtained the results as shown in Figure 1, for each website we can see the IP Address corresponding to the domain name in the first line. In each subsequent , the data corresponding to a packet is given. The size of data(In bytes), the icmp-seq(which gives the order/index of the packet), the TTL(total time to live) and the time i.e the RTT(Round trip time) are given. In the last section we can see the number of packets sent, number of packets received, packet loss and total time. We also get the statistical information like min, max and average of the RTT.

Note : I have used -c attribute to send specify the number of packets.

1.2 Part b

The RTT values obtained are different for each website, as it depends on various factors such as traffic levels, server response times, distance etc. As we can see the RTT's for amazon.in and google.com are nearly same and it is different for youtube.com, hence RTT's maybe different for different servers. We should also note that the RTT's are in the order of milliseconds, and hence a normal user may not be able to perceive a difference while using these services.

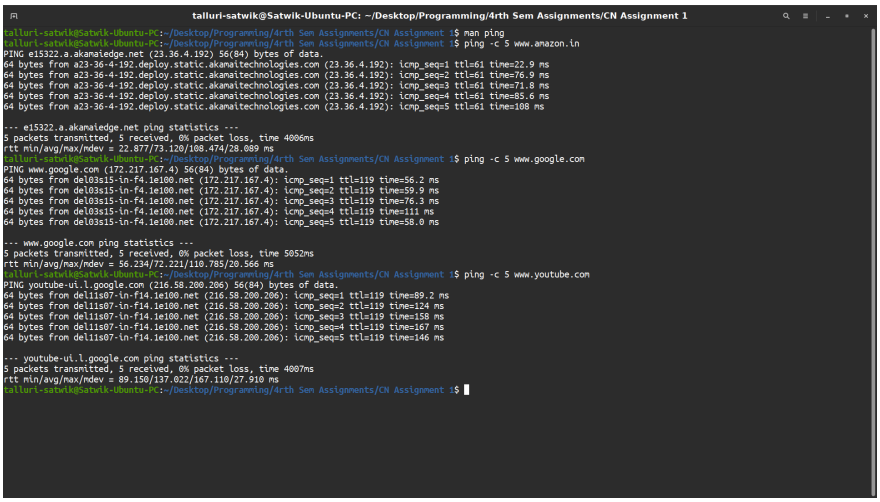

Figure 1: Terminal Window for Q1

2 Question 2 - TraceRoute

2.1 Part a

The network map is drawn for www.google.com as follows, (the terminal screenshot is shown in Figure 2)
192.168.1.1(Default IP address of my router) → 223.230.16.1 → 182.79.198.5 → 72.14.216.192 → 108.170.253.97 → 108.170.253.105 → 72.14.239.10 → 108.170.251.97 → 72.14.233.31 → 172.217.167.4(www.google.com)
These values represent the IP address of each router in the intermediate steps(hop addresses).

The network map is drawn for www.youtube.com as follows,
192.168.1.1(Default IP address of my router) → 223.230.16.1 → 116.119.57.201 → 72.14.208.234 → 72.14.239.61 → 108.170.236.197 → 216.58.197.78(www.youtube.com)

The network map is drawn for www.amazon.in as follows,
192.168.1.1(Default IP address of my router) → 223.230.16.1 → 116.119.35.171 → 23.36.4.192 (www.amazon.in)

2.2 Part b

We can set the maximum number of hops, by using the -m attribute. The command for it is :
$ traceroute -m 5 www.google.com, which sets the max number of hops to be 5.

2.3 Part c

For each hop, we send 3 seperate signal packets, and the timestamps corresponds to the RTTs for each packet. This is done to display consistency in the route and check how much the RTT values change.

2.4 Part d

TTL field is useful for ICMP packets, because it helps to terminate the trace if it stuck in a loop. TTL values speicfy the number of hops a packet can travel before it is dropped off, and hence we can specify a termination condition. We can also calculate the number of hops or distance between a server and the router.

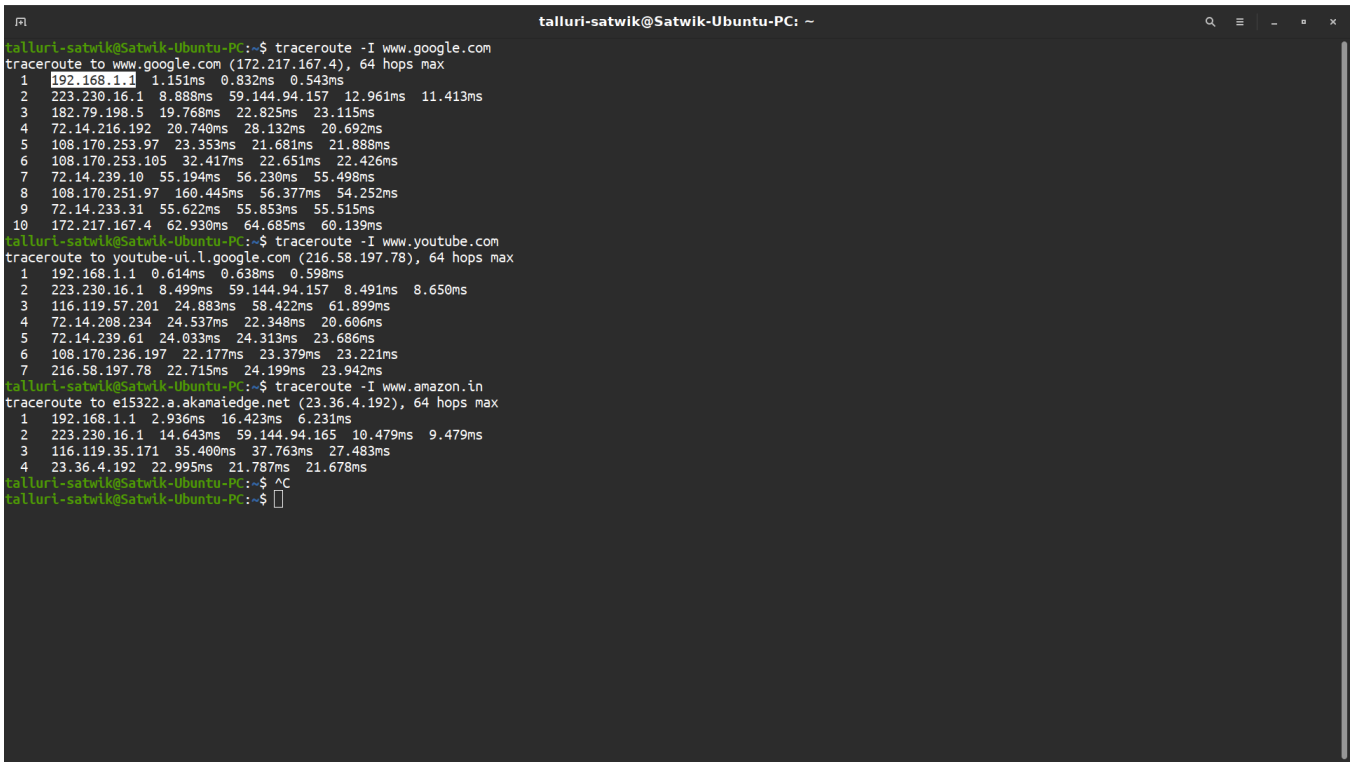

Figure 2: Terminal Window for Q2

3 Question 3 - Network Config Files

3.1 Part a

Machine's hostname: Satwik-Ubuntu-PC
IP address: 192.168.1.12
I got this information by using the following commands:
$ cat /etc/hostname and $ ip addr respectively

3.2 Part b

Next Hop router's IP address: 192.168.1.1
Next Hop router's MAC address: b8:c1:ac:7f:5e:e4
I got this information by using the arp table, we can see the next hop IP address in the traceroute, then using ip address I looked up the MAC address of the router from the ARP table using, $ arp -a 192.168.1.1 command.

3.3 Part c

local DNS server's IP address: 127.0.0.53
I got this information by using the following command:
$ cat /etc/resolv.conf

3.4 Part d

The number in /etc/protocols represents the protocol in the layer above the IP to which the data should be passed.

3.5 Part e

Port numbers corresponding to the following services are:
ssh : 22/tcp
ftp : 21/tcp
nfs : 2049/tcp or 2049/udp
smtp : 25/tcp
I got this info by using the command :
$ cat /etc/services
This displays the table of services, where the second column specifies the port number.