CSE 4344 Lab 3

1.
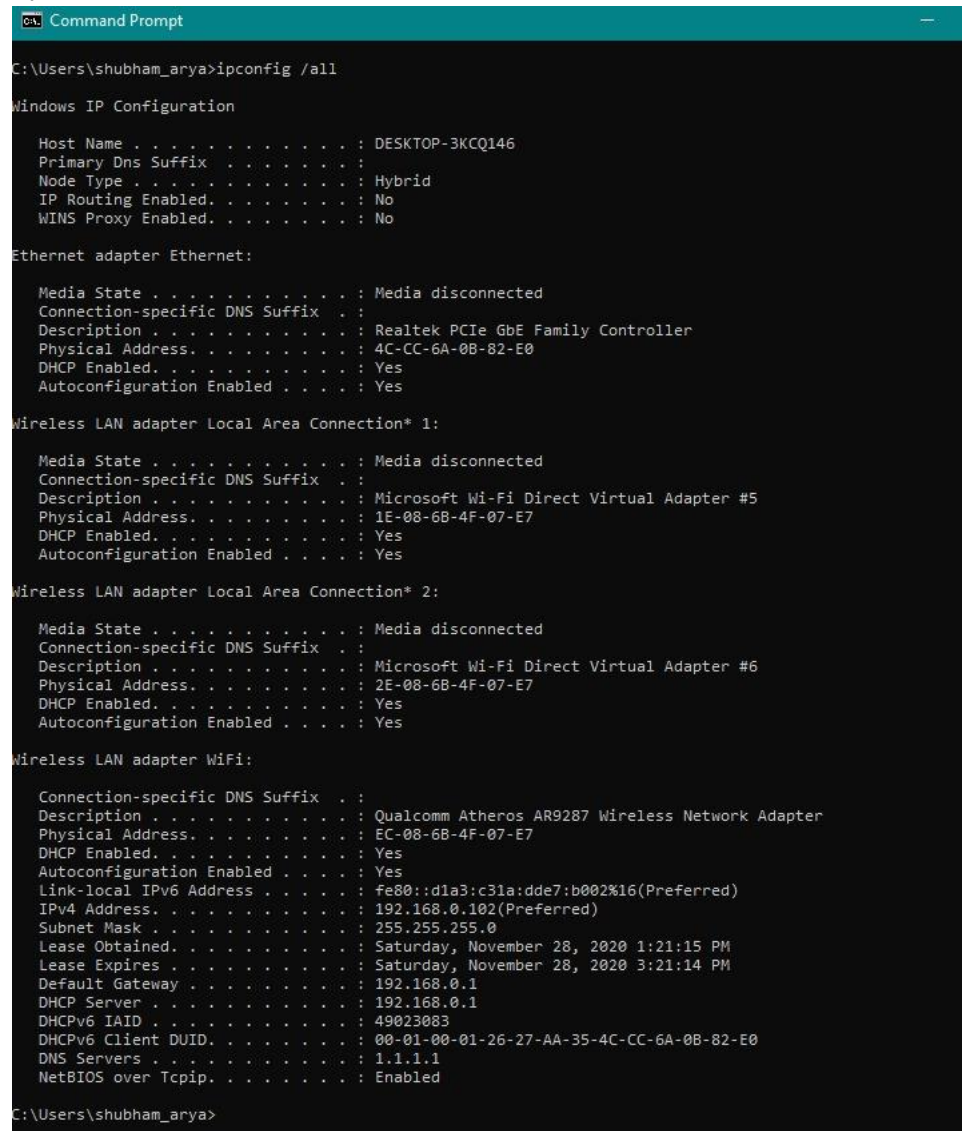
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Command Prompt                                                          —

C:\Users\shubham_arya>ipconfig /all

Windows IP Configuration

   Host Name . . . . . . . . . . . . : DESKTOP-3KCQ146
   Primary Dns Suffix . . . . . . . :
   Node Type . . . . . . . . . . . . : Hybrid
   IP Routing Enabled. . . . . . . . : No
   WINS Proxy Enabled. . . . . . . . : No

Ethernet adapter Ethernet:

   Media State . . . . . . . . . . . : Media disconnected
   Connection-specific DNS Suffix  . :
   Description . . . . . . . . . . . : Realtek PCIe GbE Family Controller
   Physical Address. . . . . . . . . : 4C-CC-6A-0B-82-E0
   DHCP Enabled. . . . . . . . . . . : Yes
   Autoconfiguration Enabled . . . . : Yes

Wireless LAN adapter Local Area Connection* 1:

   Media State . . . . . . . . . . . : Media disconnected
   Connection-specific DNS Suffix  . :
   Description . . . . . . . . . . . : Microsoft Wi-Fi Direct Virtual Adapter #5
   Physical Address. . . . . . . . . : 1E-08-6B-4F-07-E7
   DHCP Enabled. . . . . . . . . . . : Yes
   Autoconfiguration Enabled . . . . : Yes

Wireless LAN adapter Local Area Connection* 2:

   Media State . . . . . . . . . . . : Media disconnected
   Connection-specific DNS Suffix  . :
   Description . . . . . . . . . . . : Microsoft Wi-Fi Direct Virtual Adapter #6
   Physical Address. . . . . . . . . : 2E-08-6B-4F-07-E7
   DHCP Enabled. . . . . . . . . . . : Yes
   Autoconfiguration Enabled . . . . : Yes

Wireless LAN adapter WiFi:

   Connection-specific DNS Suffix  . :
   Description . . . . . . . . . . . : Qualcomm Atheros AR9287 Wireless Network Adapter
   Physical Address. . . . . . . . . : EC-08-6B-4F-07-E7
   DHCP Enabled. . . . . . . . . . . : Yes
   Autoconfiguration Enabled . . . . : Yes
   Link-local IPv6 Address . . . . . : fe80::d1a3:c31a:dde7:b002%16(Preferred)
   IPv4 Address. . . . . . . . . . . : 192.168.0.102(Preferred)
   Subnet Mask . . . . . . . . . . . : 255.255.255.0
   Lease Obtained. . . . . . . . . . : Saturday, November 28, 2020 1:21:15 PM
   Lease Expires . . . . . . . . . . : Saturday, November 28, 2020 3:21:14 PM
   Default Gateway . . . . . . . . . : 192.168.0.1
   DHCP Server . . . . . . . . . . . : 192.168.0.1
   DHCPv6 IAID . . . . . . . . . . . : 49023083
   DHCPv6 Client DUID. . . . . . . . : 00-01-00-01-26-27-AA-35-4C-CC-6A-0B-82-E0
   DNS Servers . . . . . . . . . . . : 1.1.1.1
   NetBIOS over Tcpip. . . . . . . . : Enabled

C:\Users\shubham_arya>
```

What is the IP address of this machine?
        IPv4 address: 192.168.0.102
▪ **How did the machine obtain this IP address?**
        IP address are assigned by the DHCP Dynamic Host Configuration Protocol, which is a
service running on the network. DHCP typically runs on network hardware such as routers or
dedicated DHCP server.
▪ **What is the subnet part of the IP address?**
        Subnet mask of the IP address: 255.255.255.0
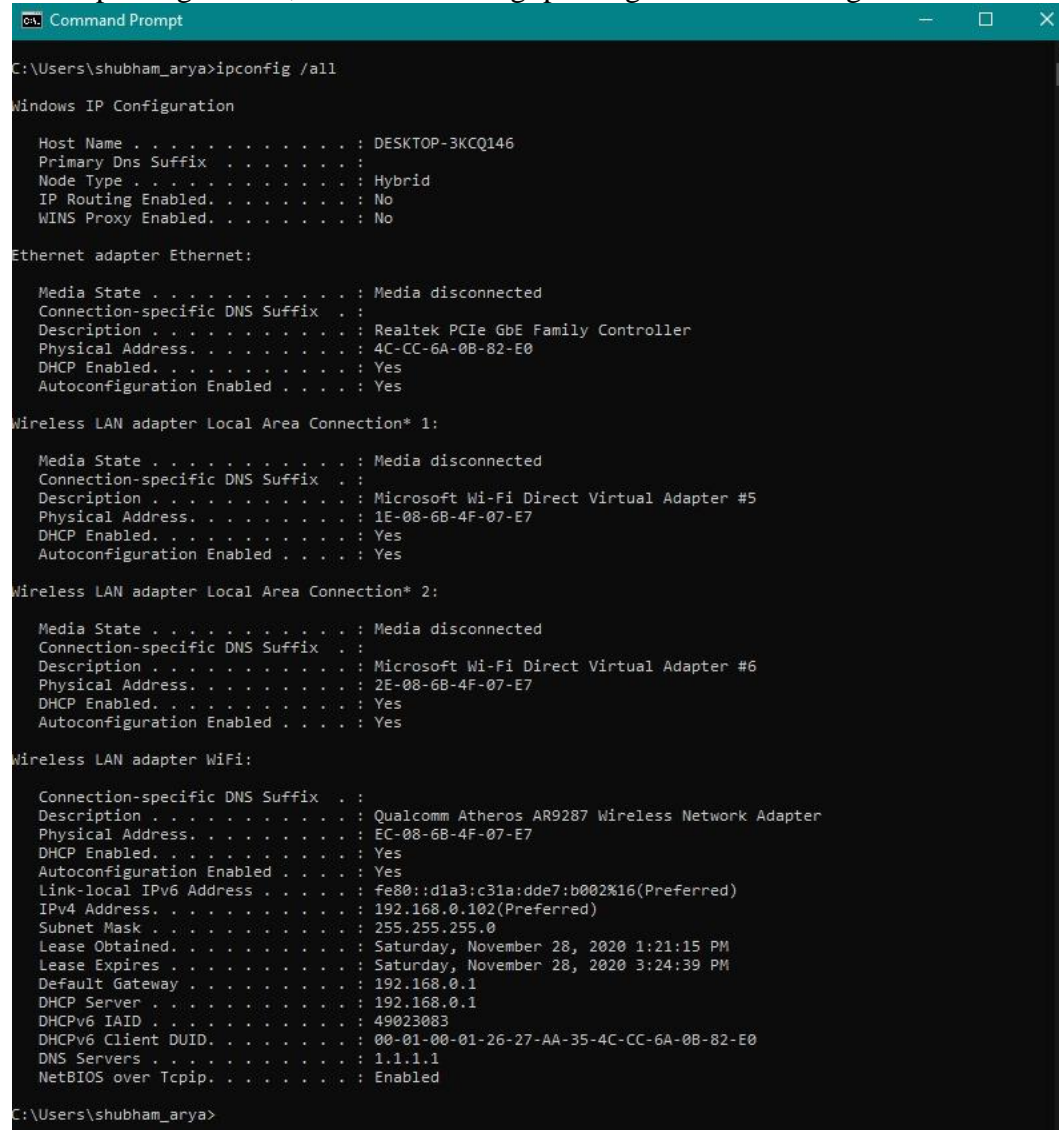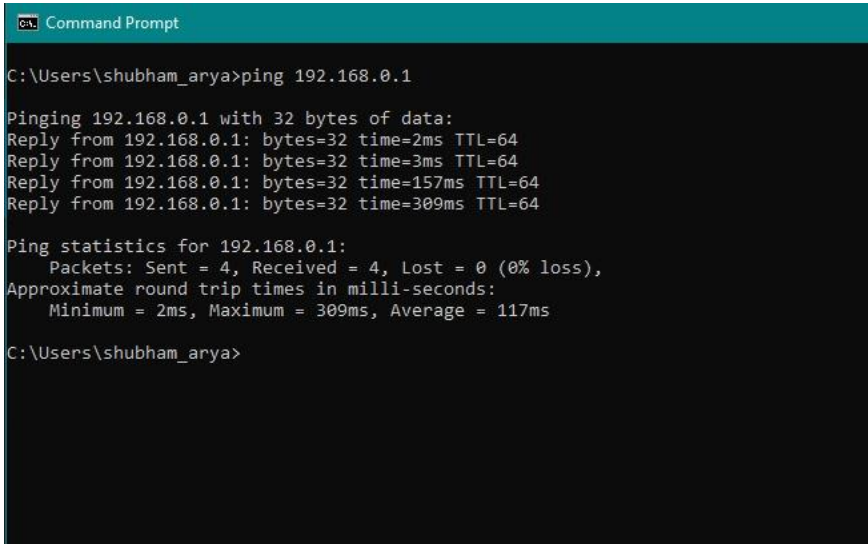▪ **What is the MAC address of this machine?**
        EC-08-6B-4F-07-E7

▪ **How did the NIC card obtain this MAC address?**

NIC card obtains the MAC address during the time of manufacturing. It is hard wired or hard coded on the computer's NIC and is a unique number.

▪ **What are the DNS servers' addresses?**

1.1.1.1

After ipconfig /renew, and then entering ipconfig /all command again.

The only difference is that the lease obtained, and lease expired date has changed. The lease expired has changed from Saturday, November 28, 2020 3:21:14 PM to Saturday, November 28, 2020 3:24:39 PM. The rest of the results are the same.

2.


```
Command Prompt

C:\Users\shubham_arya>ping 192.168.0.1

Pinging 192.168.0.1 with 32 bytes of data:
Reply from 192.168.0.1: bytes=32 time=2ms TTL=64
Reply from 192.168.0.1: bytes=32 time=3ms TTL=64
Reply from 192.168.0.1: bytes=32 time=157ms TTL=64
Reply from 192.168.0.1: bytes=32 time=309ms TTL=64

Ping statistics for 192.168.0.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 2ms, Maximum = 309ms, Average = 117ms

C:\Users\shubham_arya>
```

The ping command is used to troubleshoot connectivity, reachability, and name resolution. Ping essentially sends an echo packet request to a destination (192.168.0.1 in our case) and then waits for a reply. Ping is only successful if the request is able to get to the destination. Ping uses Internet Control Message Protocol to send the echo message to the specified host. Once ping receives the reply message when packet is reached at the destination, some statistics are provided. Statistics like the number of packets set, received and lost during transmission are given when the packet reaches back. It also tells the minimum, maximum and average round trip time it takes for the packet to reach the destination and then back to the source.
Therefore, ping can check connectivity between hosts and/or servers. Ping uses ICMP to send the message to the destination and reply message is received when the echo message is received back. Ping gives the hosts details about transmission time and success rate for a message to go and come back to the host.

3.

```
Command Prompt

C:\Users\shubham_arya>ping www.utexas.edu

Pinging pantheon-systems.map.fastly.net [151.101.2.133] with 32 bytes of data:
Reply from 151.101.2.133: bytes=32 time=6ms TTL=58
Reply from 151.101.2.133: bytes=32 time=10ms TTL=58
Reply from 151.101.2.133: bytes=32 time=11ms TTL=58
Reply from 151.101.2.133: bytes=32 time=307ms TTL=58

Ping statistics for 151.101.2.133:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 6ms, Maximum = 307ms, Average = 83ms

C:\Users\shubham_arya>
```

Since the ping is going to a different destination, the round-trip time and the packets sent, received and lost will be different.

4.

```
Command Prompt

C:\Users\shubham_arya>tracert www.utexas.edu

Tracing route to pantheon-systems.map.fastly.net [151.101.2.133]
over a maximum of 30 hops:

  1     1 ms     1 ms     1 ms  192.168.0.1
  2     4 ms     1 ms     2 ms  192.168.1.1
  3     7 ms     2 ms    11 ms  abts-tn-dynamic-1.64.65.182-airtelbroadband.in [182.65.64.1]
  4     9 ms     4 ms     3 ms  125.17.103.181
  5    13 ms     3 ms     9 ms  182.79.153.43
  6    47 ms    54 ms    53 ms  167.82.128.128
  7     5 ms     5 ms     7 ms  151.101.2.133

Trace complete.

C:\Users\shubham_arya>
```

a) The first hop in traceroute is usually the default gateway within the network. So, it is a router.

b) While ping works by checking if a destination is reachable or not, traceroute traces a packet from the source to the destination, showing each hop along the way and the total number of hops taken. Ping also tells us the minimum, maximum and average round trip time whereas traceroute will show the round-trip time for each hop.

5.

```
🔳 Command Prompt

C:\Users\shubham_arya>tracert www.hostuk.org

Tracing route to www.hostuk.org [3.10.252.9]
over a maximum of 30 hops:

  1     1 ms     1 ms     1 ms  192.168.0.1
  2     8 ms     1 ms     5 ms  192.168.1.1
  3     4 ms     2 ms     3 ms  abts-tn-dynamic-1.64.65.182-airtelbroadband.in [182.65.64.1]
  4     4 ms     7 ms     4 ms  125.17.103.181
  5   159 ms   159 ms   194 ms  116.119.35.48
  6   163 ms   137 ms   137 ms  99.83.67.148
  7   142 ms   136 ms     *     150.222.96.11
  8   265 ms   251 ms   204 ms  52.93.21.115
  9     *        *        *     Request timed out.
 10   270 ms   215 ms   196 ms  150.222.241.27
 11   204 ms   237 ms   238 ms  52.93.134.144
 12     *        *        *     Request timed out.
 13   263 ms   180 ms   180 ms  54.239.101.116
 14   529 ms   466 ms   181 ms  52.94.35.47
 15   236 ms   265 ms   278 ms  52.94.35.46
 16   161 ms   158 ms   176 ms  52.94.33.125
 17   152 ms   159 ms   162 ms  52.94.33.4
 18     *        *        *     Request timed out.
 19     *        *        *     Request timed out.
 20     *        *        *     Request timed out.
 21     *        *        *     Request timed out.
 22     *        *        *     Request timed out.
 23     *        *        *     Request timed out.
 24   166 ms   156 ms   159 ms  ec2-3-10-252-9.eu-west-2.compute.amazonaws.com [3.10.252.9]

Trace complete.

C:\Users\shubham_arya>
```

a) The sudden time increase at one hop is due to the due to the distance between the 2 routers. This suggests that there is increase in time due to undersea fiber or terrestrial link or space link.

b) The average approximate RTT can be found by using ping. Below is a screenshot of the ping command for www.hostuk.org as the destination.

From this, the approximate average round trip time is 380ms.

6.

The IP address is owned by the organization of University of Texas at Arlington.

This organization has a net range of 129.107.0.0 - 129.107.255.255

Here the first 16 bits are same for this range of IP address so UTA has a subnet mask of 16.

Therefore, we will have $2^{(32-16)} = 2^{16} = 65536$ addresses. Hence UTA own 65536 addresses.

7.

Request message:

Response message: