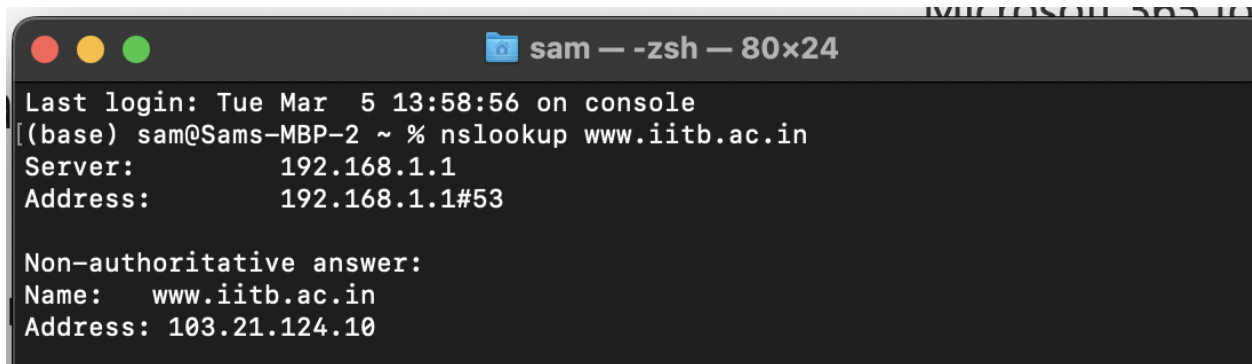Samuel Miller

Lab 3

2.

      The IP address of the DNS server that resolved my request is 2001:4860:4860::8888, which is an IPv6 address for Google's public DNS server. After changing the TCP 'Configure IPv6' setting to 'Link Local Only' for my current Wi-Fi connection, making the same nslookup request instead uses the DNS server at IPv4 address 192.168.1.1, which is the address for my home's local network router.
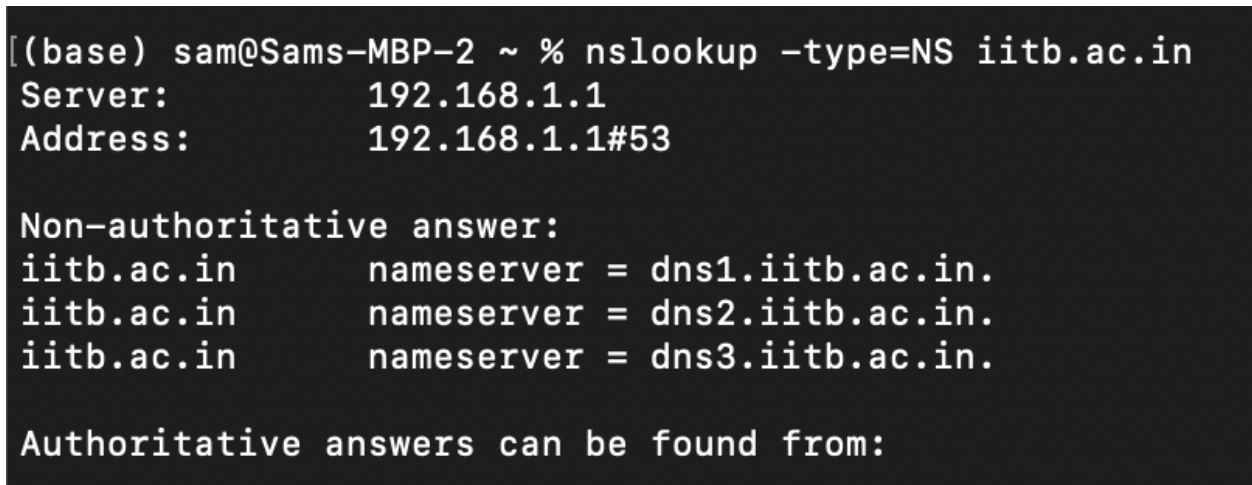
```
Last login: Tue Mar  5 13:58:56 on console
[(base) sam@Sams-MBP-2 ~ % nslookup www.iitb.ac.in
Server:         192.168.1.1
Address:        192.168.1.1#53

Non-authoritative answer:
Name:   www.iitb.ac.in
Address: 103.21.124.10
```

4.

      The authoritative name server for the iitb.ac.in domain is dns1.iitb.ac.in. To find the IP address of that authoritative name server, you would run nslookup dns1.iitb.ac.in.

```
[(base) sam@Sams-MBP-2 ~ % nslookup -type=NS iitb.ac.in
Server:         192.168.1.1
Address:        192.168.1.1#53

Non-authoritative answer:
iitb.ac.in      nameserver = dns1.iitb.ac.in.
iitb.ac.in      nameserver = dns2.iitb.ac.in.
iitb.ac.in      nameserver = dns3.iitb.ac.in.

Authoritative answers can be found from:
```

6.

      The packet number in the trace for the DNS response to the initial DNS query is 148. This message is received by my machine via UDP.

```
146 4.674216      2605:a601:555c:9500…  2001:4860:4860::8888 DNS      97 Standard query 0x707c A gaia.cs.umass.edu
147 4.674405      2605:a601:555c:9500…  2001:4860:4860::8888 DNS      97 Standard query 0x208f AAAA gaia.cs.umass.edu
148 4.677508      2001:4860:4860::8888  2605:a601:555c:9500… DNS      113 Standard query response 0x707c A gaia.cs.umass.edu A 128.119.245.12
149 4.677975      2001:4860:4860::8888  2605:a601:555c:9500… DNS      150 Standard query response 0x208f AAAA gaia.cs.umass.edu SOA unix1.cs.umass.edu
```

```
> Frame 148: 113 bytes on wire (904 bits), 113 bytes captured (904 bits) on interface \Device\NPF_{D460
> Ethernet II, Src: TechnicolorD_eb:39:c9 (d4:35:1d:eb:39:c9), Dst: ASUSTekCOMPU_d3:f8:f4 (f0:2f:74:d3:
> Internet Protocol Version 6, Src: 2001:4860:4860::8888, Dst: 2605:a601:555c:9500:4c98:7d7f:8ac8:a283
> User Datagram Protocol, Src Port: 53, Dst Port: 63799
  Domain Name System (response)
     Transaction ID: 0x707c
   ∨ Flags: 0x8180 Standard query response, No error
        1... .... .... .... = Response: Message is a response
        .000 0... .... .... = Opcode: Standard query (0)
        .... .0.. .... .... = Authoritative: Server is not an authority for domain
        .... ..0. .... .... = Truncated: Message is not truncated
        .... ...1 .... .... = Recursion desired: Do query recursively
        .... .... 1... .... = Recursion available: Server can do recursive queries
        .... .... .0.. .... = Z: reserved (0)
        .... .... ..0. .... = Answer authenticated: Answer/authority portion was not authenticated by th
        .... .... ...0 .... = Non-authenticated data: Unacceptable
        .... .... .... 0000 = Reply code: No error (0)
     Questions: 1
     Answer RRs: 1
     Authority RRs: 0
     Additional RRs: 0
   ∨ Queries
      > gaia.cs.umass.edu: type A, class IN
   ∨ Answers
      > gaia.cs.umass.edu: type A, class IN, addr 128.119.245.12
     [Request In: 146]
     [Time: 0.003292000 seconds]
```

```
0000  f0 2f 74 d3 f8 f4 d4 35  1d eb 39 c9 86 dd 60 0f   ·/t····5 ··9···`·
0010  bc f0 00 3b 11 3b 20 01  48 60 48 60 00 00 00 00   ···;·; · H`H`····
0020  00 00 00 00 88 88 26 05  a6 01 55 5c 95 00 4c 98   ······&· ··U\··L·
0030  7d 7f 8a c8 a2 83 00 35  f9 37 00 3b 50 27 70 7c   }······5 ·7·;P`p|
0040  81 80 00 01 00 01 00 00  00 00 04 67 61 69 61 02   ········ ···gaia·
0050  63 73 05 75 6d 61 73 73  03 65 64 75 00 00 01 00   cs·umass ·edu····
0060  01 c0 0c 00 01 00 01 00  00 33 cb 00 04 80 77 f5   ········ ·3····w·
0070  0c                                                 ·
```

12.

The destination port of the initial DNS query message is 53.


```
81 5.517883       2605:a601:555c:9500…  2001:4860:4860::8888 DNS      96 Standard query 0x0004 A www.cs.umass.edu
82 5.551355       2001:4860:4860::8888  2605:a601:555c:9500… DNS      112 Standard query response 0x0004 A www.cs.umass.edu A 128.119.240.84
83 5.553169       2605:a601:555c:9500…  2001:4860:4860::8888 DNS      96 Standard query 0x0005 AAAA www.cs.umass.edu
84 5.587466       2001:4860:4860::8888  2605:a601:555c:9500… DNS      149 Standard query response 0x0005 AAAA www.cs.umass.edu SOA unix1.cs.umass.edu
```

```
∨ Ethernet II, Src: ASUSTekCOMPU_d3:f8:f4 (f0:2f:74:d3:f8:f4), Dst: TechnicolorD_eb:39:c9 (d4:35:1d:e ∧
  > Destination: TechnicolorD_eb:39:c9 (d4:35:1d:eb:39:c9)
  > Source: ASUSTekCOMPU_d3:f8:f4 (f0:2f:74:d3:f8:f4)
    Type: IPv6 (0x86dd)
∨ Internet Protocol Version 6, Src: 2605:a601:555c:9500:4c98:7d7f:8ac8:a283, Dst: 2001:4860:4860::888
    0110 .... = Version: 6
  > .... 0000 0000 .... .... .... .... .... = Traffic Class: 0x00 (DSCP: CS0, ECN: Not-ECT)
    .... 0101 1010 1100 0111 1101 = Flow Label: 0x5ac7d
    Payload Length: 42
    Next Header: UDP (17)
    Hop Limit: 64
    Source Address: 2605:a601:555c:9500:4c98:7d7f:8ac8:a283
    Destination Address: 2001:4860:4860::8888
∨ User Datagram Protocol, Src Port: 53494, Dst Port: 53
    Source Port: 53494
    Destination Port: 53
```

```
0000  d4 35 1d eb 39 c9 f0 2f  74 d3 f8 f4 86 dd 60 05   ·5··9··/ t·····`·
0010  ac 7d 00 2a 11 40 26 05  a6 01 55 5c 95 00 4c 98   ·}·*·@&· ··U\··L·
0020  7d 7f 8a c8 a2 83 20 01  48 60 48 60 00 00 00 00   }····· · H`H`····
0030  00 00 00 00 88 88 d0 f6  00 35 00 2a e7 4c 00 04   ········ ·5·*·L·
0040  01 00 00 01 00 00 00 00  00 00 03 77 77 77 02 63   ········ ···www·c
0050  73 05 75 6d 61 73 73 03  65 64 75 00 00 01 00 01   s·umass· edu··..·
```

The source port of the DNS response message is also 53.

16.

The DNS query is being sent to IP address 192.168.1.1. This is indeed the address of my default local DNS server.