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Discussion Section: A03

Code Files:
1. udp_ping_SriramSuresh_917698411.py
2. udp_iperf_SriramSuresh_917698411.py

Question I: Ping

1.

```
siramsuresh1003@Srirams-MacBook-Pro Project1 % python udp_ping_SriramSuresh_917698411.py
The current time is: 1652143934.138697 and this is message number: 1
Uppercase Message from the Server:     b'PING'
The Round Trip Time is: 0.0325770378112793 seconds
The current time is: 1652143934.1713731 and this is message number: 2
Uppercase Message from the Server:     b'PING'
The Round Trip Time is: 0.024185895919799805 seconds
The current time is: 1652143934.1955972 and this is message number: 3
Uppercase Message from the Server:     b'PING'
The Round Trip Time is: 0.023579835891723633 seconds
The current time is: 1652143934.219212 and this is message number: 4
Uppercase Message from the Server:     b'PING'
The Round Trip Time is: 0.023534774780273438 seconds
The current time is: 1652143934.242789 and this is message number: 5
Uppercase Message from the Server:     b'PING'
The Round Trip Time is: 0.0244140625 seconds
The current time is: 1652143934.2672892 and this is message number: 6
Uppercase Message from the Server:     b'PING'
The Round Trip Time is: 0.02391982078552246 seconds
The current time is: 1652143934.291266 and this is message number: 7
Uppercase Message from the Server:     b'PING'
The Round Trip Time is: 0.024782896041870117 seconds
The current time is: 1652143934.316132 and this is message number: 8
Uppercase Message from the Server:     b'PING'
The Round Trip Time is: 0.023914098739624023 seconds
The current time is: 1652143934.3401039 and this is message number: 9
Uppercase Message from the Server:     b'PING'
The Round Trip Time is: 0.023736238479614258 seconds
The current time is: 1652143934.363901 and this is message number: 10
Uppercase Message from the Server:     b'PING'
The Round Trip Time is: 0.02396225929260254 seconds
the program is done
Stored RTTs are: [0.0325770378112793, 0.024185895919799805, 0.023579835891723633, 0.023534774
780273438, 0.0244140625, 0.02391982078552246, 0.024782896041870117, 0.023914098739624023, 0.0
23736238479614258, 0.02396225929260254]
Total number of successful packets is: 10
Max RTT is: 0.0325770378112793 seconds
Min RTT is: 0.023534774780273438 seconds
Sum of all RTTs is: 0.24860692024230957 seconds
Average Round Trip Time is: 0.024860692024230958 seconds
Total number of packets lost is: 0
```

2.
Number of ping packets delivered: 10
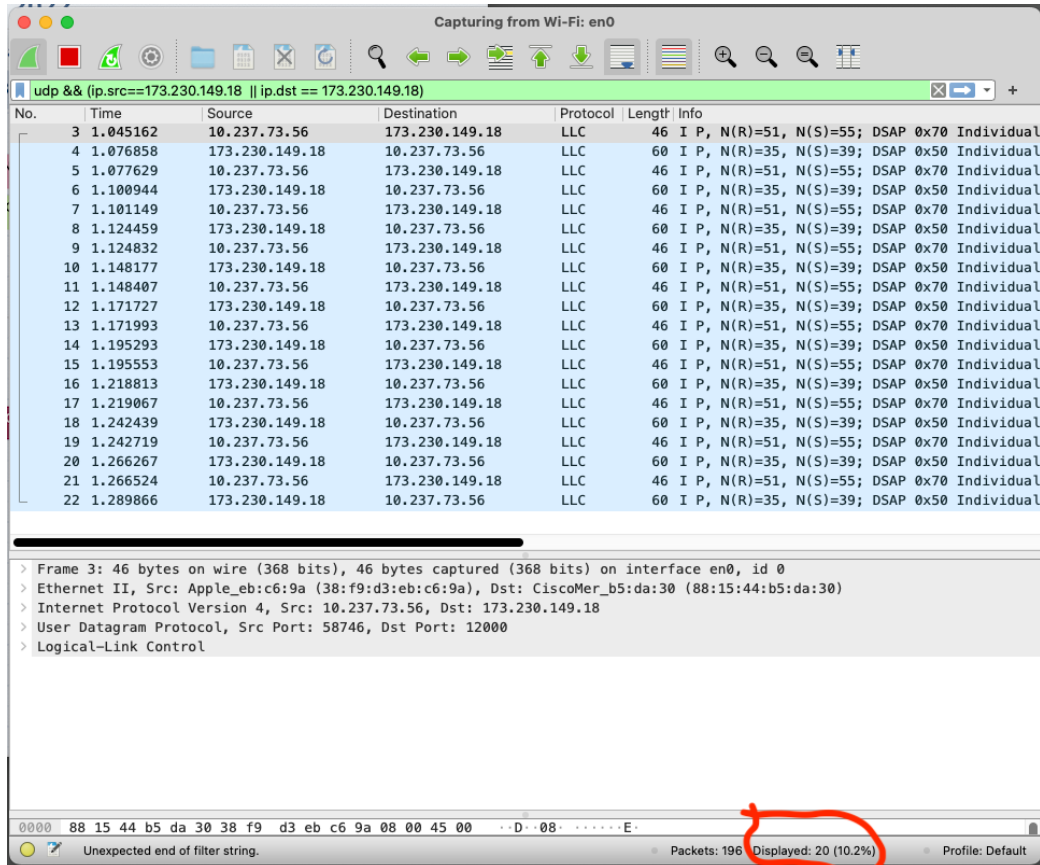Number of ping packets lost: 0

3.
Minimum ping RTT: 0.0235 seconds
Maximum ping RTT: 0.0325 seconds

Average ping RTT: 0.0248 seconds
Sum of all ping RTTs: 0.248 seconds

4.

Since there were 10 packets sent and received successfully without any packet loss, there were 20 packets exchanged in total. This is reflected correctly, as shown by the part circled in red above. The Wireshark filters I used above look for UDP packets where either the source or the destination IPv4 address is that of the project server.

Question II: Iperf

5.

```
sriramsuresh1003@Srirams-MacBook-Pro Project1 % python udp_iperf_SriramSuresh_917698411.py
received %: 0
received %: 0
received %: 0
received %: 1
received %: 1
received %: 1
received %: 2
received %: 2
received %: 2
received %: 3
received %: 3
received %: 3
received %: 4
received %: 4
received %: 4
received %: 5
received %: 5
received %: 5
received %: 5
received %: 6
received %: 6
received %: 6
received %: 7
received %: 7
received %: 7
received %: 8
received %: 8
received %: 8
received %: 9
received %: 9
received %: 9
received %: 10
received %: 10
received %: 10
received %: 10
received %: 11
received %: 11
received %: 11
received %: 12
received %: 12
received %: 12
received %: 13
received %: 13
received %: 13
received %: 14
received %: 14
received %: 14
received %: 15
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```
received %: 94
received %: 94
received %: 95
received %: 95
received %: 95
received %: 96
received %: 96
received %: 96
received %: 97
received %: 97
received %: 97
received %: 97
received %: 98
received %: 98
received %: 98
received %: 99
received %: 99
received %: 99
received %: 100
break
Time elapsed: 6.469897031784058 seconds
Throughput: 1607444.4382822313 bps
Size of file is 1300000 bytes
File Downloaded
Number of packets received: 320
sriramsuresh1003@Srirams-MacBook-Pro Project1 %
```

6.

I received 320 packets in total (as shown in the last line of the output screenshot above).

The part circled in red also confirms this. The Wireshark filters I used here display the UDP packets where the project server's IP address is the source IP address, and my IP address is the destination IP address.

7.
It took 6.469 seconds in total for the entire file to be received.

8.
The throughput is 1607444.43 bits per second.