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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.

```
sriramsuresh1003@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

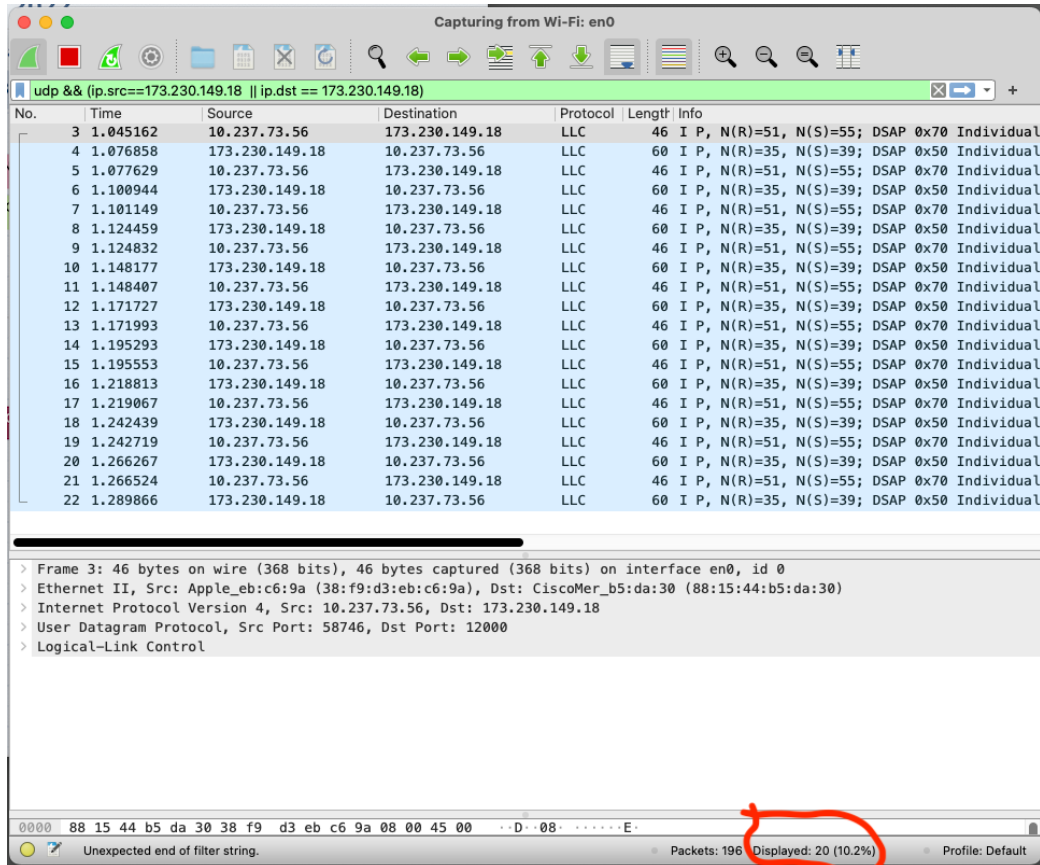
3.

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.



Capturing from Wi-Fi: en0

udp && (ip.src==173.230.149.18 || ip.dst == 173.230.149.18)

No.	Time	Source	Destination	Protocol	Length	Info
3	1.045162	10.237.73.56	173.230.149.18	LLC	46	I P, N(R)=51, N(S)=55; DSAP 0x70 Individual
4	1.076858	173.230.149.18	10.237.73.56	LLC	60	I P, N(R)=35, N(S)=39; DSAP 0x50 Individual
5	1.077629	10.237.73.56	173.230.149.18	LLC	46	I P, N(R)=51, N(S)=55; DSAP 0x70 Individual
6	1.100944	173.230.149.18	10.237.73.56	LLC	60	I P, N(R)=35, N(S)=39; DSAP 0x50 Individual
7	1.101149	10.237.73.56	173.230.149.18	LLC	46	I P, N(R)=51, N(S)=55; DSAP 0x70 Individual
8	1.124459	173.230.149.18	10.237.73.56	LLC	60	I P, N(R)=35, N(S)=39; DSAP 0x50 Individual
9	1.124832	10.237.73.56	173.230.149.18	LLC	46	I P, N(R)=51, N(S)=55; DSAP 0x70 Individual
10	1.148177	173.230.149.18	10.237.73.56	LLC	60	I P, N(R)=35, N(S)=39; DSAP 0x50 Individual
11	1.148407	10.237.73.56	173.230.149.18	LLC	46	I P, N(R)=51, N(S)=55; DSAP 0x70 Individual
12	1.171727	173.230.149.18	10.237.73.56	LLC	60	I P, N(R)=35, N(S)=39; DSAP 0x50 Individual
13	1.171993	10.237.73.56	173.230.149.18	LLC	46	I P, N(R)=51, N(S)=55; DSAP 0x70 Individual
14	1.195293	173.230.149.18	10.237.73.56	LLC	60	I P, N(R)=35, N(S)=39; DSAP 0x50 Individual
15	1.195553	10.237.73.56	173.230.149.18	LLC	46	I P, N(R)=51, N(S)=55; DSAP 0x70 Individual
16	1.218813	173.230.149.18	10.237.73.56	LLC	60	I P, N(R)=35, N(S)=39; DSAP 0x50 Individual
17	1.219067	10.237.73.56	173.230.149.18	LLC	46	I P, N(R)=51, N(S)=55; DSAP 0x70 Individual
18	1.242439	173.230.149.18	10.237.73.56	LLC	60	I P, N(R)=35, N(S)=39; DSAP 0x50 Individual
19	1.242719	10.237.73.56	173.230.149.18	LLC	46	I P, N(R)=51, N(S)=55; DSAP 0x70 Individual
20	1.266267	173.230.149.18	10.237.73.56	LLC	60	I P, N(R)=35, N(S)=39; DSAP 0x50 Individual
21	1.266524	10.237.73.56	173.230.149.18	LLC	46	I P, N(R)=51, N(S)=55; DSAP 0x70 Individual
22	1.289866	173.230.149.18	10.237.73.56	LLC	60	I P, N(R)=35, N(S)=39; DSAP 0x50 Individual

> Frame 3: 46 bytes on wire (368 bits), 46 bytes captured (368 bits) on interface en0, id 0
> Ethernet II, Src: Apple_eb:c6:9a (38:f9:d3:eb:c6:9a), Dst: CiscoMer_b5:da:30 (88:15:44:b5:da:30)
> Internet Protocol Version 4, Src: 10.237.73.56, Dst: 173.230.149.18
> User Datagram Protocol, Src Port: 58746, Dst Port: 12000
> Logical-Link Control

0000 88 15 44 b5 da 30 38 f9 d3 eb c6 9a 08 00 45 00 ..D..08..E..

Unexpected end of filter string. Packets: 196 Displayed: 20 (10.2%) Profile: Default

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 %: 96
received %: 96
received %: 96
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 screenshot shows a Wireshark packet capture on the 'Wi-Fi: en0' interface. The filter is set to '(ip.src == 173.230.149.18 && ip.dst == 10.237.73.56) && udp'. The packet list shows 320 packets (No. 1121 to 1192) from source 173.230.149.18 to destination 10.237.73.56, all using UDP port 5007 to destination port 62151. The packet details for packet 1158 are expanded, showing: Frame 1058: 1150 bytes on wire (9200 bits), 1150 bytes captured (9200 bits) on interface en0, id 0; Ethernet II, Src: CiscoMer_b5:da:30 (88:15:44:b5:da:30), Dst: Apple_eb:c6:9a (38:f9:d3:eb:c6:9a); Internet Protocol Version 4, Src: 173.230.149.18, Dst: 10.237.73.56; User Datagram Protocol, Src Port: 5007, Dst Port: 62151; Data (4068 bytes).

At the bottom, the status bar indicates: Packets: 1257, **Displayed: 320 (25.5%)**, Dropped: 0 (0.0%), Profile: Default.

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.