

Assignment 2

UDP Sockets

PART 1: Socket Programming

Screenshots of the communication messages between the client and the server:

```
nived@nived-Inspiron-14-5420:~/KGP/Sem6/Networks Lab/Lab2$ ./wc
Enter the file name to fetch from the server: 22CS10049_File1.txt

Message Received: HELLO
Translates to: Request acknowledged, proceeding to retrieve file contents...

Word 1 received from server: My
Word 2 received from server: Name
Word 3 received from server: is
Word 4 received from server: Nived
Word 5 received from server: Shah

FINISH received, completing file content retrieval
```

```
nived@nived-Inspiron-14-5420:~/KGP/Sem6/Networks Lab/Lab2$ ./ws

Server Running .....

Sending contents of file: 22CS10049_File1.txt

Word 1 sent: HELLO
Word 2 sent: My
Word 3 sent: Name
Word 4 sent: is
Word 5 sent: Nived
Word 6 sent: Shah
Word 7 sent: FINISH

File contents sent to client
```

```
nived@nived-Inspiron-14-5420:~/KGP/Sem6/Networks Lab/Lab2$ ./wc
Enter the file name to fetch from the server: wredfa

Message Received: NOTFOUND wredfa
Translates to: FILE NOT FOUND
```

1. A capture of all packets exchanged between client and server during execution.

2. Protocol Used for communication

3. Source and Destination IP addresses and Ports

No.	Time	Source	Destination	Protocol	Length	Info
1	0.000000000	127.0.0.1	127.0.0.1	UDP	62	60719 → 5050 Len=20
2	0.000353350	127.0.0.1	127.0.0.1	UDP	48	5050 → 60719 Len=6
3	0.000758089	127.0.0.1	127.0.0.1	UDP	48	60719 → 5050 Len=6
4	0.000964020	127.0.0.1	127.0.0.1	UDP	45	5050 → 60719 Len=3
<p>Frame 2: 48 bytes on wire (384 bits), 48 bytes captured (384 bits) on interface lo, id 0</p> <p>Ethernet II, Src: 00:00:00_00:00:00 (00:00:00:00:00:00), Dst: 00:00:00_00:00:00 (00:00:00:00:00:00)</p> <p>Internet Protocol Version 4, Src: 127.0.0.1, Dst: 127.0.0.1</p> <p>User Datagram Protocol, Src Port: 5050, Dst Port: 60719</p> <p>Source Port: 5050</p> <p>Destination Port: 60719</p> <p>Length: 14</p>						
No.	Time	Source	Destination	Protocol	Length	Info
1	0.000000000	127.0.0.1	127.0.0.1	UDP	62	60719 → 5050 Len=20
2	0.000353350	127.0.0.1	127.0.0.1	UDP	48	5050 → 60719 Len=6
3	0.000758089	127.0.0.1	127.0.0.1	UDP	48	60719 → 5050 Len=6
4	0.000964020	127.0.0.1	127.0.0.1	UDP	45	5050 → 60719 Len=3
<p>Frame 3: 48 bytes on wire (384 bits), 48 bytes captured (384 bits) on interface lo, id 0</p> <p>Ethernet II, Src: 00:00:00_00:00:00 (00:00:00:00:00:00), Dst: 00:00:00_00:00:00 (00:00:00:00:00:00)</p> <p>Internet Protocol Version 4, Src: 127.0.0.1, Dst: 127.0.0.1</p> <p>User Datagram Protocol, Src Port: 60719, Dst Port: 5050</p> <p>Source Port: 60719</p> <p>Destination Port: 5050</p> <p>Length: 14</p>						

4. Size in bytes of the FILENAME request

Packet Size: **62 bytes**

Data Length: **20 bytes**

No.	Time	Source	Destination	Protocol	Length	Info
1	0.000000000	127.0.0.1	127.0.0.1	UDP	62	60719 → 5050 Len=20
2	0.000353350	127.0.0.1	127.0.0.1	UDP	48	5050 → 60719 Len=6
3	0.000758080	127.0.0.1	127.0.0.1	UDP	48	60719 → 5050 Len=6
Frame 1: 62 bytes on wire (496 bits), 62 bytes captured (496 bits) on interface lo, id 0						
Ethernet II, Src: 00:00:00_00:00:00 (00:00:00:00:00:00), Dst: 00:00:00_00:00:00 (00:00:00:00:00:00)						
Internet Protocol Version 4, Src: 127.0.0.1, Dst: 127.0.0.1						
User Datagram Protocol, Src Port: 60719, Dst Port: 5050						
Data (20 bytes)						
Data: 3232435331303034395f46696c65312e74787400						
[Length: 20]						
0000	00 00 00 00 00 00 00 00	00 00 00 00 08 00 45 00E.			
0010	00 30 9c 04 40 00 40 11	a0 b6 7f 00 00 01 7f 00	.0..@.@.			
0020	00 01 ed 2f 13 ba 00 1c	fe 2f 32 32 43 53 31 30	.../.... /2CS10			
0030	30 34 39 5f 46 69 6c 65	31 2e 74 78 74 00	049_File 1.txt.			

5. Size of server's response for HELLO and Word1

Size of packet (HELLO): **48 bytes** (including headers)

No.	Time	Source	Destination	Protocol	Length	Info
1	0.000000000	127.0.0.1	127.0.0.1	UDP	62	60719 → 5050 Len=20
2	0.000353350	127.0.0.1	127.0.0.1	UDP	48	5050 → 60719 Len=6
3	0.000758080	127.0.0.1	127.0.0.1	UDP	48	60719 → 5050 Len=6
Frame 2: 48 bytes on wire (384 bits), 48 bytes captured (384 bits) on interface lo, id 0						
Ethernet II, Src: 00:00:00_00:00:00 (00:00:00:00:00:00), Dst: 00:00:00_00:00:00 (00:00:00:00:00:00)						
Internet Protocol Version 4, Src: 127.0.0.1, Dst: 127.0.0.1						
User Datagram Protocol, Src Port: 5050, Dst Port: 60719						
Data (6 bytes)						
Data: 48454c4c4f00						
[Length: 6]						
0000	00 00 00 00 00 00 00 00	00 00 00 00 08 00 45 00E.			
0010	00 22 9c 05 40 00 40 11	a0 c3 7f 00 00 01 7f 00	."..@.@.			
0020	00 01 13 ba ed 2f 00 0e	fe 21 48 45 4c 4c 4f 00	.../... .HELLO.			

Size of packet for Word1 ("My"): **45 bytes** (including headers)

No.	Time	Source	Destination	Protocol	Length	Info
3	0.000758	127.0.0.1	127.0.0.1	UDP	48	60719 → 5050 Len=6
4	0.000964	127.0.0.1	127.0.0.1	UDP	45	5050 → 60719 Len=3
5	0.001112	127.0.0.1	127.0.0.1	UDP	48	60719 → 5050 Len=6
6	0.001257	127.0.0.1	127.0.0.1	UDP	47	5050 → 60719 Len=5
Frame 4: 45 bytes on wire (360 bits), 45 bytes captured (360 bits)						
Ethernet II, Src: 00:00:00_00:00:00 (00:00:00:00:00:00), Dst: 00:00:00_00:00:00 (00:00:00:00:00:00)						
Internet Protocol Version 4, Src: 127.0.0.1, Dst: 127.0.0.1						
User Datagram Protocol, Src Port: 5050, Dst Port: 60719						
Data (3 bytes)						
Data: 4d7900						
[Length: 3]						
0000	00 00 00 00 00 00 00 00	00 00 00 00 08 00 45 00E.			
0010	00 1f 9c 07 40 00 40 11	a0 c4 7f 00 00 01 7f 00	...@.@.			
0020	00 01 13 ba ed 2f 00 0b	fe 1e 4d 79 00	.../... .My.			

6. Packet Payload inspection, displaying UDP payloads of those packets

Packet Payload signifies the actual data that is sent or received by the client and server (the headers are stripped off).

No.	Time	Source	Destination	Protocol	Length	Info
1	0.000000000	127.0.0.1	127.0.0.1	UDP	62	60719 → 5050 Len=20
2	0.000353350	127.0.0.1	127.0.0.1	UDP	48	5050 → 60719 Len=6
3	0.000758089	127.0.0.1	127.0.0.1	UDP	48	60719 → 5050 Len=6
4	0.000964020	127.0.0.1	127.0.0.1	UDP	45	5050 → 60719 Len=3
5	0.001111976	127.0.0.1	127.0.0.1	UDP	48	60719 → 5050 Len=6
6	0.001256571	127.0.0.1	127.0.0.1	UDP	47	5050 → 60719 Len=5
7	0.001389971	127.0.0.1	127.0.0.1	UDP	48	60719 → 5050 Len=6

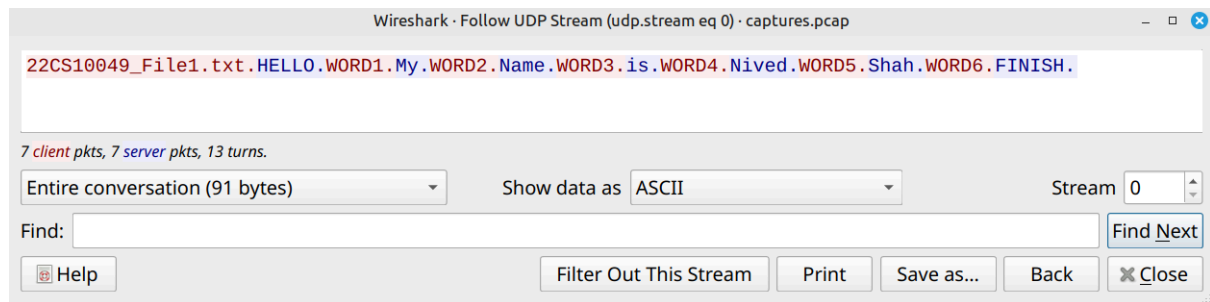
Frame 4: 45 bytes on wire (360 bits), 45 bytes captured (360 bits) on interface lo, id 0
Ethernet II, Src: 00:00:00_00:00:00 (00:00:00:00:00:00), Dst: 00:00:00_00:00:00 (00:00:00:00:00:00)
Internet Protocol Version 4, Src: 127.0.0.1, Dst: 127.0.0.1
User Datagram Protocol, Src Port: 5050, Dst Port: 60719
Source Port: 5050
Destination Port: 60719
Length: 11
Checksum: 0xfe1e [unverified]
[Checksum Status: Unverified]
[Stream index: 0]
[Timestamps]
UDP payload (3 bytes)
Data (3 bytes)
Data: 4d7900
Length: 31

0000	00 00 00 00 00 00 00 00	00 00 00 00 08 00 45 00E.
0010	00 1f 9c 07 40 00 40 11	a0 c4 7f 00 00 01 7f 00	...@.@.
0020	00 01 13 ba ed 2f 00 0b	fe 1e 4d 79 00	.../...My.

The following screenshot shows the UDP stream during the capture duration.

Red - messages sent by client

Blue - messages sent by server.



7. Total time for file transfer from start to finish

The transfer time over the network is **0.001830988 seconds** (this is the time when “FINISH” arrives at the client).

udp.port == 5050					
No.	Time	Source	Destination	Protocol	Length Info
1	0.000000000	127.0.0.1	127.0.0.1	UDP	62 60719 → 5050 Len=20
2	0.000353350	127.0.0.1	127.0.0.1	UDP	48 5050 → 60719 Len=6
3	0.000758089	127.0.0.1	127.0.0.1	UDP	48 60719 → 5050 Len=6
4	0.000964020	127.0.0.1	127.0.0.1	UDP	45 5050 → 60719 Len=3
5	0.001111976	127.0.0.1	127.0.0.1	UDP	48 60719 → 5050 Len=6
6	0.001256571	127.0.0.1	127.0.0.1	UDP	47 5050 → 60719 Len=5
7	0.001389971	127.0.0.1	127.0.0.1	UDP	48 60719 → 5050 Len=6
8	0.001531851	127.0.0.1	127.0.0.1	UDP	45 5050 → 60719 Len=3
9	0.001584766	127.0.0.1	127.0.0.1	UDP	48 60719 → 5050 Len=6
10	0.001632777	127.0.0.1	127.0.0.1	UDP	48 5050 → 60719 Len=6
11	0.001720845	127.0.0.1	127.0.0.1	UDP	48 60719 → 5050 Len=6
12	0.001759813	127.0.0.1	127.0.0.1	UDP	47 5050 → 60719 Len=5
13	0.001802387	127.0.0.1	127.0.0.1	UDP	48 60719 → 5050 Len=6
14	0.001830988	127.0.0.1	127.0.0.1	UDP	49 5050 → 60719 Len=7

Frame 1: 62 bytes on wire (496 bits), 62 bytes captured (496 bits) on interface 0
Ethernet II, Src: 00:00:00:00:00:00 (00:00:00:00:00:00), Dst: 00:00:00:00:00:00 (00:00:00:00:00:00)
Internet Protocol Version 4, Src: 127.0.0.1, Dst: 127.0.0.1
User Datagram Protocol, Src Port: 60719, Dst Port: 5050
Data (20 bytes)

UDP · 1								
Total Packets	Percent Filtered	Packets A → B	Bytes A → B	Packets B → A	Bytes B → A	Rel Start	Duration	
14	100.00%	7	350 bytes	7	329 bytes	0.000000	0.0018	

8. Packet length analysis:

Wireshark · Packet Lengths · Loopback: lo								
Topic / Item	Count	Average	Min Val	Max Val	Rate (ms)	Percent	Burst Rate	Burst Start
Packet Lengths	14	48.50	45	62	7.6461	100%	0.1400	0.000
0-19	0	-	-	-	0.0000	0.00%	-	-
20-39	0	-	-	-	0.0000	0.00%	-	-
40-79	14	48.50	45	62	7.6461	100.00%	0.1400	0.000
80-159	0	-	-	-	0.0000	0.00%	-	-
160-319	0	-	-	-	0.0000	0.00%	-	-
320-639	0	-	-	-	0.0000	0.00%	-	-
640-1279	0	-	-	-	0.0000	0.00%	-	-

Display filter: **udp.port == 5050** Apply Copy Save as... Close

Average size of of each packet during communication: **48.50 bytes**