CS39006: Computer Networks Lab

Assignment 3 Report

Basic Socket Programming

Report by:

NISARG SHAH (15CS10030)

MAYANK BHUSHAN (15CS30019)

Objective:

The objective of this assignment is to understand the basic functionalities of POSIX socket programming through a single threaded file transfer application.

PART I: Documentation

Compilation :

Step 1: Extract the zip folder

Step 2: Open the folder containing folders Server and Client in a terminal

Step 3: run “make” in terminal

```
mayank@devil13:~/Documents/networks_lab/Assignment3/Socket/UDP$ make
(cd Server; make all)
make[1]: Entering directory '/home/mayank/Documents/networks_lab/Assignment3/Socket/UDP/Server'
make[1]: Nothing to be done for 'all'.
make[1]: Leaving directory '/home/mayank/Documents/networks_lab/Assignment3/Socket/UDP/Server'
(cd Client; make all)
make[1]: Entering directory '/home/mayank/Documents/networks_lab/Assignment3/Socket/UDP/Client'
make[1]: Nothing to be done for 'all'.
make[1]: Leaving directory '/home/mayank/Documents/networks_lab/Assignment3/Socket/UDP/Client'
mayank@devil13:~/Documents/networks_lab/Assignment3/Socket/UDP$
```

Running :

Step 1: Open the folder Server in a terminal

Step 2: run “./server PORTNO” in terminal

```
mayank@devil13:~/Documents/networks_lab/Assignment3/Socket/UDP/Server$ ./server 2000
------------ Server Running ------------
```

Step 3: Open the folder Client in another terminal

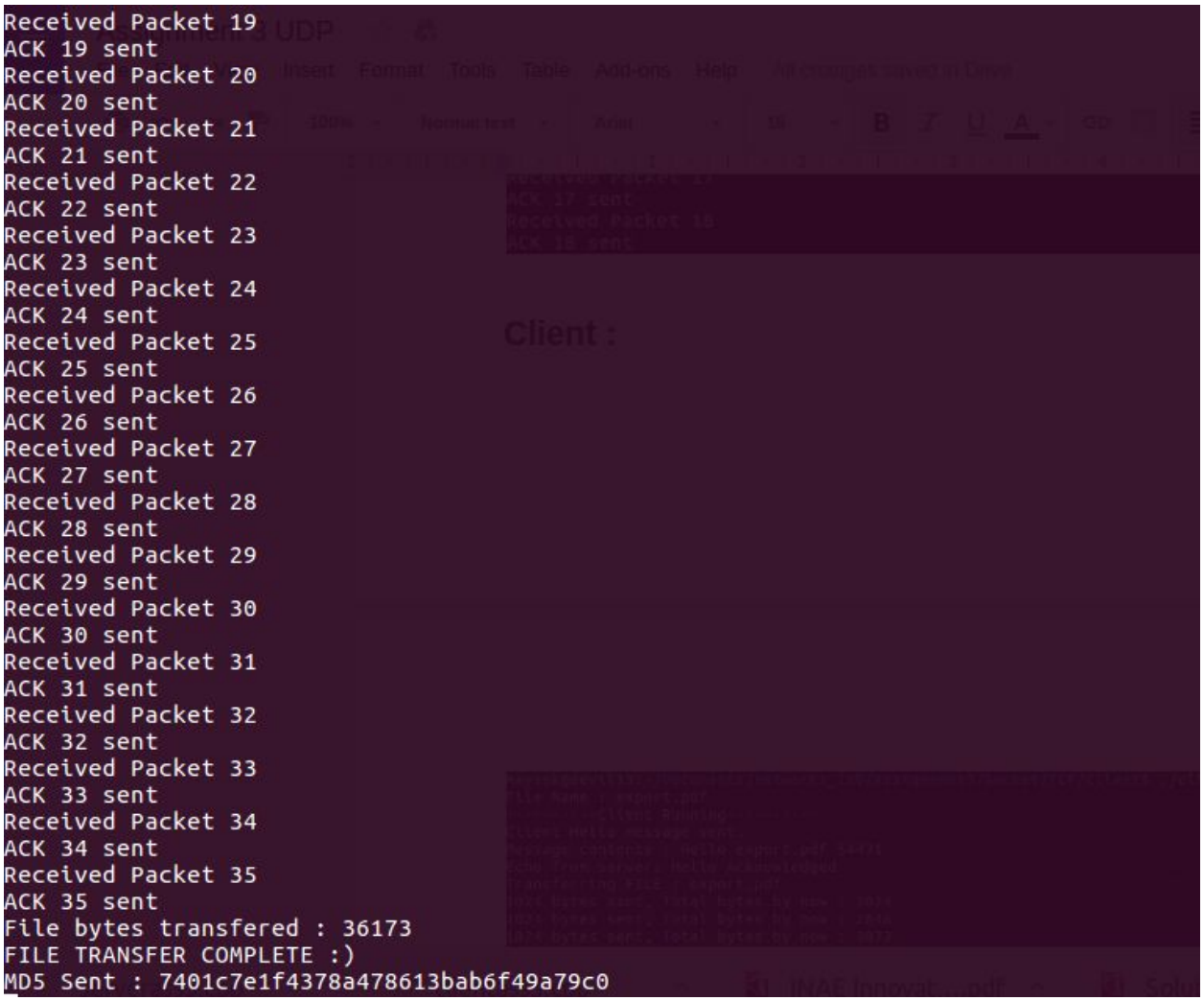
Step 4:run “./client localhost PORTNO FILENAME” in terminal

```
mayank@devil13:~/Documents/networks_lab/Assignment3/Socket/UDP/Client$ ./client localhost 2000 Report.pdf
--------- Client Running ------------
```

Sample I/O

Server :

```
mayank@devil13:~/Documents/networks_lab/Assignment3/Socket/UDP/Server$ ./server 2000
------------ Server Running ------------
FileSize : 36173
File Receiving
Received Packet 0
ACK 0 sent
Received Packet 1
ACK 1 sent
Received Packet 2
ACK 2 sent
Received Packet 3
ACK 3 sent
Received Packet 4
ACK 4 sent
Received Packet 5
ACK 5 sent
Received Packet 6
ACK 6 sent
Received Packet 7
ACK 7 sent
Received Packet 8
ACK 8 sent
Received Packet 9
ACK 9 sent
Received Packet 10
ACK 10 sent
Received Packet 11
ACK 11 sent
Received Packet 12
ACK 12 sent
Received Packet 13
ACK 13 sent
Received Packet 14
ACK 14 sent
Received Packet 15
ACK 15 sent
Received Packet 16
ACK 16 sent
Received Packet 17
ACK 17 sent
Received Packet 18
ACK 18 sent
```


Received Packet 19
ACK 19 sent
Received Packet 20
ACK 20 sent
Received Packet 21
ACK 21 sent
Received Packet 22
ACK 22 sent
Received Packet 23
ACK 23 sent
Received Packet 24
ACK 24 sent
Received Packet 25
ACK 25 sent
Received Packet 26
ACK 26 sent
Received Packet 27
ACK 27 sent
Received Packet 28
ACK 28 sent
Received Packet 29
ACK 29 sent
Received Packet 30
ACK 30 sent
Received Packet 31
ACK 31 sent
Received Packet 32
ACK 32 sent
Received Packet 33
ACK 33 sent
Received Packet 34
ACK 34 sent
Received Packet 35
ACK 35 sent
File bytes transfered : 36173
FILE TRANSFER COMPLETE :)
MD5 Sent : 7401c7e1f4378a478613bab6f49a79c0

Client :

```
mayank@devil13:~/Documents/networks_lab/Assignment3/Socket/UDP/Client$ ./client localhost 2000 Report.pdf
--------- Client Running ------------
File Name : Report.pdf
Total Chunks : 36
File Size : 36173
 Msg Sent : Report.pdf 36173 36
 ACK 0 received
 ACK 1 received
 ACK 2 received
 ACK 3 received
 ACK 4 received
 ACK 5 received
 ACK 6 received
 ACK 7 received
 ACK 8 received
 ACK 9 received
 ACK 10 received
 ACK 11 received
 ACK 12 received
 ACK 13 received
 ACK 14 received
 ACK 15 received
 ACK 16 received
 ACK 17 received
 ACK 18 received
 ACK 19 received
 ACK 20 received
 ACK 21 received
 ACK 22 received
 ACK 23 received
 ACK 24 received
 ACK 25 received
 ACK 26 received
```

```
 ACK 27 received
 ACK 28 received
 ACK 29 received
 ACK 30 received
 ACK 31 received
 ACK 32 received
 ACK 33 received
 ACK 34 received
 ACK 35 received
Retransmitted Packets 0
MD5 Received
MD5 Matched : 7401c7e1f4378a478613bab6f49a79c0
```

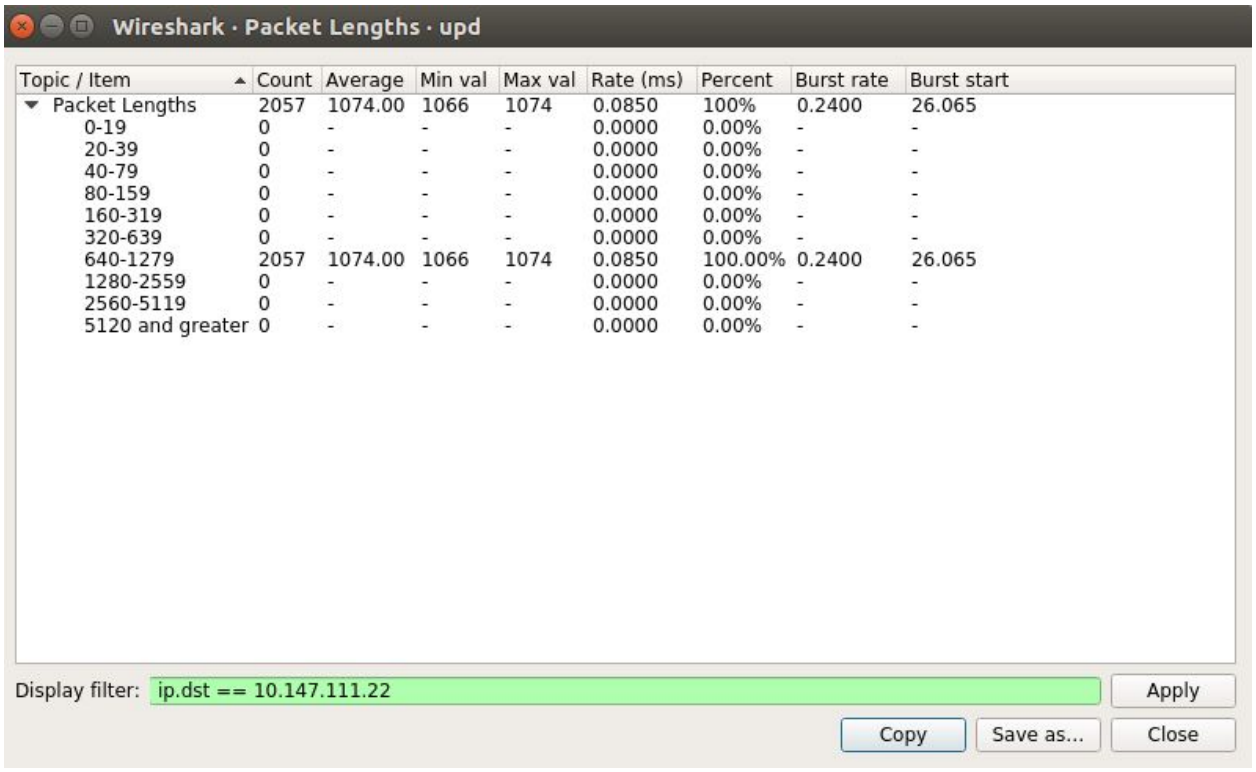
PART II: Observations

A jpg file (‘IMG_20180113_134648.jpg’, size: 2.1MB) was transferred using the given protocol and the following was observed:

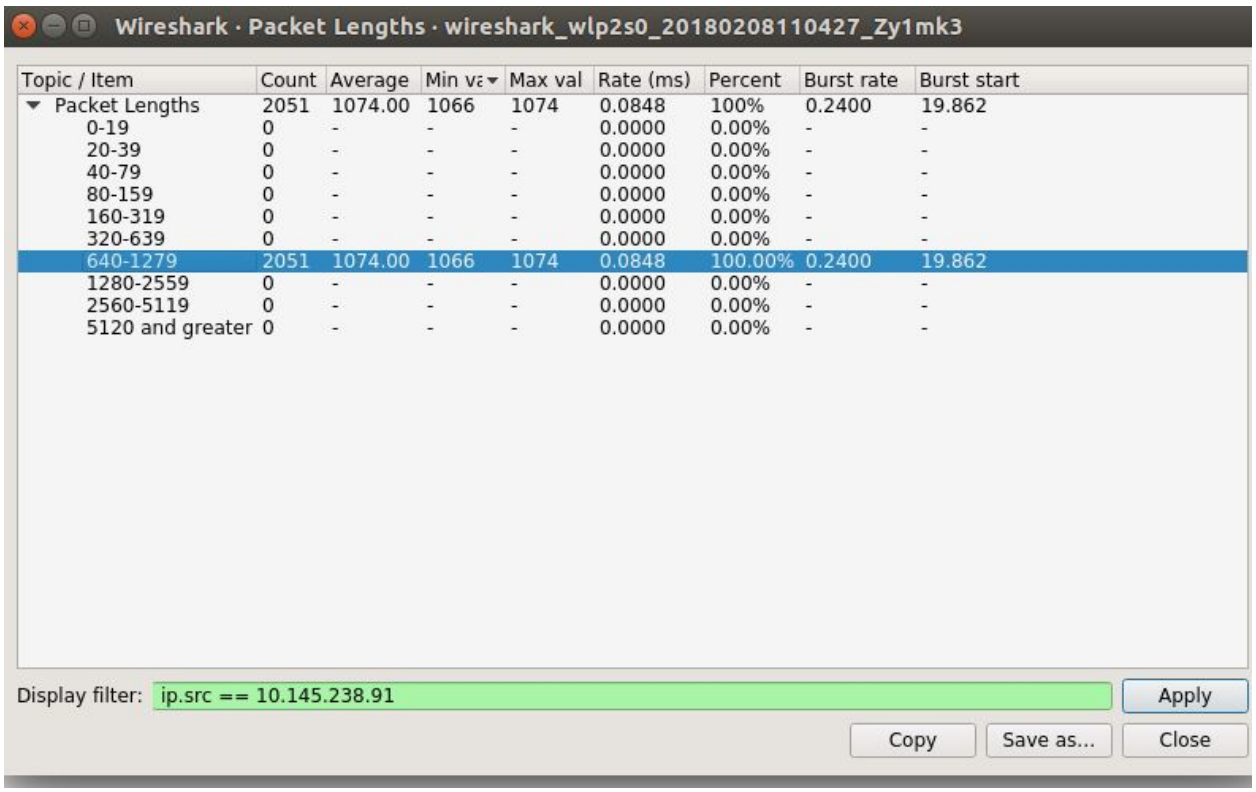
1. Total number of segments received for UDP and the segment size distribution.

Segments received by the server: 2051
Segments received by the client: 2057

Segment size distribution for the client: 1066,1074



Segment size distribution for the server: 1066, 1074



2. Total number of retransmitted segments for UDP.

6 packets were retransmitted.

3. Total time to receive the file for UDP

Client: 24.192s
Server 24.195s

4. Time difference between UDP and TCP

The main reason for the time observed is the stop and wait protocol used in UDP. In UDP, the client waits for an acknowledgement to every packet sent. The client does not send the next packet before getting the acknowledgement and if not received within 1 sec, it retransmits the packet. The packets cannot be transmitted continuously, like in TCP. Thus UDP takes more time to transfer the same file.