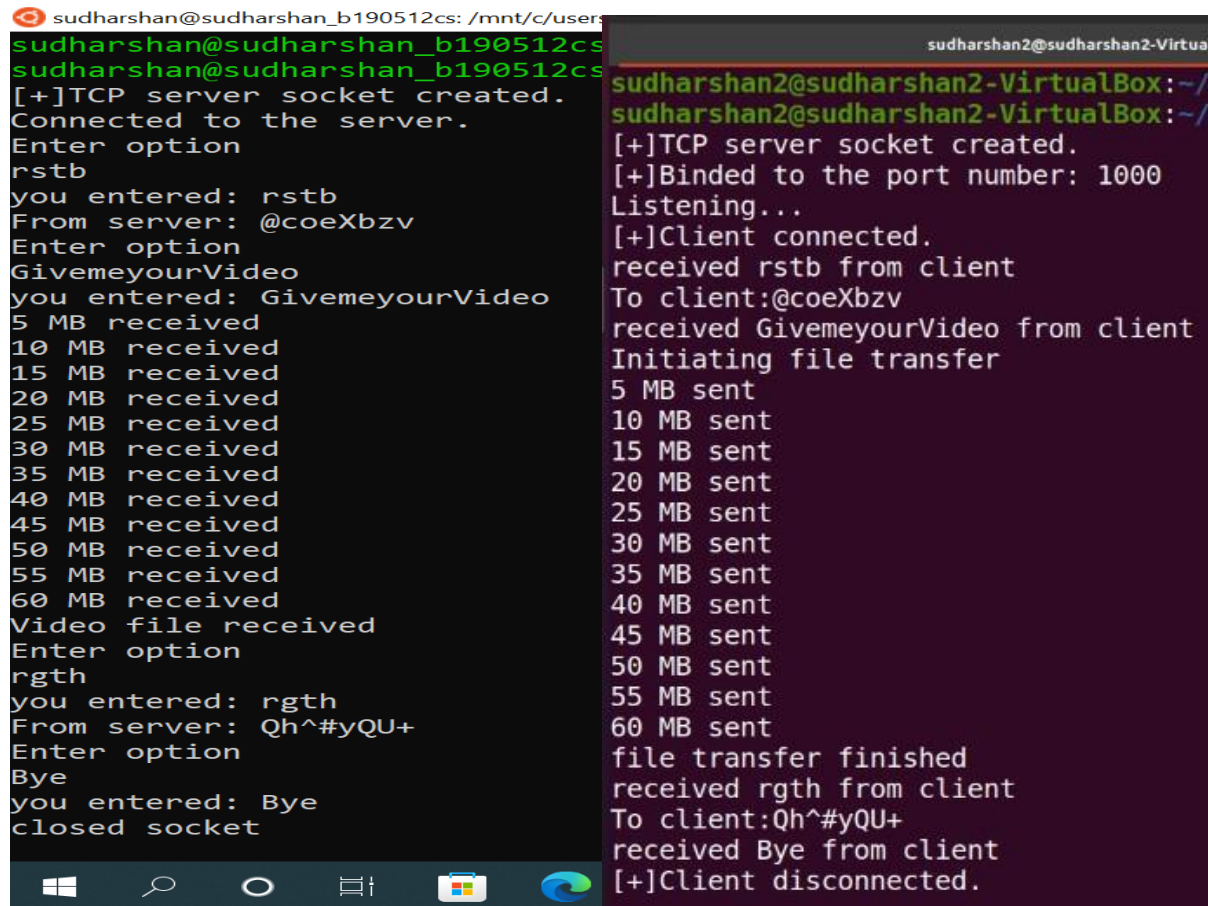


Q2)programs execution covering all functionalities.

Commands: gcc tcpclient2.c && ./a.out 1000      gcc tcpserver2.c && ./a.out 1000



```
sudharshan@sudharshan_b190512cs: /mnt/c/users/sudharshan/sudharshan_b190512cs
sudharshan@sudharshan_b190512cs
[+]TCP server socket created.
Connected to the server.
Enter option
rstb
you entered: rstb
From server: @coeXbzv
Enter option
GivemeyourVideo
you entered: GivemeyourVideo
5 MB received
10 MB received
15 MB received
20 MB received
25 MB received
30 MB received
35 MB received
40 MB received
45 MB received
50 MB received
55 MB received
60 MB received
Video file received
Enter option
rgth
you entered: rgth
From server: Qh^#yQU+
Enter option
Bye
you entered: Bye
closed socket

sudharshan2@sudharshan2-VirtualBox: ~/
sudharshan2@sudharshan2-VirtualBox: ~/
[+]TCP server socket created.
[+]Bound to the port number: 1000
Listening...
[+]Client connected.
received rstb from client
To client:@coeXbzv
received GivemeyourVideo from client
Initiating file transfer
5 MB sent
10 MB sent
15 MB sent
20 MB sent
25 MB sent
30 MB sent
35 MB sent
40 MB sent
45 MB sent
50 MB sent
55 MB sent
60 MB sent
file transfer finished
received rgth from client
To client:Qh^#yQU+
received Bye from client
[+]Client disconnected.
```

I did not concentrate much on this 2 programs so these 2 programs might not be modular,checking edge cases,errors,readable.if want a basic tcp programs which are modular and reusable refer Q1 tcp codes and don't use Q2 codes.

While running these two programs before entering GivemeyourVideo option open a new tab in same terminal window(both server window and client window) and run the below command:

"Ifstat -t -i enp0s3 0.1 > capture.txt"

(capture1.txt for server and capture2.txt for client window)

After file transfer is finished stop the two ifstat.. commands by using ctrl+c .two .txt files will be created and will contain kb/s in and kbps out values for every 0.1 second.

Ifstat command prints network interface statistics

-t flag allows to add timestamp in front of each line

-i flag specifies the list of interfaces to monitor(can use lo,eth0 etc based on interface name-type ifconfig to determine the interface name).

0.1 is to record transmission rate for every 0.1 seconds

> capture.txt specifies to write statistics into a file

GNUPlot is a command-driven interactive plotting program

GNUPlot commands

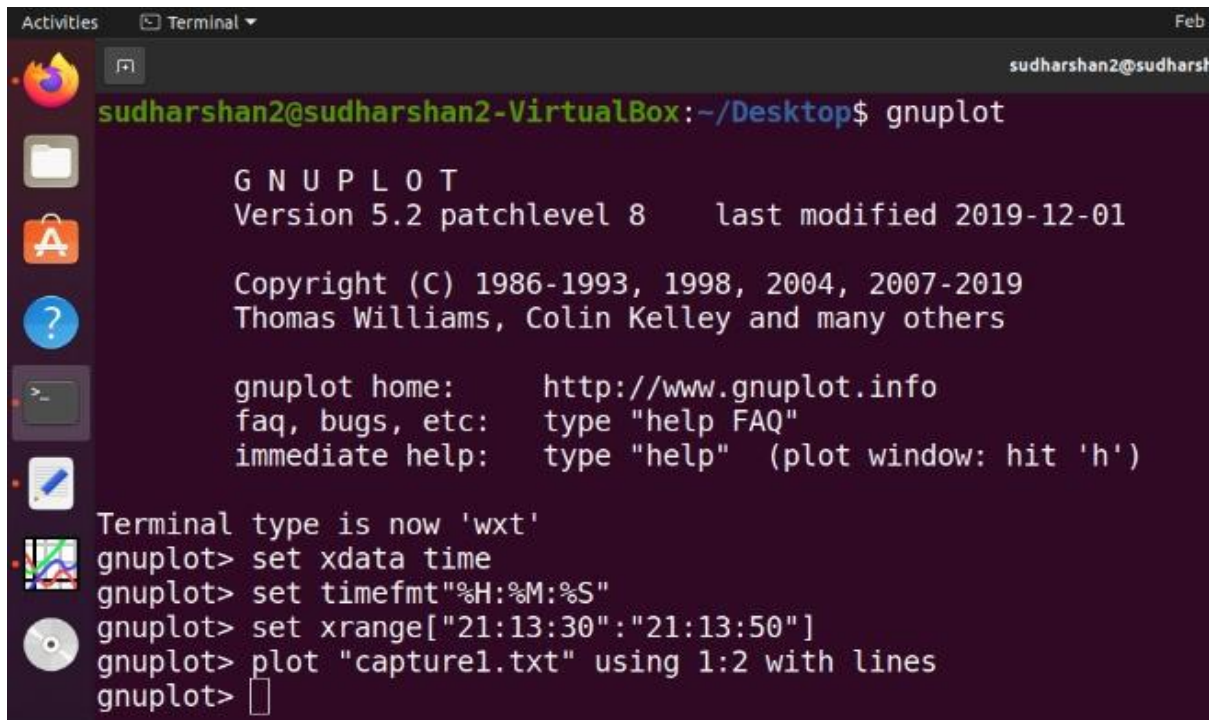
set xdata time - set x axis as time

set timefmt "%H:%M:%S" - set time format

set xrange[ " " ] - set range of x values (mention the timings appropriately)

plot "capture.txt" using 1:2 with lines - plot file with line graphs(capture1 and capture2)

Install gnuplot in terminal to plot the graph using capture.txt files.

A screenshot of a terminal window titled 'Terminal' with a dark background. The prompt is 'sudharshan2@sudharshan2-VirtualBox:~/Desktop\$'. The user has entered 'gnuplot', which has started the program. The output shows 'G N U P L O T', 'Version 5.2 patchlevel 8', 'last modified 2019-12-01', and copyright information. It also provides URLs for the home page and FAQ, and instructions for help. The user then enters several commands: 'set xdata time', 'set timefmt "%H:%M:%S"', 'set xrange["21:13:30":"21:13:50"]', and 'plot "capture1.txt" using 1:2 with lines'. The prompt returns to 'gnuplot>'.

```
Activities Terminal Feb
sudharshan2@sudharshan2-VirtualBox:~/Desktop$ gnuplot

G N U P L O T
Version 5.2 patchlevel 8    last modified 2019-12-01

Copyright (C) 1986-1993, 1998, 2004, 2007-2019
Thomas Williams, Colin Kelley and many others

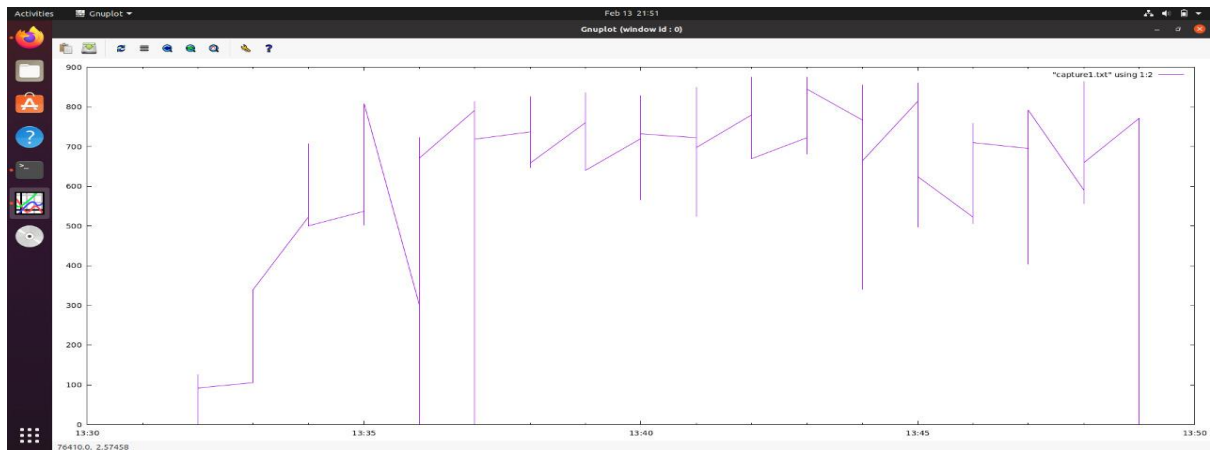
gnuplot home:      http://www.gnuplot.info
faq, bugs, etc:    type "help FAQ"
immediate help:    type "help" (plot window: hit 'h')

Terminal type is now 'wxt'
gnuplot> set xdata time
gnuplot> set timefmt "%H:%M:%S"
gnuplot> set xrange["21:13:30":"21:13:50"]
gnuplot> plot "capture1.txt" using 1:2 with lines
gnuplot>
```

Above gnuplot commands will only plot kb/s-in values and ignore kb/s-out values of given input .txt file.

Here I am plotting only capture1.txt file(captured in server terminal window) so kb/s-in values = speed of client to server data flow only.similarly we can plot server to client data speed using capture2.txt file.y-axis 1 unit=1 kbps-in from client to server.

Avoid putting small xranges in gnuplot.it will not plot in a graph if put very small xranges.



Mam said gnuplot or xgraph anything is fine.so did not plot graph using xgraph.

2)c)i did not do the c part of Q2 .for theory of stop and wait ARQ refer raudra CN section-2 flow control methods.

Note:server is one VM and client is wsl ubuntu here so change ip address of both programs if to run in same machine.we can run both server and client in same VM also old video and received video will have different names we can detect.