

Fast NUCES

Networking

Project (Internet Television)

CN | [Date:18-5-24]

- **C files**

- server.c

- gcc server.c

- ./a.out

- station1.c

- gcc station1.c

- ./a.out 239.192.4.1

- station2.c

- gcc station2.c

- ./a.out 239.192.4.2

- client.c

- gcc `pkg-config --cflags gtk+-3.0` -o client client.c
`pkg-config --libs gtk+-3.0`

- sudo ./client <IP-ADDRESS of the server>

- receiver.c

- Compiled and executed by the client.

- **Execution steps:**

- First of all, client will send a join request to the server to join the multicast group.
- After that Server will provide station list, site info to the client through TCP.
- Then whichever station it selects from the station list, it is connected to that station.
- All the stations are sending data, irrespective of client is connected or not. This functionality is incorporated to relate more with real life situation, e.g Tv/radio sends data even though there is no receiver connected.
- Whenever receiver connects to a particular station, it starts receiving live-streaming videos from that station.
- Used Media player: **ffplay** . All videos at station side is converted using ffmpeg to make it streamable.
 - ◆ Command used for conversion: `ffmpeg -i inputfile.mp4 -f mpegts streamable_output.mp4`
- Receiver can pause, resume, change station or even terminate at any given time from GUI using thread.

- ◆ **Pause** : It closes the multicast reception. This is implemented to relate with real life.

When this button is pressed, it will generate an interrupt by changing flag value, which will temporarily stop receiving data from sender.

- ◆ **Resume** : resumes it, keeping the station the same.

When this button is pressed, it will generate an interrupt by

again changing flag value, which will start receiving data from sender.

◆ **Change Station** : Receiver can change it anytime.

- ❑ Firstly it is disconnected from the station to whom it was connected earlier and then is connected to a new station as per receiver's choice and starts receiving respective live-streaming of data from that station.

◆ **Terminate** : Whenever it is selected, it is disconnected from the station it was connected earlier.

It will exit station, we have done this using 'pkill <media player>'

- Thread is used so that two processes can run in parallel:

- 1) GUI
- 2) Socket programming to send and receive the data

- **Design Configurations**

1. Client to Server: TCP

- a. TCP is used for one to one connection from client to server and it is used for station info and site info

2. Sender to Receiver: UDP

- a. UDP is used to send multicast live-streaming videos from sender to all receivers who joined multicast group.

3. Implementation of GUI: using **gtk** .

4. For all the previous functionalities, we have implemented four different functions which handles pause, resume, change the station, and Terminate accordingly.

- **Station Information**

Station 1 name: F.R.I.E.N.D.S

Station 2 name: H.I.M.Y.M

Port Used for both stations: 5432

Multicast Address for station 1: 239.192.4.1

Multicast Address for station 2: 239.192.4.2

- **Features:**

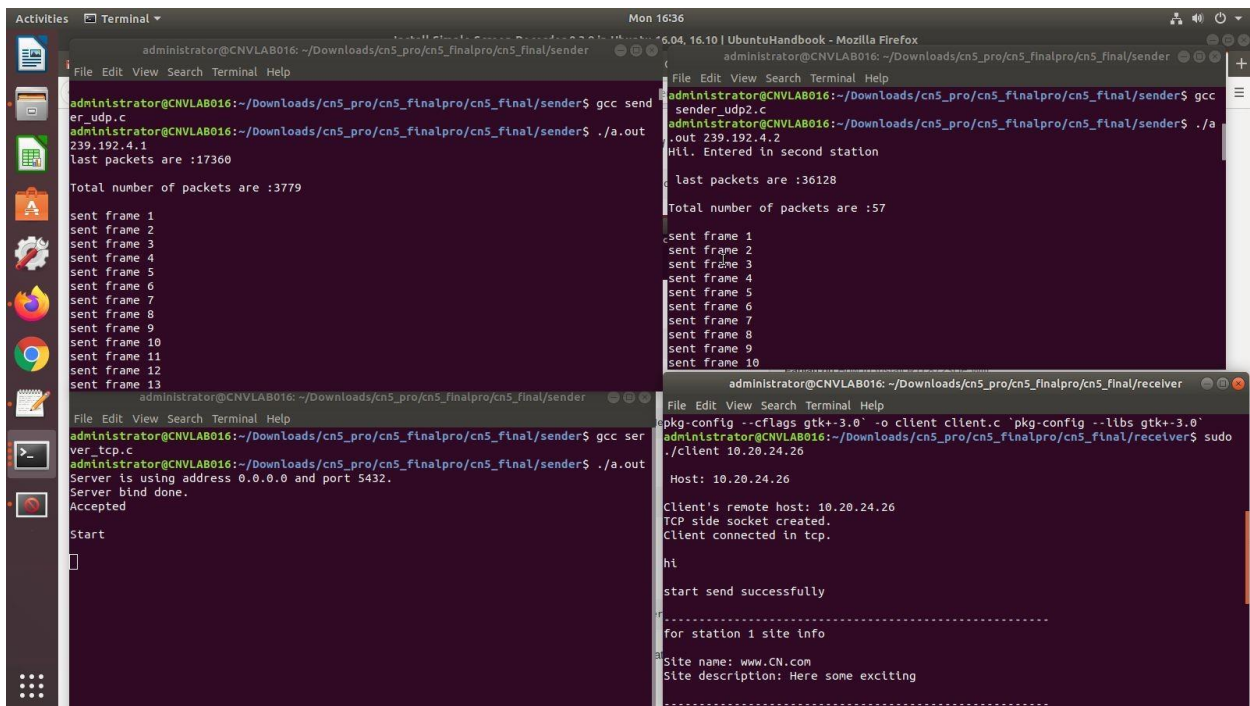
- ☐ Receiver is receiving audio as well as video without any loss of data through UDP.
- ☐ Both the stations are sending data on the same port, but having different IP addresses.

- **Buffer calculation:**

- Time (t seconds) is initially declared and bit-rate will depend on station. Thus, the size of the buffer should be large enough to hold received data of t seconds.
- Every time when the station is changed buffer-size will be recalculated according to t and bit-rate. For a particular station bit-rate is fixed and which is approximated.
- By calculation, we got the buffer size = 64000.

- Screen shots:

- 1.Successful compilation of all files.



The image displays three terminal windows from an Ubuntu system, showing the successful compilation and execution of a network program. The first window shows the compilation of 'sender_udp.c' and 'sender_tcp.c' using 'gcc', followed by running the 'sender' program which sends 13 frames. The second window shows the compilation of 'receiver.c' and running the 'receiver' program, which receives the frames and displays site information. The third window shows the compilation of 'client.c' and running the 'client' program, which connects to the server and sends data.

```
administrator@CNVLAB016: ~/Downloads/cn5_pro/cn5_finalpro/cn5_final/sender$ gcc sender_udp.c
administrator@CNVLAB016: ~/Downloads/cn5_pro/cn5_finalpro/cn5_final/sender$ ./a.out
239.192.4.1
last packets are :17360
Total number of packets are :3779
sent frame 1
sent frame 2
sent frame 3
sent frame 4
sent frame 5
sent frame 6
sent frame 7
sent frame 8
sent frame 9
sent frame 10
sent frame 11
sent frame 12
sent frame 13
administrator@CNVLAB016: ~/Downloads/cn5_pro/cn5_finalpro/cn5_final/sender$ gcc sender_tcp.c
administrator@CNVLAB016: ~/Downloads/cn5_pro/cn5_finalpro/cn5_final/sender$ ./a.out
Server is using address 0.0.0.0 and port 5432.
Server bind done.
Accepted
Start
[ ]

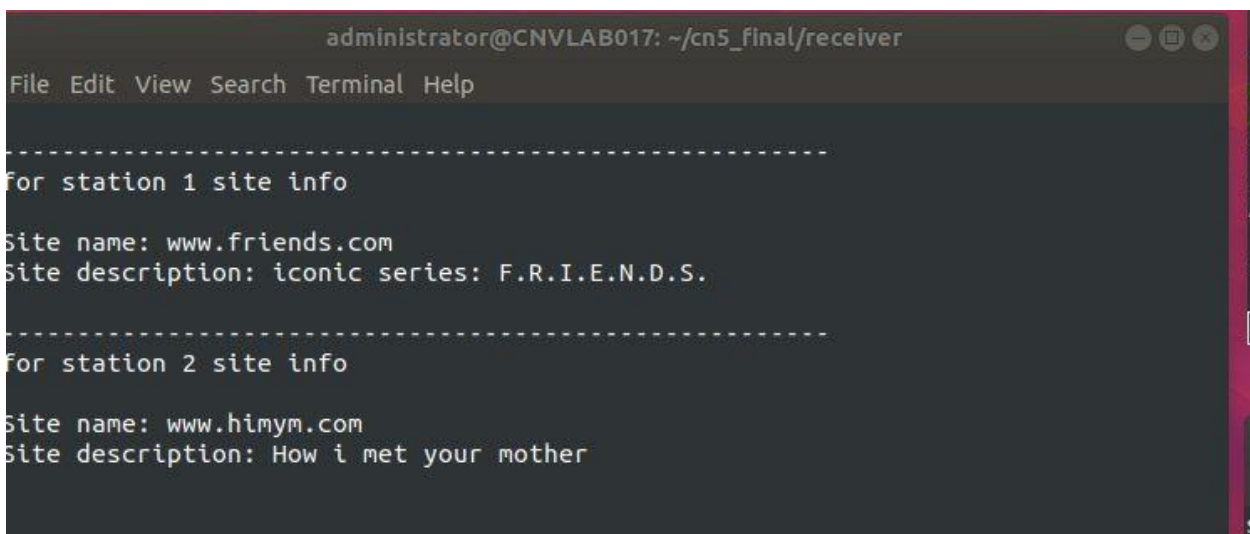
administrator@CNVLAB016: ~/Downloads/cn5_pro/cn5_finalpro/cn5_final/receiver$ gcc receiver.c
administrator@CNVLAB016: ~/Downloads/cn5_pro/cn5_finalpro/cn5_final/receiver$ ./a.out
Hi.. Entered in second station
last packets are :36128
Total number of packets are :57
sent frame 1
sent frame 2
sent frame 3
sent frame 4
sent frame 5
sent frame 6
sent frame 7
sent frame 8
sent frame 9
sent frame 10

administrator@CNVLAB016: ~/Downloads/cn5_pro/cn5_finalpro/cn5_final/receiver$ sudo ./client 10.20.24.26
Host: 10.20.24.26
Client's remote host: 10.20.24.26
TCP side socket created.
Client connected in tcp.
ht
start send successfully
.....
for station 1 site info
Site name: www.CN.com
Site description: Here some exciting
.....

administrator@CNVLAB016: ~/Downloads/cn5_pro/cn5_finalpro/cn5_final/client$ gcc client.c
administrator@CNVLAB016: ~/Downloads/cn5_pro/cn5_finalpro/cn5_final/client$ ./a.out
Client's remote host: 10.20.24.26
TCP side socket created.
Client connected in tcp.
ht
start send successfully
.....
for station 1 site info
Site name: www.CN.com
Site description: Here some exciting
.....
```

2. Site info and station info at client side

Site info at client side

A terminal window with a dark background and light-colored text. The window title bar shows 'administrator@CNVLAB017: ~/cn5_final/receiver'. The menu bar includes 'File', 'Edit', 'View', 'Search', 'Terminal', and 'Help'. The terminal content shows two sections of site information, each separated by dashed lines. The first section is for 'station 1' and lists the site name as 'www.friends.com' and the site description as 'iconic series: F.R.I.E.N.D.S.'. The second section is for 'station 2' and lists the site name as 'www.himym.com' and the site description as 'How i met your mother'.

```
administrator@CNVLAB017: ~/cn5_final/receiver
File Edit View Search Terminal Help
-----
for station 1 site info
Site name: www.friends.com
Site description: iconic series: F.R.I.E.N.D.S.
-----
for station 2 site info
Site name: www.himym.com
Site description: How i met your mother
```

Station info at client side

```
-----  
Info port: 9531  
Station Number: 1  
Station name: friends  
Multicast Address: 239.192.4.1  
Data port: 5431  
Bit rate: 1087 kb/s
```

```
-----  
Info port: 9532  
Station Number: 2  
Station name: himym  
Multicast Address: 239.192.4.2  
Data port: 5431  
Bit rate: 891 kb/s  
-----
```

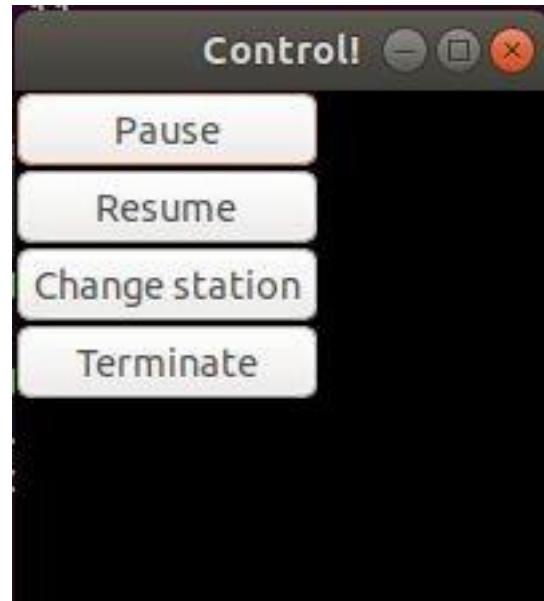
3. Station selection GUI window

- Page 1 opens for the client whenever he is connected to the server.
- Page 2 opens after selecting any of the two buttons : F.R.I.E.N.D.S or H.I.M.Y.M

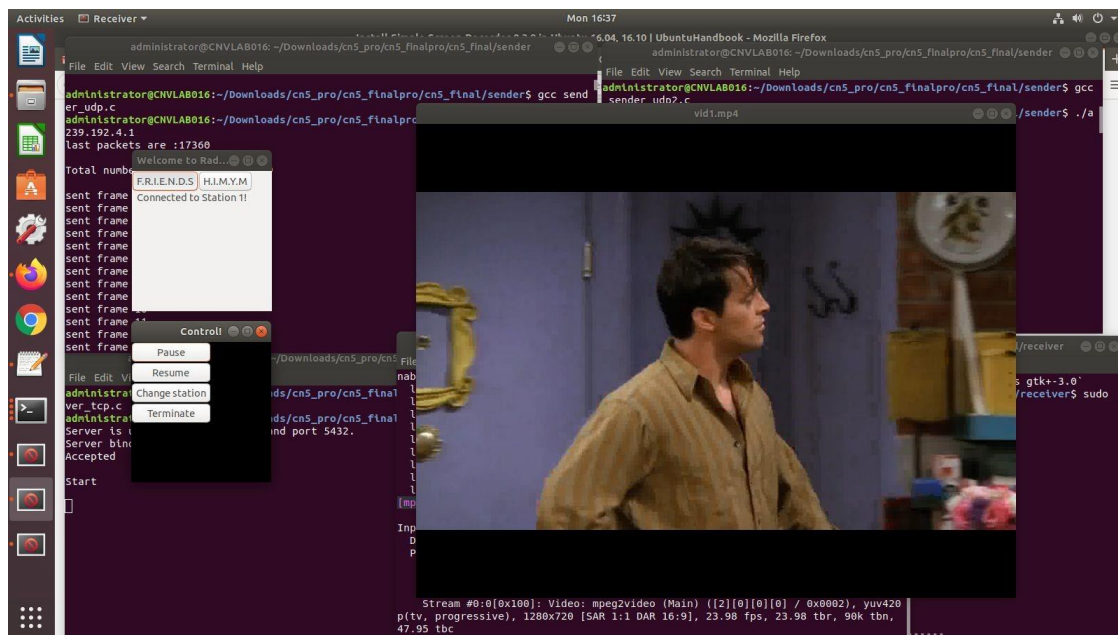
Page 1 of GUI



Page 2 of GUI



4.Station 1 :F.R.I.E.N.D.S



5. Station 2: H.I.M.Y.M

Activities ffplay Mon 16:38

administrator@CNVLAB016: ~/Downloads/cn5_pro/cn5_finalpro/cn5_final/sender

File Edit View Search Terminal Help

administrator@CNVLAB016:~/Downloads/er_udp.c
administrator@CNVLAB016:~/Downloads/239.192.4.1
last packets are :17360

Wellcome to Rad...
F.R.I.E.N.D.S | H.I.M.Y.M
Connected to Station 2!

Control
Pause
Resume
Change station
Terminate

vid1.mp4

Duration: 00:00:11.83,
Program 1 Ready to listen!
Metadata:
service_name : 0 Receiving 64000
service_provider: 1 Receiving 64000
Stream #0:0[0x100]: 2 Receiving 64000
p(tv, progressive), 320x3 Receiving 64000
Stream #0:1[0x101](u4 Receiving 64000
o, sl0p, 160 kb/s 5 Receiving 64000
59.47 A-V: 0.003 fd= 6 Receiving 64000
7 Receiving 64000
8 Receiving 64000
9 Receiving 64000
10 Receiving 64000
11 Receiving 64000

administrator@CNVLAB016: ~/Downloads/cn5_pro/cn5_finalpro/cn5_final/sender\$ gcc
~/Downloads/cn5_pro/cn5_finalpro/cn5_final/sender\$./a
station
3
are :57
-61883 --enable-chromaprint --e
LAB016: ~/Downloads/cn5_pro/cn5_finalpro/cn5_final/receiver
al Help
odify_bg (Gtkwidget *wldget,