

CSD 304: Computer Networks

Lab Assignment : 02

Group:11

Team Members

1. Jagmeet Singh Oberoi
1410110166
2. Paul George
1410110280
3. Alapati Sai Varun
1410110037
4. Hithesh Sekhar
1310110097
5. Girik Malik
1310110140

Audio file | Varying nanosleep | Server

```
saivarun@ubuntu: ~/Desktop/CN/2/server
saivarun@ubuntu:~/Desktop/CN/2/server$ ./servera 40480 0
Nano sec 0 and buffer_size 40480
Server is listening at address 0.0.0.0:5432
Client needs to send "GET" to receive the file
Server got message from 127.0.0.1: GET
[4 bytes]

GET
File being sent
16496718 Bytes sent
Time taken : 76 ms and Datarate : 217062 bytes per ms

saivarun@ubuntu:~/Desktop/CN/2/server$ ./servera 40480 150000
Nano sec 150000 and buffer_size 40480
Server is listening at address 0.0.0.0:5432
Client needs to send "GET" to receive the file
Server got message from 127.0.0.1: GET
[4 bytes]

GET
File being sent
16496718 Bytes sent
Time taken : 206 ms and Datarate : 80081 bytes per ms

saivarun@ubuntu:~/Desktop/CN/2/server$ ./servera 40480 300000
Nano sec 300000 and buffer_size 40480
Server is listening at address 0.0.0.0:5432
Client needs to send "GET" to receive the file
Server got message from 127.0.0.1: GET
[4 bytes]

GET
File being sent
16496718 Bytes sent
Time taken : 301 ms and Datarate : 54806 bytes per ms

saivarun@ubuntu:~/Desktop/CN/2/server$ ./servera 40480 450000
Nano sec 450000 and buffer_size 40480
Server is listening at address 0.0.0.0:5432
Client needs to send "GET" to receive the file
Server got message from 127.0.0.1: GET
[4 bytes]
```

```
saivarun@ubuntu: ~/Desktop/CN/2/server
saivarun@ubuntu:~/Desktop/CN/2/server$ ./servera 40480 600000
Nano sec 600000 and buffer_size 40480
Server is listening at address 0.0.0.0:5432
Client needs to send "GET" to receive the file
Server got message from 127.0.0.1: GET
[4 bytes]

GET
File being sent
16496718 Bytes sent
Time taken : 717 ms and Datarate : 23007 bytes per ms

saivarun@ubuntu:~/Desktop/CN/2/server$ ./servera 40480 750000
Nano sec 750000 and buffer_size 40480
Server is listening at address 0.0.0.0:5432
Client needs to send "GET" to receive the file
Server got message from 127.0.0.1: GET
[4 bytes]

GET
File being sent
16496718 Bytes sent
Time taken : 667 ms and Datarate : 24732 bytes per ms

saivarun@ubuntu:~/Desktop/CN/2/server$ ./servera 40480 900000
Nano sec 900000 and buffer_size 40480
Server is listening at address 0.0.0.0:5432
Client needs to send "GET" to receive the file
Server got message from 127.0.0.1: GET
[4 bytes]

GET
File being sent
16496718 Bytes sent
Time taken : 749 ms and Datarate : 22024 bytes per ms

saivarun@ubuntu:~/Desktop/CN/2/server$
```

Audio file | Varying nanosleep | Client

```
saivarun@ubuntu: ~/Desktop/CN/2/client

saivarun@ubuntu:~/Desktop/CN/2/client$ ./clienta 0.0.0.0 40840
Host 0.0.0.0 found!
Client connected to 0.0.0.0:5432.
To play the music, pipe the download file to a player, e.g., ALSA, SOX, VLC: cat recvd_file.wav | vlc -
GET
Bytes Received : 12537880
File Received Successfully

saivarun@ubuntu:~/Desktop/CN/2/client$ ./clienta 0.0.0.0 40840
Host 0.0.0.0 found!
Client connected to 0.0.0.0:5432.
To play the music, pipe the download file to a player, e.g., ALSA, SOX, VLC: cat recvd_file.wav | vlc -
GET
Bytes Received : 16213480
File Received Successfully

saivarun@ubuntu:~/Desktop/CN/2/client$ ./clienta 0.0.0.0 40840
Host 0.0.0.0 found!
Client connected to 0.0.0.0:5432.
To play the music, pipe the download file to a player, e.g., ALSA, SOX, VLC: cat recvd_file.wav | vlc -
GET
Bytes Received : 15723400
File Received Successfully

saivarun@ubuntu:~/Desktop/CN/2/client$ ./clienta 0.0.0.0 40840
Host 0.0.0.0 found!
Client connected to 0.0.0.0:5432.
To play the music, pipe the download file to a player, e.g., ALSA, SOX, VLC: cat recvd_file.wav | vlc -
GET
Bytes Received : 14702400
File Received Successfully
```



```
saivarun@ubuntu: ~/Desktop/CN/2/client

saivarun@ubuntu:~/Desktop/CN/2/client$ ./clienta 0.0.0.0 40840
Host 0.0.0.0 found!
Client connected to 0.0.0.0:5432.
To play the music, pipe the download file to a player, e.g., ALSA, SOX, VLC: cat recvd_file.wav | vlc -
GET
Bytes Received : 14702400
File Received Successfully

saivarun@ubuntu:~/Desktop/CN/2/client$ ./clienta 0.0.0.0 40840
Host 0.0.0.0 found!
Client connected to 0.0.0.0:5432.
To play the music, pipe the download file to a player, e.g., ALSA, SOX, VLC: cat recvd_file.wav | vlc -
GET
Bytes Received : 16295160
File Received Successfully

saivarun@ubuntu:~/Desktop/CN/2/client$ ./clienta 0.0.0.0 40840
Host 0.0.0.0 found!
Client connected to 0.0.0.0:5432.
To play the music, pipe the download file to a player, e.g., ALSA, SOX, VLC: cat recvd_file.wav | vlc -
GET
Bytes Received : 16376840
File Received Successfully

saivarun@ubuntu:~/Desktop/CN/2/client$
```

Video file | Varying nanosleep | Server

```
saivarun@ubuntu: ~/Desktop/CN/2/server
saivarun@ubuntu:~/Desktop/CN/2/server$ ./servera 40480 0
Nano sec 0 and buffer_size 40480
Server is listening at address 0.0.0.0:5432
Client needs to send "GET" to receive the file
Server got message from 127.0.0.1: GET
[4 bytes]

GET
File being sent
36008917 Bytes sent
Time taken : 1433 ms and Datarate : 25128 bytes per ms

saivarun@ubuntu:~/Desktop/CN/2/server$ ./servera 40480 150000
Nano sec 150000 and buffer_size 40480
Server is listening at address 0.0.0.0:5432
Client needs to send "GET" to receive the file
Server got message from 127.0.0.1: GET
[4 bytes]

GET
File being sent
36008917 Bytes sent
Time taken : 1043 ms and Datarate : 34524 bytes per ms

saivarun@ubuntu:~/Desktop/CN/2/server$ ./servera 40480 300000
Nano sec 300000 and buffer_size 40480
Server is listening at address 0.0.0.0:5432
Client needs to send "GET" to receive the file
Server got message from 127.0.0.1: GET
[4 bytes]

GET
File being sent
36008917 Bytes sent
Time taken : 683 ms and Datarate : 52721 bytes per ms

saivarun@ubuntu:~/Desktop/CN/2/server$ ./servera 40480 450000
Nano sec 450000 and buffer_size 40480
Server is listening at address 0.0.0.0:5432
Client needs to send "GET" to receive the file
Server got message from 127.0.0.1: GET
[4 bytes]

GET
File being sent
36008917 Bytes sent
Time taken : 868 ms and Datarate : 41484 bytes per ms
```

```
saivarun@ubuntu: ~/Desktop/CN/2/server
saivarun@ubuntu:~/Desktop/CN/2/server$ ./servera 40480 600000
Nano sec 600000 and buffer_size 40480
Server is listening at address 0.0.0.0:5432
Client needs to send "GET" to receive the file
Server got message from 127.0.0.1: GET
[4 bytes]

GET
File being sent
36008917 Bytes sent
Time taken : 1259 ms and Datarate : 28601 bytes per ms

saivarun@ubuntu:~/Desktop/CN/2/server$ ./servera 40480 750000
Nano sec 750000 and buffer_size 40480
Server is listening at address 0.0.0.0:5432
Client needs to send "GET" to receive the file
Server got message from 127.0.0.1: GET
[4 bytes]

GET
File being sent
36008917 Bytes sent
Time taken : 1644 ms and Datarate : 21903 bytes per ms

saivarun@ubuntu:~/Desktop/CN/2/server$ ./servera 40480 900000
Nano sec 900000 and buffer_size 40480
Server is listening at address 0.0.0.0:5432
Client needs to send "GET" to receive the file
Server got message from 127.0.0.1: GET
[4 bytes]

GET
File being sent
36008917 Bytes sent
Time taken : 1719 ms and Datarate : 20947 bytes per ms

saivarun@ubuntu:~/Desktop/CN/2/server$
```


Video file | Varying nanosleep | Client

```
saivarun@ubuntu: ~/Desktop/CN/2/client
saivarun@ubuntu:~/Desktop/CN/2/client$ ./clienta 0.0.0.0 40840
Host 0.0.0.0 found!
Client connected to 0.0.0.0:5432.
To play the music, pipe the download file to a player, e.g., ALSA, SOX, VLC: cat recvd_file.wav | vlc -
GET
Bytes Received : 32508640
File Received Successfully

saivarun@ubuntu:~/Desktop/CN/2/client$ ./clienta 0.0.0.0 40840
Host 0.0.0.0 found!
Client connected to 0.0.0.0:5432.
To play the music, pipe the download file to a player, e.g., ALSA, SOX, VLC: cat recvd_file.wav | vlc -
GET
Bytes Received : 32100240
File Received Successfully

saivarun@ubuntu:~/Desktop/CN/2/client$ ./clienta 0.0.0.0 40840
Host 0.0.0.0 found!
Client connected to 0.0.0.0:5432.
To play the music, pipe the download file to a player, e.g., ALSA, SOX, VLC: cat recvd_file.wav | vlc -
GET
Bytes Received : 33121240
File Received Successfully

saivarun@ubuntu:~/Desktop/CN/2/client$ ./clienta 0.0.0.0 40840
Host 0.0.0.0 found!
Client connected to 0.0.0.0:5432.
To play the music, pipe the download file to a player, e.g., ALSA, SOX, VLC: cat recvd_file.wav | vlc -
GET
Bytes Received : 34305600
File Received Successfully
```

```
saivarun@ubuntu: ~/Desktop/CN/2/client
saivarun@ubuntu:~/Desktop/CN/2/client$ ./clienta 0.0.0.0 40840
Host 0.0.0.0 found!
Client connected to 0.0.0.0:5432.
To play the music, pipe the download file to a player, e.g., ALSA, SOX, VLC: cat received_file.wav | vlc -
GET
Bytes Received : 35489960
File Received Successfully

saivarun@ubuntu:~/Desktop/CN/2/client$ ./clienta 0.0.0.0 40840
Host 0.0.0.0 found!
Client connected to 0.0.0.0:5432.
To play the music, pipe the download file to a player, e.g., ALSA, SOX, VLC: cat received_file.wav | vlc -
GET
Bytes Received : 35775840
File Received Successfully

saivarun@ubuntu:~/Desktop/CN/2/client$ ./clienta 0.0.0.0 40840
Host 0.0.0.0 found!
Client connected to 0.0.0.0:5432.
To play the music, pipe the download file to a player, e.g., ALSA, SOX, VLC: cat received_file.wav | vlc -
GET
Bytes Received : 36020880
File Received Successfully

saivarun@ubuntu:~/Desktop/CN/2/client$
```

Audio file | Varying Payload | Server

```
saivarun@ubuntu: ~/Desktop/CN/2/server
saivarun@ubuntu:~/Desktop/CN/2/server$ ./servera 30480 900000
Nano sec 900000 and buffer_size 30480
Server is listening at address 0.0.0.0:5432
Client needs to send "GET" to receive the file
Server got message from 127.0.0.1: GET
[4 bytes]

GET
File being sent
16496718 Bytes sent
Time taken : 1370 ms and Datarate : 12041 bytes per ms

saivarun@ubuntu:~/Desktop/CN/2/server$ ./servera 33480 900000
Nano sec 900000 and buffer_size 33480
Server is listening at address 0.0.0.0:5432
Client needs to send "GET" to receive the file
Server got message from 127.0.0.1: GET
[4 bytes]

GET
File being sent
16496718 Bytes sent
Time taken : 1197 ms and Datarate : 13781 bytes per ms

saivarun@ubuntu:~/Desktop/CN/2/server$ ./servera 36480 900000
Nano sec 900000 and buffer_size 36480
Server is listening at address 0.0.0.0:5432
Client needs to send "GET" to receive the file
Server got message from 127.0.0.1: GET
[4 bytes]

GET
File being sent
16496718 Bytes sent
Time taken : 988 ms and Datarate : 16697 bytes per ms

saivarun@ubuntu:~/Desktop/CN/2/server$ ./servera 39480 900000
Nano sec 900000 and buffer_size 39480
Server is listening at address 0.0.0.0:5432
Client needs to send "GET" to receive the file
Server got message from 127.0.0.1: GET
[4 bytes]

GET
File being sent
16496718 Bytes sent
Time taken : 866 ms and Datarate : 19049 bytes per ms
```



```
saivarun@ubuntu: ~/Desktop/CN/2/server
saivarun@ubuntu:~/Desktop/CN/2/server$ ./servera 42480 900000
Nano sec 900000 and buffer_size 42480
Server is listening at address 0.0.0.0:5432
Client needs to send "GET" to receive the file
Server got message from 127.0.0.1: GET
[4 bytes]

GET
File being sent
16496718 Bytes sent
Time taken : 1073 ms and Datarate : 15374 bytes per ms

saivarun@ubuntu:~/Desktop/CN/2/server$ ./servera 45480 900000
Nano sec 900000 and buffer_size 45480
Server is listening at address 0.0.0.0:5432
Client needs to send "GET" to receive the file
Server got message from 127.0.0.1: GET
[4 bytes]

GET
File being sent
16496718 Bytes sent
Time taken : 573 ms and Datarate : 28790 bytes per ms

saivarun@ubuntu:~/Desktop/CN/2/server$ ./servera 48480 900000
Nano sec 900000 and buffer_size 48480
Server is listening at address 0.0.0.0:5432
Client needs to send "GET" to receive the file
Server got message from 127.0.0.1: GET
[4 bytes]

GET
File being sent
16496718 Bytes sent
Time taken : 529 ms and Datarate : 31184 bytes per ms

saivarun@ubuntu:~/Desktop/CN/2/server$
saivarun@ubuntu:~/Desktop/CN/2/server$
```

Audio file | Varying Payload || Client

```
saivarun@ubuntu: ~/Desktop/CN/2/client
saivarun@ubuntu:~/Desktop/CN/2/client$ ./clienta 0.0.0.0 30480
Host 0.0.0.0 found!
Client connected to 0.0.0.0:5432.
To play the music, pipe the download file to a player, e.g., ALSA, SOX, VLC: cat recvd_file.wav | vlc -
GET
Bytes Received : 16398240
File Received Successfully

saivarun@ubuntu:~/Desktop/CN/2/client$ ./clienta 0.0.0.0 33480
Host 0.0.0.0 found!
Client connected to 0.0.0.0:5432.
To play the music, pipe the download file to a player, e.g., ALSA, SOX, VLC: cat recvd_file.wav | vlc -
GET
Bytes Received : 16304760
File Received Successfully

saivarun@ubuntu:~/Desktop/CN/2/client$ ./clienta 0.0.0.0 36480
Host 0.0.0.0 found!
Client connected to 0.0.0.0:5432.
To play the music, pipe the download file to a player, e.g., ALSA, SOX, VLC: cat recvd_file.wav | vlc -
GET
Bytes Received : 16306560
File Received Successfully

saivarun@ubuntu:~/Desktop/CN/2/client$ ./clienta 0.0.0.0 39480
Host 0.0.0.0 found!
Client connected to 0.0.0.0:5432.
To play the music, pipe the download file to a player, e.g., ALSA, SOX, VLC: cat recvd_file.wav | vlc -
GET
Bytes Received : 16226280
File Received Successfully

saivarun@ubuntu:~/Desktop/CN/2/client$
```

```
saivarun@ubuntu: ~/Desktop/CN/2/client

saivarun@ubuntu:~/Desktop/CN/2/client$ ./clienta 0.0.0.0 42480
Host 0.0.0.0 found!
Client connected to 0.0.0.0:5432.
To play the music, pipe the download file to a player, e.g., ALSA, SOX, VLC: cat recvd_file.wav | vlc -
GET
Bytes Received : 16142400
File Received Successfully

saivarun@ubuntu:~/Desktop/CN/2/client$ ./clienta 0.0.0.0 45480
Host 0.0.0.0 found!
Client connected to 0.0.0.0:5432.
To play the music, pipe the download file to a player, e.g., ALSA, SOX, VLC: cat recvd_file.wav | vlc -
GET
Bytes Received : 16281840
File Received Successfully

saivarun@ubuntu:~/Desktop/CN/2/client$ ./clienta 0.0.0.0 48480
Host 0.0.0.0 found!
Client connected to 0.0.0.0:5432.
To play the music, pipe the download file to a player, e.g., ALSA, SOX, VLC: cat recvd_file.wav | vlc -
GET
Bytes Received : 16192320
File Received Successfully

saivarun@ubuntu:~/Desktop/CN/2/client$
```

Video file | Varying Payload | Server


```
saivarun@ubuntu: ~/Desktop/CN/2/server
saivarun@ubuntu:~/Desktop/CN/2/server$ ./servera 30480 900000
Nano sec 900000 and buffer_size 30480
Server is listening at address 0.0.0.0:5432
Client needs to send "GET" to receive the file
Server got message from 127.0.0.1: GET
[4 bytes]

GET
File being sent
36008917 Bytes sent
Time taken : 1804 ms and Datarate : 19960 bytes per ms

saivarun@ubuntu:~/Desktop/CN/2/server$ ./servera 33480 900000
Nano sec 900000 and buffer_size 33480
Server is listening at address 0.0.0.0:5432
Client needs to send "GET" to receive the file
Server got message from 127.0.0.1: GET
[4 bytes]

GET
File being sent
36008917 Bytes sent
Time taken : 2684 ms and Datarate : 13416 bytes per ms

saivarun@ubuntu:~/Desktop/CN/2/server$ ./servera 36480 900000
Nano sec 900000 and buffer_size 36480
Server is listening at address 0.0.0.0:5432
Client needs to send "GET" to receive the file
Server got message from 127.0.0.1: GET
[4 bytes]

GET
File being sent
36008917 Bytes sent
Time taken : 1913 ms and Datarate : 18823 bytes per ms

saivarun@ubuntu:~/Desktop/CN/2/server$ ./servera 39480 900000
Nano sec 900000 and buffer_size 39480
Server is listening at address 0.0.0.0:5432
Client needs to send "GET" to receive the file
Server got message from 127.0.0.1: GET
[4 bytes]

GET
File being sent
36008917 Bytes sent
Time taken : 1925 ms and Datarate : 18705 bytes per ms
```



```
saivarun@ubuntu: ~/Desktop/CN/2/server
saivarun@ubuntu:~/Desktop/CN/2/server$ ./servera 42480 900000
Nano sec 900000 and buffer_size 42480
Server is listening at address 0.0.0.0:5432
Client needs to send "GET" to receive the file
Server got message from 127.0.0.1: GET
[4 bytes]

GET
File being sent
36008917 Bytes sent
Time taken : 1628 ms and Datarate : 22118 bytes per ms

saivarun@ubuntu:~/Desktop/CN/2/server$ ./servera 45480 900000
Nano sec 900000 and buffer_size 45480
Server is listening at address 0.0.0.0:5432
Client needs to send "GET" to receive the file
Server got message from 127.0.0.1: GET
[4 bytes]

GET
File being sent
36008917 Bytes sent
Time taken : 1261 ms and Datarate : 28555 bytes per ms

saivarun@ubuntu:~/Desktop/CN/2/server$ ./servera 48480 900000
Nano sec 900000 and buffer_size 48480
Server is listening at address 0.0.0.0:5432
Client needs to send "GET" to receive the file
Server got message from 127.0.0.1: GET
[4 bytes]

GET
File being sent
36008917 Bytes sent
Time taken : 1561 ms and Datarate : 23067 bytes per ms

saivarun@ubuntu:~/Desktop/CN/2/server$
```

Video file | Varying Payload | Client

saivarun@ubuntu: ~/Desktop/CN/2/client

```
saivarun@ubuntu:~/Desktop/CN/2/client$ ./clienta 0.0.0.0 30480
Host 0.0.0.0 found!
Client connected to 0.0.0.0:5432.
To play the music, pipe the download file to a player, e.g., ALSA, SOX, VLC: cat recvd_file.wav | vlc -
GET
Bytes Received : 35234880
File Received Successfully

saivarun@ubuntu:~/Desktop/CN/2/client$ ./clienta 0.0.0.0 33480
Host 0.0.0.0 found!
Client connected to 0.0.0.0:5432.
To play the music, pipe the download file to a player, e.g., ALSA, SOX, VLC: cat recvd_file.wav | vlc -
GET
Bytes Received : 35522280
File Received Successfully

saivarun@ubuntu:~/Desktop/CN/2/client$ ./clienta 0.0.0.0 36480
Host 0.0.0.0 found!
Client connected to 0.0.0.0:5432.
To play the music, pipe the download file to a player, e.g., ALSA, SOX, VLC: cat recvd_file.wav | vlc -
GET
Bytes Received : 35786880
File Received Successfully

saivarun@ubuntu:~/Desktop/CN/2/client$ ./clienta 0.0.0.0 39480
Host 0.0.0.0 found!
Client connected to 0.0.0.0:5432.
To play the music, pipe the download file to a player, e.g., ALSA, SOX, VLC: cat recvd_file.wav | vlc -
GET
Bytes Received : 35689920
```

```

saivarun@ubuntu: ~/Desktop/CN/2/client
saivarun@ubuntu:~/Desktop/CN/2/client$ ./clienta 0.0.0.0 42480
Host 0.0.0.0 found!
Client connected to 0.0.0.0:5432.
To play the music, pipe the download file to a player, e.g., ALSA, SOX, VLC: cat recvd_file.wav | vlc -
GET
Bytes Received : 34196400
File Received Successfully

saivarun@ubuntu:~/Desktop/CN/2/client$ ./clienta 0.0.0.0 45480
Host 0.0.0.0 found!
Client connected to 0.0.0.0:5432.
To play the music, pipe the download file to a player, e.g., ALSA, SOX, VLC: cat recvd_file.wav | vlc -
GET
Bytes Received : 35156040
File Received Successfully

saivarun@ubuntu:~/Desktop/CN/2/client$ ./clienta 0.0.0.0 48480
Host 0.0.0.0 found!
Client connected to 0.0.0.0:5432.
To play the music, pipe the download file to a player, e.g., ALSA, SOX, VLC: cat recvd_file.wav | vlc -
GET
Bytes Received : 35487360
File Received Successfully

saivarun@ubuntu:~/Desktop/CN/2/client$

```

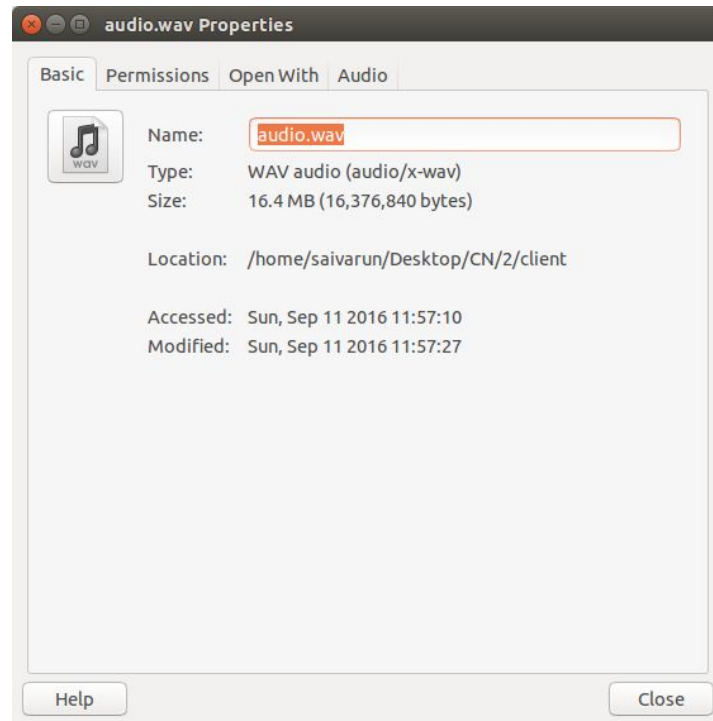
REPRESENTATION OF RECEIVED FILE SIZE AS A FUNCTION OF DATA RATE

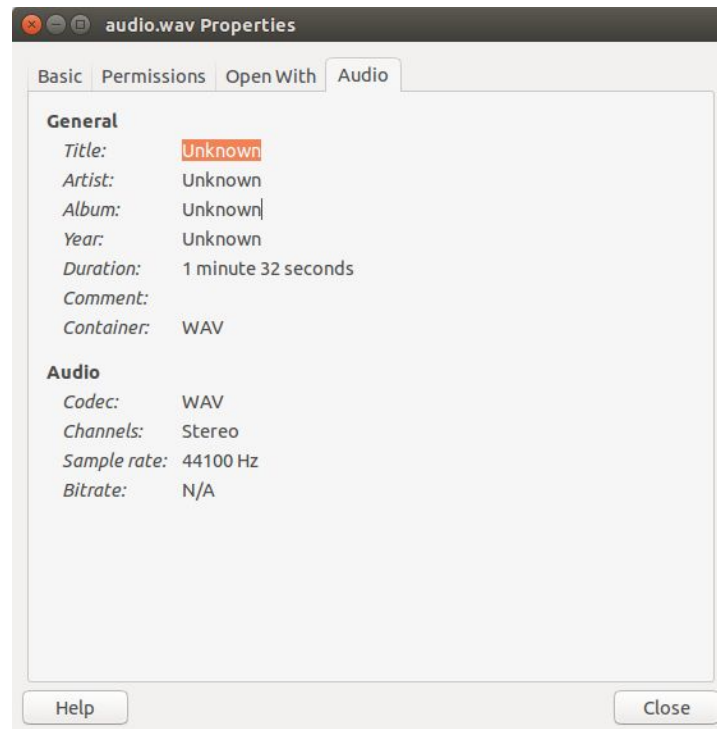
DataRate (MBps)	Bytes Received	MB Received
-----------------	----------------	-------------

12.79449441	35522280	33.8766861
17.83847778	35689920	34.03656006
17.95101135	35786888	34.12903595
19.03533903	35234880	33.6026001
19.97661556	36020880	34.35218811
20.88832819	35775840	34.11849976
21.09336817	34196400	32.61222839
21.99840508	35487360	33.84338379
23.96392781	32508640	31.00265503
26.76105453	35489960	33.84586334
27.23216964	35156040	33.52741241
32.92465153	32100240	30.61317444
39.56222466	34305600	32.71636963
50.27866277	33121240	31.58687592
12.79449441	35522280	33.8766861

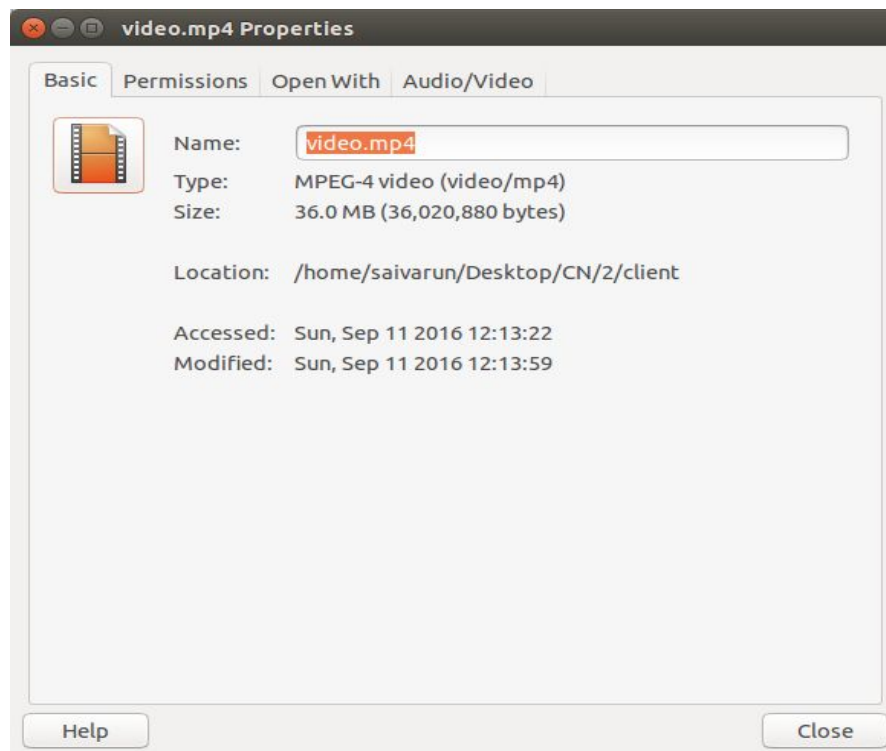
PROPERTIES

Of the Audio File





PROPERTIES Of the Video File



Discrepancy in sizes of sent and received file:

1. Sleep time Variation :

With low or No Sleep Time : We observed that if we send at low sleep time or with no sleep time, the data is transferred at very high speed and client is not able to receive at such high rates and it leads to the data loss.

With high Sleep Time : We observed that if we send at high sleep time then the data is sent at a nominal rate where the client is able to receive without data loss.

2. Payload Variation :

If the payload size of client is smaller compared to the payload of the server then data losses occur because the client is not able to receive the whole data sent until and unless the buffer size of client is equal to or more than that of server.