

## ECEN 602 Assignment 3 Test Cases

Following are the use cases tested:

1. Transfer binary file of 2048 bytes

The clients connects to the server with port number as 1234 and requests for 2048bin file. The server sends data in UDP format in terms of blocks each having 512 bytes.

### Server

```
server client guest@gautham: ~/client
guest@gautham:~/Networks/ECEN-602-Network_Programming/Programming_Assignment_3/bin$ ls
2048bin server
guest@gautham:~/Networks/ECEN-602-Network_Programming/Programming_Assignment_3/bin$ ./server 127.0.0.1 1234
TFTP server is running now. Listening on: 1234
Got a new connection from 127.0.0.1:55551!
File 2048bin in mode octet will be read by 127.0.0.1:55551!
Data transfer done successfully for 127.0.0.1:55551!
```

### Client

```
server client guest@gautham: ~/client
guest@gautham:~/client$ tftp
tftp> connect 127.0.0.1 1234
tftp> verbose
Verbose mode on.
tftp> trace
Packet tracing on.
tftp> binary
mode set to octet
tftp> get 2048bin
getting from 127.0.0.1:2048bin to 2048bin [octet]
sent RRQ <file=2048bin, mode=octet>
received DATA <block=1, 512 bytes>
sent ACK <block=1>
received DATA <block=2, 512 bytes>
sent ACK <block=2>
received DATA <block=3, 512 bytes>
sent ACK <block=3>
received DATA <block=4, 512 bytes>
sent ACK <block=4>
received DATA <block=5, 0 bytes>
Received 2048 bytes in 0.0 seconds [inf bits/sec]
tftp>
```

## diff

```
server client guest@gautham: ~/client
guest@gautham:~/client$ diff 2048bin ~/Networks/ECEN-602-Network_Programming/Programming_Assignment_3/bin/2048bin
guest@gautham:~/client$
```

## 2. Transfer binary file of 2047 bytes

The clients connects to the server with port number as 1234 and requests for 2047bin file. The server sends data in UDP format in terms of blocks each having 512 bytes.

## Server

```
server client guest@gautham: ~/client
guest@gautham:~/Networks/ECEN-602-Network_Programming/Programming_Assignment_3/bin$ ls
2048bin server
guest@gautham:~/Networks/ECEN-602-Network_Programming/Programming_Assignment_3/bin$ ./server 127.0.0.1 1234
TFTP server is running now. Listening on: 1234
Got a new connection from 127.0.0.1:55551!
File 2048bin in mode octet will be read by 127.0.0.1:55551!
Data transfer done successfully for 127.0.0.1:55551!
Got a new connection from 127.0.0.1:59538!
File 2047bin in mode octet will be read by 127.0.0.1:59538!
Data transfer done successfully for 127.0.0.1:59538!
```

## Client

```
server ❌ client ❌ guest@gautham: ~/client ❌  
tftp>  
tftp>  
tftp>  
tftp>  
tftp>  
tftp>  
tftp>  
tftp>  
tftp>  
tftp>  
tftp>  
tftp>  
tftp>  
tftp>  
tftp>  
tftp>  
tftp>  
tftp>  
tftp>  
tftp> get 2047bin  
getting from 127.0.0.1:2047bin to 2047bin [octet]  
sent RRQ <file=2047bin, mode=octet>  
received DATA <block=1, 512 bytes>  
sent ACK <block=1>  
received DATA <block=2, 512 bytes>  
sent ACK <block=2>  
received DATA <block=3, 512 bytes>  
sent ACK <block=3>  
received DATA <block=4, 511 bytes>  
Received 2047 bytes in 0.0 seconds [inf bits/sec]  
tftp>
```

## Diff

```
server
client
guest@gautham: ~/client
guest@gautham:~/client$ diff 2047bin ~/Networks/ECEN-602-Network_Programming/Programming_Assignment_3/bin/2047bin
guest@gautham:~/client$
```

### 3. Transfer of ascii file that includes 3 CRs

#### Server

```
server  check  client
guest@gautham:~/Networks/ECEN-602-Network_Programming/Programming_Assignment_3/bin$ ./server 127.0.0.1 1234
TFTP server is running now. Listening on: 1234
Got a new connection from 127.0.0.1:42648!
File text_with_3CR_3LF in mode netascii will be read by 127.0.0.1:42648!
Data transfer done successfully for 127.0.0.1:42648!
```

#### Client

```
server  client  client
guest@gautham:~/client1$ tftp 127.0.0.1 1234
tftp> ascii
tftp> get text_with_3CR_3LF
Received 902 bytes in 0.0 seconds
tftp>
```

## Diff

```
server client diff
guest@gauthan:~/client1$ diff text_with_3CR_3LF ~/Networks/ECEN-602-Network_Programming/Programming_Assignment_3/bin/text_with_3CR_3LF
guest@gauthan:~/client1$
```

4. Transfer of 34MB file and check if wrap around occurs

Client asks for 34MB file to the server. Since server can send maximum of 65535 blocks, it wraps around sending from the first block.

### Server

```
server client guest@gautham: ~/client guest@gautham: ~/client
guest@gautham:~/Networks/ECEN-602-Network_Programming/Programming_Assignment_3/bin$ ./server 127.0.0.1 1234
TFTP server is running now. Listening on: 1234
Got a new connection from 127.0.0.1:55412!
File 34_MB_file.txt in mode netascii will be read by 127.0.0.1:55412!
Data transfer done successfully for 127.0.0.1:55412!
```

### Client

```
server client guest@gautham: ~/client guest@gautham: ~/client
received DATA <block=3897, 512 bytes>
sent ACK <block=3897>
received DATA <block=3898, 512 bytes>
sent ACK <block=3898>
received DATA <block=3899, 512 bytes>
sent ACK <block=3899>
received DATA <block=3900, 512 bytes>
sent ACK <block=3900>
received DATA <block=3901, 512 bytes>
sent ACK <block=3901>
received DATA <block=3902, 512 bytes>
sent ACK <block=3902>
received DATA <block=3903, 512 bytes>
sent ACK <block=3903>
received DATA <block=3904, 512 bytes>
sent ACK <block=3904>
received DATA <block=3905, 512 bytes>
sent ACK <block=3905>
received DATA <block=3906, 512 bytes>
sent ACK <block=3906>
received DATA <block=3907, 512 bytes>
sent ACK <block=3907>
received DATA <block=3908, 512 bytes>
sent ACK <block=3908>
received DATA <block=3909, 512 bytes>
sent ACK <block=3909>
received DATA <block=3910, 512 bytes>
sent ACK <block=3910>
received DATA <block=3911, 512 bytes>
sent ACK <block=3911>
received DATA <block=3912, 134 bytes>
Received 35556998 bytes in 8.3 seconds [34271805 bits/sec]
tftp> █
```

## Diff

```
server client guest@gautham: ~/client guest@gautham: ~/client
guest@gautham:~/client$ ls -lah 34_MB_file.txt
-rw-r--r-- 1 guest guest 34M Mar 17 19:20 34_MB_file.txt
guest@gautham:~/client$ diff ~/prog_test_files/34_MB_file.txt ~/Networks/ECEN-602-Network_Programming/Programming_Assignment_3/bin/34_MB_file.t
xt
guest@gautham:~/client$
```

## Wrap around

```
server client guest@gautham: ~/client guest@gautham: ~/client
sent ACK <block=65522>
received DATA <block=65523, 512 bytes>
sent ACK <block=65523>
received DATA <block=65524, 512 bytes>
sent ACK <block=65524>
received DATA <block=65525, 512 bytes>
sent ACK <block=65525>
received DATA <block=65526, 512 bytes>
sent ACK <block=65526>
received DATA <block=65527, 512 bytes>
sent ACK <block=65527>
received DATA <block=65528, 512 bytes>
sent ACK <block=65528>
received DATA <block=65529, 512 bytes>
sent ACK <block=65529>
received DATA <block=65530, 512 bytes>
sent ACK <block=65530>
received DATA <block=65531, 512 bytes>
sent ACK <block=65531>
received DATA <block=65532, 512 bytes>
sent ACK <block=65532>
received DATA <block=65533, 512 bytes>
sent ACK <block=65533>
received DATA <block=65534, 512 bytes>
sent ACK <block=65534>
received DATA <block=65535, 512 bytes>
sent ACK <block=65535>
received DATA <block=0, 512 bytes>
sent ACK <block=0>
received DATA <block=1, 512 bytes>
sent ACK <block=1>
received DATA <block=2, 512 bytes>
sent ACK <block=2>
```

### 5. Error message when file is not present

Server sends an error code to the client when the file requested is not present.

Server

```
server  ✖ client  ✖ guest@gautham: ~/client  ✖ guest@gautham: ~/client  ✖
guest@gautham:~/Networks/ECEN-602-Network_Programming/Programming_Assignment_3/bin$ ./server 127.0.0.1 1234
TFTP server is running now. Listening on: 1234
Got a new connection from 127.0.0.1':55412!
File 34_MB_file.txt in mode netascii will be read by 127.0.0.1:55412!
Data transfer done successfully for 127.0.0.1:55412!
Got a new connection from 127.0.0.1':57652!
File not found
```

## Client

```
server x client x guest@gautham: ~/client x
```

```
tftp>  
tftp>  
tftp>  
tftp>  
tftp>  
tftp>  
tftp>  
tftp>  
tftp>  
tftp>  
tftp>  
tftp>  
tftp>  
tftp>  
tftp>  
tftp>  
tftp>  
tftp>  
tftp>  
tftp>  
tftp>  
tftp>  
tftp>  
tftp>  
tftp>  
tftp>  
tftp>  
tftp>  
tftp>  
tftp>  
tftp>  
tftp> get no_file.txt  
getting from 127.0.0.1:no_file.txt to no_file.txt [netascii]  
sent RRQ <file=no_file.txt, mode=netascii>  
received ERROR <code=1, msg=File not found>  
Error code 1: File not found  
tftp>
```



6. Connect to TFTP server with 3 clients

3 clients connect to TFTP server and request 34MB file simultaneously.

Server

```
server client 1 client 2 client 3 guest@gautham: ~/client guest@gautham: ~/Net...
guest@gautham:~/Networks/ECEN-602-Network_Programming/Programming_Assignment_3/bin$ ./server 127.0.0.1 1234
TFTP server is running now. Listening on: 1234
Got a new connection from 127.0.0.1:35533!
File 34_MB_file3.txt in mode netascii will be read by 127.0.0.1:35533!
Got a new connection from 127.0.0.1:52811!
File 34_MB_file2.txt in mode netascii will be read by 127.0.0.1:52811!
Got a new connection from 127.0.0.1:48783!
File 34_MB_file1.txt in mode netascii will be read by 127.0.0.1:48783!
Data transfer done successfully for 127.0.0.1:35533!
Data transfer done successfully for 127.0.0.1:52811!
Data transfer done successfully for 127.0.0.1:48783!
```

Client 1

```
server client 1 client 2 client 3 guest@gautham: ~/client guest@gautham: ~/Net...
received DATA <block=3897, 512 bytes>
sent ACK <block=3897>
received DATA <block=3898, 512 bytes>
sent ACK <block=3898>
received DATA <block=3899, 512 bytes>
sent ACK <block=3899>
received DATA <block=3900, 512 bytes>
sent ACK <block=3900>
received DATA <block=3901, 512 bytes>
sent ACK <block=3901>
received DATA <block=3902, 512 bytes>
sent ACK <block=3902>
received DATA <block=3903, 512 bytes>
sent ACK <block=3903>
received DATA <block=3904, 512 bytes>
sent ACK <block=3904>
received DATA <block=3905, 512 bytes>
sent ACK <block=3905>
received DATA <block=3906, 512 bytes>
sent ACK <block=3906>
received DATA <block=3907, 512 bytes>
sent ACK <block=3907>
received DATA <block=3908, 512 bytes>
sent ACK <block=3908>
received DATA <block=3909, 512 bytes>
sent ACK <block=3909>
received DATA <block=3910, 512 bytes>
sent ACK <block=3910>
received DATA <block=3911, 512 bytes>
sent ACK <block=3911>
received DATA <block=3912, 134 bytes>
Received 35556998 bytes in 12.0 seconds [23704665 bits/sec]
tftp>
```

## Client 2

```
server      ✖ client 1      ✖ client 2      ✖ client 3      ✖ guest@gautham: ~/client ✖ guest@gautham: ~/Net... ✖
received DATA <block=3897, 512 bytes>
sent ACK <block=3897>
received DATA <block=3898, 512 bytes>
sent ACK <block=3898>
received DATA <block=3899, 512 bytes>
sent ACK <block=3899>
received DATA <block=3900, 512 bytes>
sent ACK <block=3900>
received DATA <block=3901, 512 bytes>
sent ACK <block=3901>
received DATA <block=3902, 512 bytes>
sent ACK <block=3902>
received DATA <block=3903, 512 bytes>
sent ACK <block=3903>
received DATA <block=3904, 512 bytes>
sent ACK <block=3904>
received DATA <block=3905, 512 bytes>
sent ACK <block=3905>
received DATA <block=3906, 512 bytes>
sent ACK <block=3906>
received DATA <block=3907, 512 bytes>
sent ACK <block=3907>
received DATA <block=3908, 512 bytes>
sent ACK <block=3908>
received DATA <block=3909, 512 bytes>
sent ACK <block=3909>
received DATA <block=3910, 512 bytes>
sent ACK <block=3910>
received DATA <block=3911, 512 bytes>
sent ACK <block=3911>
received DATA <block=3912, 134 bytes>
Received 35556998 bytes in 11.9 seconds [23903864 bits/sec]
tftp> █
```

## Client 3

```
server      ✖ client 1      ✖ client 2      ✖ client 3      ✖ guest@gautham: ~/client ✖ guest@gautham: ~/Net... ✖
sent ACK <block=3897>
received DATA <block=3898, 512 bytes>
sent ACK <block=3898>
received DATA <block=3899, 512 bytes>
sent ACK <block=3899>
received DATA <block=3900, 512 bytes>
sent ACK <block=3900>
received DATA <block=3901, 512 bytes>
sent ACK <block=3901>
received DATA <block=3902, 512 bytes>
sent ACK <block=3902>
received DATA <block=3903, 512 bytes>
sent ACK <block=3903>
received DATA <block=3904, 512 bytes>
sent ACK <block=3904>
received DATA <block=3905, 512 bytes>
sent ACK <block=3905>
received DATA <block=3906, 512 bytes>
sent ACK <block=3906>
received DATA <block=3907, 512 bytes>
sent ACK <block=3907>
received DATA <block=3908, 512 bytes>
sent ACK <block=3908>
received DATA <block=3909, 512 bytes>
sent ACK <block=3909>
received DATA <block=3910, 512 bytes>
sent ACK <block=3910>
received DATA <block=3911, 512 bytes>
sent ACK <block=3911>
received DATA <block=3912, 134 bytes>
Received 35556998 bytes in 12.8 seconds [22223124 bits/sec]
```

## 7. Terminate TFTP client in the middle of transfer

When the client is terminated in between the transfer, the server waits for 10 seconds and displays transfer session has failed, indicating the client connection is lost.

### Server

```
server client guest@gautham: ~/client guest@gautham: ~/client
guest@gautham:~/Networks/ECEN-602-Network_Programming/Programming_Assignment_3/bin$ ./server 127.0.0.1 1234
TFTP server is running now. Listening on: 1234
Got a new connection from 127.0.0.1:55412!
File 34_MB_file.txt in mode netascii will be read by 127.0.0.1:55412!
Data transfer done successfully for 127.0.0.1:55412!
Got a new connection from 127.0.0.1:57652!
File not found
Got a new connection from 127.0.0.1:59062!
File 34_MB_file.txt in mode netascii will be read by 127.0.0.1:59062!
no response session from 127.0.0.1:59062!
no response session from 127.0.0.1:59062!
no response session from 127.0.0.1:59062!
no response session from 127.0.0.1:59062!
no response session from 127.0.0.1:59062!
no response session from 127.0.0.1:59062!
no response session from 127.0.0.1:59062!
no response session from 127.0.0.1:59062!
no response session from 127.0.0.1:59062!
no response session from 127.0.0.1:59062!
no response session from 127.0.0.1:59062!
no response session from 127.0.0.1:59062!
Transfer session has failed
```

### Client

```
server client guest@gautham: ~/client guest@gautham: ~/client
sent ACK <block=4294>
received DATA <block=4295, 512 bytes>
sent ACK <block=4295>
received DATA <block=4296, 512 bytes>
sent ACK <block=4296>
received DATA <block=4297, 512 bytes>
sent ACK <block=4297>
received DATA <block=4298, 512 bytes>
sent ACK <block=4298>
received DATA <block=4299, 512 bytes>
sent ACK <block=4299>
received DATA <block=4300, 512 bytes>
sent ACK <block=4300>
received DATA <block=4301, 512 bytes>
sent ACK <block=4301>
received DATA <block=4302, 512 bytes>
sent ACK <block=4302>
received DATA <block=4303, 512 bytes>
sent ACK <block=4303>
received DATA <block=4304, 512 bytes>
sent ACK <block=4304>
received DATA <block=4305, 512 bytes>
sent ACK <block=4305>
received DATA <block=4306, 512 bytes>
sent ACK <block=4306>
received DATA <block=4307, 512 bytes>
sent ACK <block=4307>
received DATA <block=4308, 512 bytes>
sent ACK <block=4308>
received DATA <block=4309, 512 bytes>received DATA <block=4309, 512 bytes>

^Ctftp> ^C
tftp> █
```

## 8. WRQ Bonus feature

Clients request WRQ to the server. The server sends ack to that command. Later, the client starts sending data to the server.

### Server

```
server client 1 client 2 client 3 guest@gautham: ~/client1
guest@gautham:~/Networks/ECEN-602-Network_Programming/Programming_Assignment_3/bin$ ./server 127.0.0.1 1234
TFTP server is running now. Listening on: 1234
Got a new connection from 127.0.0.1:55250!
File put.txt in mode netascii will be written by 127.0.0.1:55250!
Data transfer done successfully for 127.0.0.1:55250!
```

### Client

```
server client 1 client 2 client 3 guest@gautham: ~/client1
guest@gautham:~/client1$ tftp
tftp> connect 127.0.0.1 1234
tftp> verbose
Verbose mode on.
tftp> trace
Packet tracing on.
tftp> ascii
mode set to netascii
tftp> put put.txt
putting put.txt to 127.0.0.1:put.txt [netascii]
sent WRQ <file=put.txt, mode=netascii>
received ACK <block=0>
sent DATA <block=1, 512 bytes>
received ACK <block=1>
sent DATA <block=2, 512 bytes>
received ACK <block=2>
sent DATA <block=3, 512 bytes>
received ACK <block=3>
sent DATA <block=4, 512 bytes>
received ACK <block=4>
sent DATA <block=5, 512 bytes>
received ACK <block=5>
sent DATA <block=6, 512 bytes>
received ACK <block=6>
sent DATA <block=7, 121 bytes>
received ACK <block=7>
Sent 3193 bytes in 0.0 seconds [inf bits/sec]
tftp>
```

## 9. 2 Put, 1 Get

In this test case, two clients send data to the server and third client receives data from server simultaneously.

### Server

```
server client 1 client 2 client 3 guest@gautham: ~/client1
guest@gautham:~/Networks/ECEN-602-Network_Programming/Programming_Assignment_3/bin$ ./server 127.0.0.1 1234
TFTP server is running now. Listening on: 1234
Got a new connection from 127.0.0.1:45316!
File 34_MB_put_file.txt in mode netascii will be read by 127.0.0.1:45316!
Got a new connection from 127.0.0.1:34536!
File 34_MB_put_file2.txt in mode netascii will be written by 127.0.0.1:34536!
Got a new connection from 127.0.0.1:51058!
File 34_MB_put_file1.txt in mode netascii will be written by 127.0.0.1:51058!
Data transfer done successfully for 127.0.0.1:51058!
Data transfer done successfully for 127.0.0.1:45316!
Data transfer done successfully for 127.0.0.1:34536!
```

### Client1

```
server client 1 client 2 client 3 guest@gautham: ~/client1
received ACK <block=6602>
sent DATA <block=6603, 512 bytes>
received ACK <block=6603>
sent DATA <block=6604, 512 bytes>
received ACK <block=6604>
sent DATA <block=6605, 512 bytes>
received ACK <block=6605>
sent DATA <block=6606, 512 bytes>
received ACK <block=6606>
sent DATA <block=6607, 512 bytes>
received ACK <block=6607>
sent DATA <block=6608, 512 bytes>
received ACK <block=6608>
sent DATA <block=6609, 512 bytes>
received ACK <block=6609>
sent DATA <block=6610, 512 bytes>
received ACK <block=6610>
sent DATA <block=6611, 512 bytes>
received ACK <block=6611>
sent DATA <block=6612, 512 bytes>
received ACK <block=6612>
sent DATA <block=6613, 512 bytes>
received ACK <block=6613>
sent DATA <block=6614, 512 bytes>
received ACK <block=6614>
sent DATA <block=6615, 512 bytes>
received ACK <block=6615>
sent DATA <block=6616, 512 bytes>
received ACK <block=6616>
sent DATA <block=6617, 511 bytes>
received ACK <block=6617>
Sent 36942335 bytes in 12.7 seconds [23270762 bits/sec]
tftp>
```

## Client 2

```
server      ✖ client 1      ✖ client 2      ✖ client 3      ✖ guest@gautham: ~/client1 ✖
received ACK <block=6602>
sent DATA <block=6603, 512 bytes>
received ACK <block=6603>
sent DATA <block=6604, 512 bytes>
received ACK <block=6604>
sent DATA <block=6605, 512 bytes>
received ACK <block=6605>
sent DATA <block=6606, 512 bytes>
received ACK <block=6606>
sent DATA <block=6607, 512 bytes>
received ACK <block=6607>
sent DATA <block=6608, 512 bytes>
received ACK <block=6608>
sent DATA <block=6609, 512 bytes>
received ACK <block=6609>
sent DATA <block=6610, 512 bytes>
received ACK <block=6610>
sent DATA <block=6611, 512 bytes>
received ACK <block=6611>
sent DATA <block=6612, 512 bytes>
received ACK <block=6612>
sent DATA <block=6613, 512 bytes>
received ACK <block=6613>
sent DATA <block=6614, 512 bytes>
received ACK <block=6614>
sent DATA <block=6615, 512 bytes>
received ACK <block=6615>
sent DATA <block=6616, 512 bytes>
received ACK <block=6616>
sent DATA <block=6617, 511 bytes>
received ACK <block=6617>
Sent 36942335 bytes in 14.8 seconds [19968830 bits/sec]
tftp>
```

## Client 3

```
server      ✖ client 1      ✖ client 2      ✖ client 3      ✖ guest@gautham: ~/client1 ✖
received DATA <block=4799, 512 bytes>
sent ACK <block=4799>
received DATA <block=4800, 512 bytes>
sent ACK <block=4800>
received DATA <block=4801, 512 bytes>
sent ACK <block=4801>
received DATA <block=4802, 512 bytes>
sent ACK <block=4802>
received DATA <block=4803, 512 bytes>
sent ACK <block=4803>
received DATA <block=4804, 512 bytes>
sent ACK <block=4804>
received DATA <block=4805, 512 bytes>
sent ACK <block=4805>
received DATA <block=4806, 512 bytes>
sent ACK <block=4806>
received DATA <block=4807, 512 bytes>
sent ACK <block=4807>
received DATA <block=4808, 512 bytes>
sent ACK <block=4808>
received DATA <block=4809, 512 bytes>
sent ACK <block=4809>
received DATA <block=4810, 512 bytes>
sent ACK <block=4810>
received DATA <block=4811, 512 bytes>
sent ACK <block=4811>
received DATA <block=4812, 512 bytes>
sent ACK <block=4812>
received DATA <block=4813, 512 bytes>
sent ACK <block=4813>
received DATA <block=4814, 99 bytes>
Received 36018787 bytes in 15.1 seconds [19082801 bits/sec]
tftp>
```