

ECEN 602: Network Programming Assignment 3
TFTP SERVER
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1) TESTCASE 1: TRANSFERRING A 2048 BYTE BINARY FILE

```
vidhya1007@vidhya1007-VirtualBox: /media/sf_mani_SHARED/CCN/Assignment_3_TFTPServer 101x48
vidhya1007@vidhya1007-VirtualBox: /media/sf_mani_SHARED/CCN/Assignment_3_TFTPServer$ ./tftp_server 127
.0.0.1 23000
Server is waiting for connections...
Server established connection with CLIENT from: 127.0.0.1
OPCODE RECEIVED 4
ACK RECEIVED : ACK_NUM 1
OPCODE RECEIVED 4
ACK RECEIVED : ACK_NUM 2
OPCODE RECEIVED 4
ACK RECEIVED : ACK_NUM 3
OPCODE RECEIVED 4
ACK RECEIVED : ACK_NUM 4
ZERO BYTES BLOCK
OPCODE RECEIVED 4
ACK RECEIVED : ACK_NUM 5
FINAL ACK RECEIVED
CHILD DISCONNECTED
Child Process ID: 6735
[]

vidhya1007@vidhya1007-VirtualBox: ~/TFTP_client_101x23
tftp> connect 127.0.0.1 23000
tftp> binary
tftp> get 2048bin
Received 2048 bytes in 0.0 seconds
tftp> []

vidhya1007@vidhya1007-VirtualBox: ~/TFTP_client_101x23
vidhya1007@vidhya1007-VirtualBox: ~/TFTP_client_101x23$ diff 2048bin1 2048bin
vidhya1007@vidhya1007-VirtualBox: ~/TFTP_client_101x23$
```

A random 2048 byte binary file was generated. Server is run, then tftp native linux client is used which connects to the server and requests to get the file with filename. Once the file is successfully transferred, the file in the client directory is renamed to 2048bin1 and the file from the server directory is copied to this directory and are compared using diff. Since diff didn't return any differences, the file was successfully transferred.

2) TESTCASE 2: TRASNFERRING A 2047 BYTES FILE (NOT A MULTIPLE OF 512)

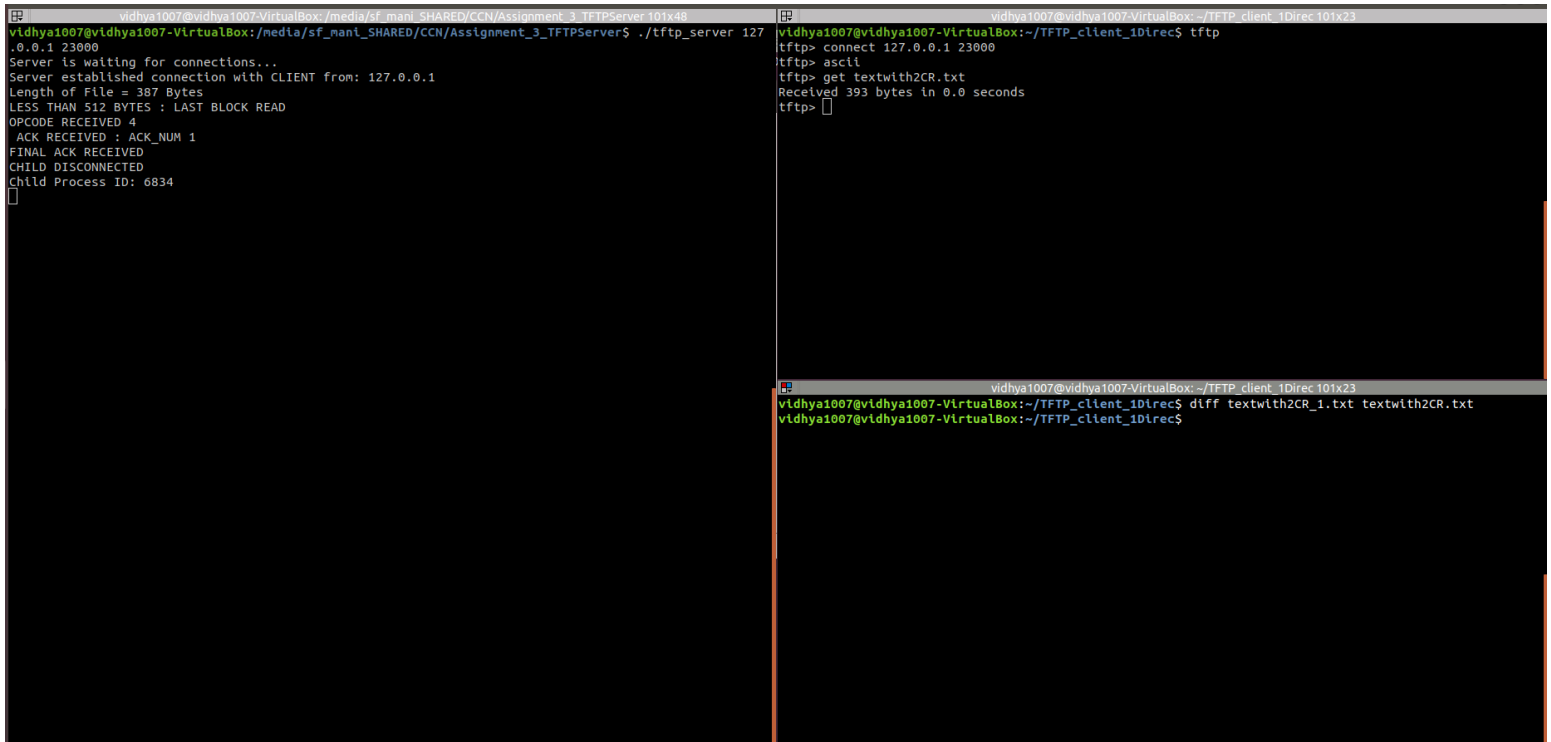
```
vidhya1007@vidhya1007-VirtualBox: /media/sf_man1_SHARED/CCN/Assignment_3_TFTPServer 101x48
vidhya1007@vidhya1007-VirtualBox: /media/sf_man1_SHARED/CCN/Assignment_3_TFTPServer$ ./tftp_server 127
.0.0.1 23000
Server is waiting for connections...
Server established connection with CLIENT from: 127.0.0.1
OPCODE RECEIVED 4
ACK RECEIVED : ACK_NUM 1
OPCODE RECEIVED 4
ACK RECEIVED : ACK_NUM 2
OPCODE RECEIVED 4
ACK RECEIVED : ACK_NUM 3
LESS THAN 512 BYTES : LAST BLOCK READ
OPCODE RECEIVED 4
ACK RECEIVED : ACK_NUM 4
FINAL ACK RECEIVED
CHILD DISCONNECTED
Child Process ID: 6796
[]

vidhya1007@vidhya1007-VirtualBox: ~/TFTP_client_1Direc 101x23
vidhya1007@vidhya1007-VirtualBox:~/TFTP_client_1Direc$ tftp
tftp> connect 127.0.0.1 23000
tftp> binary
tftp> get 2047bin
Received 2047 bytes in 0.0 seconds
tftp> []

vidhya1007@vidhya1007-VirtualBox: ~/TFTP_client_1Direc 101x23
vidhya1007@vidhya1007-VirtualBox:~/TFTP_client_1Direc$ diff 2047bin1 2047bin
vidhya1007@vidhya1007-VirtualBox:~/TFTP_client_1Direc$ []
```

A 2047 BYTE binary file was transferred in a similar way. However, since it isn't a multiple of 512 bytes which is the size of each block, the last datagram consisted of less than 512 bytes which indicated the end of file. Similarly, the two files were put in the same directory and using diff command were checked if were the same. The diff did not return any difference thus proving successful transmission of 2047bin file.

3) TESTCASE 3: TRANSFERRING A NETASCII FILE WITH 2 CRs



```
vidhya1007@vidhya1007-VirtualBox: /media/sf_mani_SHARED/CCN/Assignment_3_TFTPServer.101x48
vidhya1007@vidhya1007-VirtualBox: /media/sf_mani_SHARED/CCN/Assignment_3_TFTPServer$ ./tftp_server 127
.0.0.1 23000
Server is waiting for connections...
Server established connection with CLIENT from: 127.0.0.1
Length of File = 387 Bytes
LESS THAN 512 BYTES : LAST BLOCK READ
OPCODE RECEIVED 4
ACK RECEIVED : ACK_NUM 1
FINAL ACK RECEIVED
CHILD DISCONNECTED
Child Process ID: 6834
[]

vidhya1007@vidhya1007-VirtualBox: ~/TFTP_client.101x23
vidhya1007@vidhya1007-VirtualBox: ~/TFTP_client_1Direc$ tftp
tftp> connect 127.0.0.1 23000
tftp> ascii
tftp> get textwith2CR.txt
Received 393 bytes in 0.0 seconds
tftp> []

vidhya1007@vidhya1007-VirtualBox: ~/TFTP_client.101x23
vidhya1007@vidhya1007-VirtualBox: ~/TFTP_client_1Direc$ diff textwith2CR_1.txt textwith2CR.txt
vidhya1007@vidhya1007-VirtualBox: ~/TFTP_client_1Direc$
```



```
Open ▾ ⓘ textwith2CR.txt ~/TFTP_client_1Direc Save ⌵ ⌵ ⌵ ⌵
There are differences in UDP and TCP programming. Recall that UDP is a connectionless, unreliable, datagram protocol.
Instead, the UDP client just sends a datagram to the server using the sendto() function (described below), which requires the address of the destination (IP address and port number) as a parameter.
Similarly, the UDP server does not issue a listen() or an accept().

Open ▾ ⓘ textwith2CR_1.txt ~/TFTP_client_1Direc Save ⌵ ⌵ ⌵ ⌵
There are differences in UDP and TCP programming. Recall that UDP is a connectionless, unreliable, datagram protocol.
Instead, the UDP client just sends a datagram to the server using the sendto() function (described below), which requires the address of the destination (IP address and port number) as a parameter.
Similarly, the UDP server does not issue a listen() or an accept().

Plain Text ▾ Tab Width: 8 ▾ Ln 3, Col 68 ▾ INS
```

A text file named textwith2CR was created at the server directory. The content includes two new line characters. The tftp client mode was set to ASCII and a request was made to get the file textwith2CR.txt. The received files were compared using diff in a similar fashion like the above test cases. The second screenshot shows both the files opened and how the lines were exactly matching ensuring successful file transmission.

4) TESTCASE 4: TRANSMISSION OF A VERY LARGE FILE (34 MB)

```
vidhya1007@vidhya1007-VirtualBox: /media/sf_man1_SHARED/CCN/Assignment_3_TFTPServer 101x48
vidhya1007@vidhya1007-VirtualBox: /media/sf_man1_SHARED/CCN/Assignment_3_TFTPServer$ ./tftp_server 127
.0.0.1 23000
Server is waiting for connections...
Server established connection with CLIENT from: 127.0.0.1
ZERO BYTES BLOCK
FINAL ACK RECEIVED
CHILD DISCONNECTED
Child Process ID: 7120
█

vidhya1007@vidhya1007-VirtualBox: ~ 101x21
tftp> connect 127.0.0.1 23000
tftp> binary
tftp> get rand1
Received 33556480 bytes in 1.9 seconds
tftp> █

vidhya1007@vidhya1007-VirtualBox: ~ 101x23
vidhya1007@vidhya1007-VirtualBox:~$ diff rand1_1 rand1
vidhya1007@vidhya1007-VirtualBox:~$ █
```

A random 34 MB was generated and was requested by client. Again the files were compared using diff. Block number wrap around worked and the file was successfully received.

```
vidhya1007@vidhya1007-VirtualBox: /media/sf_man1_SHARED/CCN/Assignment_3_TFTPServer$ ./tftp_server 101x48
vidhya1007@vidhya1007-VirtualBox: /media/sf_man1_SHARED/CCN/Assignment_3_TFTPServer$ ./tftp_server 127
.0.0.1 23000
Server is waiting for connections...
Server established connection with CLIENT from: 127.0.0.1
FILE NOT FOUND
Child Process ID: 6922

vidhya1007@vidhya1007-VirtualBox: ~/TFTP_client_1Dirc$
vidhya1007@vidhya1007-VirtualBox: ~/TFTP_client_1Dirc$ tftp
tftp> connect 127.0.0.1 23000
tftp> ascii
tftp> get randNonexistingFile.txt
Error code 1: FILE NOT FOUND
tftp>
```

6) TESTCASE 6: MULTIPLE CLIENTS REQUESTING FILES

<pre> vidhya1007@vidhya1007-VirtualBox: /media/sf_man1_SHARED/CCN/Assignment_3_TFTPServer\$./tftp_server 127.0.0.1 23000 Server is waiting for connections... Server established connection with CLIENT from: 127.0.0.1 LESS THAN 512 BYTES : LAST BLOCK READ FINAL ACK RECEIVED CHILD DISCONNECTED Child Process ID: 6992 Server established connection with CLIENT from: 127.0.0.1 ZERO BYTES BLOCK FINAL ACK RECEIVED CHILD DISCONNECTED Child Process ID: 6993 Server established connection with CLIENT from: 127.0.0.1 Length of File = 387 Bytes LESS THAN 512 BYTES : LAST BLOCK READ FINAL ACK RECEIVED CHILD DISCONNECTED Child Process ID: 6994 </pre>	<pre> vidhya1007@vidhya1007-VirtualBox: ~/TFTP_client_1Dirc\$ tftp tftp> connect 127.0.0.1 23000 tftp> binary tftp> get file1bin Received 2047 bytes in 0.0 seconds tftp> </pre>
<pre> vidhya1007@vidhya1007-VirtualBox: ~/TFTP_client_1Dirc\$ tftp tftp> connect 127.0.0.1 23000 tftp> binary tftp> get file2bin Received 2048 bytes in 0.0 seconds tftp> </pre>	<pre> vidhya1007@vidhya1007-VirtualBox: ~/TFTP_client_1Dirc\$ tftp tftp> connect 127.0.0.1 23000 tftp> ascii tftp> get textfile3.txt Received 393 bytes in 0.0 seconds tftp> </pre>

In this 3 clients were opened and each requested a file. Client 1 requested a file file1bin, client 2 requested a file file2bin, client 3 requested a file textfile3.txt. All the three client requests were processed and the server successfully transferred the corresponding files from server directory to the corresponding clients and all the files requested were successfully obtained in the client directory.

7) TESTCASE 7: TFTP SERVER TIMEOUT DURING CLIENT DISCONNECTION

```
vidhya1007@vidhya1007-VirtualBox: /media/sf_mani_SHARED/CCN/Assignment_3_TFTPServer 101x48
vidhya1007@vidhya1007-VirtualBox: /media/sf_mani_SHARED/CCN/Assignment_3_TFTPServer$ ./tftp_server 127
.0.0.1 23000
Server is waiting for connections...
Server established connection with CLIENT from: 127.0.0.1
TIMEOUT OCCURRED
TIMEOUT OCCURRED
TIMEOUT OCCURRED
TIMEOUT OCCURRED
TIMEOUT OCCURRED
TIMEOUT OCCURRED
TIMEOUT OCCURRED
TIMEOUT OCCURRED
TIMEOUT OCCURRED
TIMEOUT OCCURRED
TIMEOUT OCCURRED
MAX NUMBER OF 10 TIMEOUTS OCCURRED
CHILD DISCONNECTED
Child Process ID: 7161
]

vidhya1007@vidhya1007-VirtualBox: ~ 101x23
vidhya1007@vidhya1007-VirtualBox:~$ tftp
tftp> connect 127.0.0.1 23000
tftp> binary
tftp> get rand1
^C
tftp> ]
```

A very large file (34MB) was requested from the client. And in between the request was terminated. Time out occurred at the server side and after 10 timeouts, the server recognized that the request was terminated at the child side.