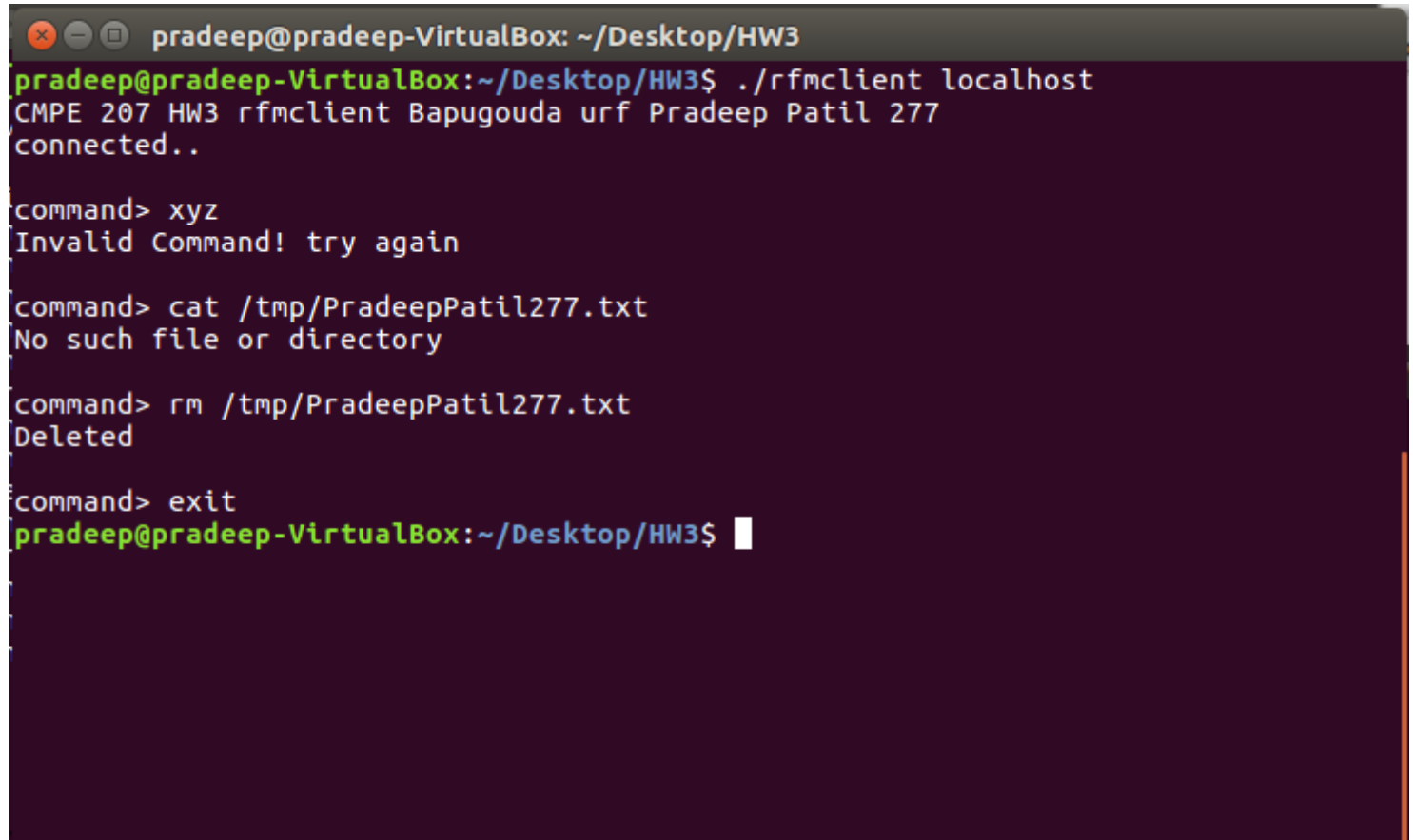


1. At this moment, take screenshots of stdout of the following shells:

VM2/client 1

A screenshot of a terminal window titled "pradeep@pradeep-VirtualBox: ~/Desktop/HW3". The terminal shows the execution of the command `./rfmclient localhost`, which outputs "CMPE 207 HW3 rfmclient Bapugouda urf Pradeep Patil 277" and "connected..". Subsequent commands include `xyz` (resulting in "Invalid Command! try again"), `cat /tmp/PradeepPatil277.txt` (resulting in "No such file or directory"), `rm /tmp/PradeepPatil277.txt` (resulting in "Deleted"), and `exit`. The prompt returns to `pradeep@pradeep-VirtualBox:~/Desktop/HW3$`.

```
pradeep@pradeep-VirtualBox: ~/Desktop/HW3
pradeep@pradeep-VirtualBox:~/Desktop/HW3$ ./rfmclient localhost
CMPE 207 HW3 rfmclient Bapugouda urf Pradeep Patil 277
connected..

command> xyz
Invalid Command! try again

command> cat /tmp/PradeepPatil277.txt
No such file or directory

command> rm /tmp/PradeepPatil277.txt
Deleted

command> exit
pradeep@pradeep-VirtualBox:~/Desktop/HW3$
```

## VM2/client 2

```
pradeep@pradeep-VirtualBox: ~/Desktop/HW3
connected..

command> stats
Concurrent connections: 2
Completed Connections : 0
Total Overall Commands: 2

command> cat /tmp/PradeepPatil277.txt
line1-PradeepPatil277-line1
PradeepPatil277-line22-PradeepPatil277
line333-PradeepPatil277-line333

command> rm /tmp/PradeepPatil277.txt
No such file or directory

command> stats
Concurrent connections: 1
Completed Connections : 1
Total Overall Commands: 8

command>
```

## VM1 server

```
pradeep@pradeep-VirtualBox: ~/Desktop/HW3/svr
pradeep@pradeep-VirtualBox:~$ cd Desktop/HW3/svr
pradeep@pradeep-VirtualBox:~/Desktop/HW3/svr$ ./mtrfmsvr
CMPE 207 HW3 mtrfmsvr Bapugouda urf Pradeep Patil 011483277

Listning...
thread 140262132545280: Started
thread 140262124152576: Started
thread 140262132545280: invalid command: xyz
thread 140262124152576: stats
thread 140262132545280: cat
Error in cat: No such file or directory
thread 140262124152576: cat
thread 140262132545280: rm
Deleted
thread 140262124152576: rm
Error in rm: No such file or directory
thread 140262132545280: exit
thread 140262132545280: exited
thread 140262124152576: stats
```

## VM1/other-shell

```

pradeep@pradeep-VirtualBox:~$ netstat --inet
Active Internet connections (w/o servers)
Proto Recv-Q Send-Q Local Address           Foreign Address         State
tcp        0      0 localhost:9091          localhost:56784         ESTABLISHED
tcp        0      0 localhost:56782         localhost:9091          ESTABLISHED
tcp        0      0 localhost:56784         localhost:9091          ESTABLISHED
tcp        0      0 localhost:9091          localhost:56782         ESTABLISHED
pradeep@pradeep-VirtualBox:~$ ps -fL -C mtrfmsvr
UID          PID    PPID    LWP   C   NLWP STIME TTY          TIME CMD
pradeep    5177    5167    5177   0     3  21:39 pts/4      00:00:00 ./m
pradeep    5177    5167    5181   0     3  21:39 pts/4      00:00:00 ./m
pradeep    5177    5167    5187   0     3  21:40 pts/4      00:00:00 ./m
pradeep@pradeep-VirtualBox:~$ ip addr
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group default qlen 1000
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
    inet 127.0.0.1/8 scope host lo
        valid_lft forever preferred_lft forever
    inet6 ::1/128 scope host
        valid_lft forever preferred_lft forever
2: enp0s3: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc pfifo_fast state UP group default qlen 1000
    link/ether 08:00:27:30:92:b2 brd ff:ff:ff:ff:ff:ff
    inet 192.168.240.3/24 brd 192.168.240.255 scope global dynamic enp0s3
        valid_lft 1139sec preferred_lft 1139sec
    inet6 fe80::1d03:e511:1f88:3630/64 scope link
        valid_lft forever preferred_lft forever
pradeep@pradeep-VirtualBox:~$

```

a. generic request format, generic response format (both success case & error case). For each field, indicate its data type (binary, text), length, network byte order, etc.) 4

answer:

generic request format: command <Path><00>

generic response format: response<00>

b. Use “cat /tmp/foo” as an example: illustrate request format, illustrate response format (success case & error case)

answer:

request format: “cat /tmp/foo00”

Opcode: cat

Path: /tmp/foo

Response: “<responsestring>00”

c. Use “rm /tmp/bar” as an example: illustrate request format, illustrate response format (success case & error case)

request fromat: “rm /tmp/bar00”

Opcode:rm

Path: /tmp/bar

Reaponse: “Deleted00”

d. Use “stats” as an example: illustrate request format, illustrate response format (success case & error case)

request fromat: “stats<00>”

Opcode: stats

Path: NONE

Reaponse: “<status string>00”

e. Use “exit” as an example: illustrate request format, illustrate response format (success case & error case)

request fromat: “exit<00>”

Shutdown(SHUT\_WR);

Opcode: exit

Path: NONE

Reaponse: “<exit>00”

Shutdown(SHUT\_WR);

5. (15 pts) Each client uses a single/persistent TCP connection to communicate with the server, and the client can

send multiple requests through the same persistent connection. Include server-side code snippet with comments to describe how the server-side pthread retrieves each client request in its entirety via a single/persistent connection.

Answer:

Client always pads 00 at the end of the command string which is detected at server and the command is processed and appropriate value is returned.

Following is the code snippet

```
static const char CmdEnd[]="00";
```

```
while(1){
    rd=read(ClientSock,ReadBuffer,sizeof(ReadBuffer)-1);
    if(rd<0){ strerror_r(errno,GERRORF,sizeof(GERRORF));printf("Error:
%s",GERRORF);return 0;}
    //printf("\ninreading..");
    if((ReadBuffer[strlen(ReadBuffer)-1]==CmdEnd[1]) & (ReadBuffer[strlen(ReadBuffer)-
2]==CmdEnd[0])) break;
}
```

break when last two chars are 00.