

CS 485/ECE 440/CS 585 Homework 3 answer key
Due Friday, 30 October 2015

1. For TCP, what port number did the server listen on? **5000**

See:

```
30962 12:05:19.603042 bind(3, {sa_family=AF_INET, sin_port=htons(5000), sin_addr=inet_addr("0.0.0.0")}, 16) = 0
...in tcpserverstrace.txt
```

2. For UDP, what port number did the server bind to to receive datagrams on? **32000**

See...

```
24443 03:45:21.106246 bind(3, {sa_family=AF_INET, sin_port=htons(32000), sin_addr=inet_addr("0.0.0.0")}, 16) = 0
...in udpserverstrace.txt
```

3. For TCP, how long (in seconds) did the server wait between when it created the listening socket and when the client connected? **Between 98 and 99 seconds**

See ...

```
30962 12:05:19.603174 listen(3, 10) = 0
30962 12:05:19.603241 accept(3, 0, NULL) = 4
30962 12:06:58.377811 read(4, "A\nA's\nAA's\nAB's\nABM's\nAC's\nACTH"..., 1024) = 1023
...in tcpserverstrace.txt
```

4. For UDP, how long (in seconds) did the server wait between being ready to receive UDP packets on its socket and actually receiving UDP packets from the client? **Between 32 and 33 seconds**

See...

```
24443 03:45:21.106387 recvfrom(3, "A's\n", 1000, 0, {sa_family=AF_INET, sin_port=htons(46144), sin_addr=inet_addr("64.106.46.57")}, [16]) = 4
24443 03:45:53.508834 sendto(3, "A's\n", 4, 0, {sa_family=AF_INET, sin_port=htons(46144), sin_addr=inet_addr("64.106.46.57")}, 16) = 4
...in udpserverstrace.txt
```

5. For TCP, how many packets did the sender have to retransmit? **6**, but any answer is okay because the original question said server

```
tshark -r tcpclient.pcap -Y tcp.analysis.retransmission | wc -l
```

6. For UDP, how many packets were dropped en route to the server so that they were never received by the server-side kernel? **499**

```
tshark -r udpclient.pcap -Y "ip.src==64.106.46.57 && udp" | wc -l
99177
```

```
tshark -r udpserver.pcap -Y "ip.src==64.106.46.57 && udp" | wc -l
98678
```

7. For UDP, how many packets were dropped by the server's kernel even though it received them (i.e., the packets appear in the packet capture but the application layer never received them)? **87904**, but anything between 87000 and 89000 is okay

```
cat udpserverstrace.txt | grep "recvfrom" | grep -v "ERESTARTSYS" | wc -l
10774
```

8. For TCP, what was the *maximum* flow control window size that the server ever advertised to the client? **357920**

```
tshark -r tcpserver.pcap -Y "ip.dst==64.106.46.57" | grep -o "Win=[0-9]*" | sed "s/Win=//g" | sort -nr | head -n 1
```

9. For TCP, what was the *minimum* flow control window size that the server ever advertised to the client? **14480**

```
tshark -r tcpserver.pcap -Y "ip.dst==64.106.46.57" | grep -o "Win=[0-9]*" | sed "s/Win=//g" | sort -n | head -n 1
```

10. Which argument of the `socket()` system call gives you the best idea of whether the socket is going to be a UDP socket or TCP socket (*e.g.*, first, second, third, *etc.*)? **The second**

```
crandall@rubicon ~/jed/485585fall2015/hw3 $ cat udp/*strace.txt | grep "socket("
27593 21:46:14.709801 socket(PF_INET, SOCK_DGRAM, IPPROTO_IP <unfinished ...>
24443 03:45:21.106070 socket(PF_INET, SOCK_DGRAM, IPPROTO_IP) = 3
crandall@rubicon ~/jed/485585fall2015/hw3 $ cat tcp/*strace.txt | grep "socket("
31714 06:07:19.596170 socket(PF_INET, SOCK_STREAM, IPPROTO_IP) = 3
30962 12:05:19.602899 socket(PF_INET, SOCK_STREAM, IPPROTO_IP) = 3
```