Project 3 – Network Performance Measurement

CIIC 4070 – Computer Networks

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I. Introduction

This paper is a project for the CIIC 4070 course at UPRM. It will count as a partial exam in which the resulting product of the student's investigative process showcases a developed result that encompasses the topics discussed in class. In it, the student is required to understand the usage of two different programs intended to measure network performance: iperf y jperf. Both will be used to measure the student's computer connection with his modem and to measure the connection that it has with a remote server specified in the iperf/jperf sites and report the bandwidth and measurements obtained in each.

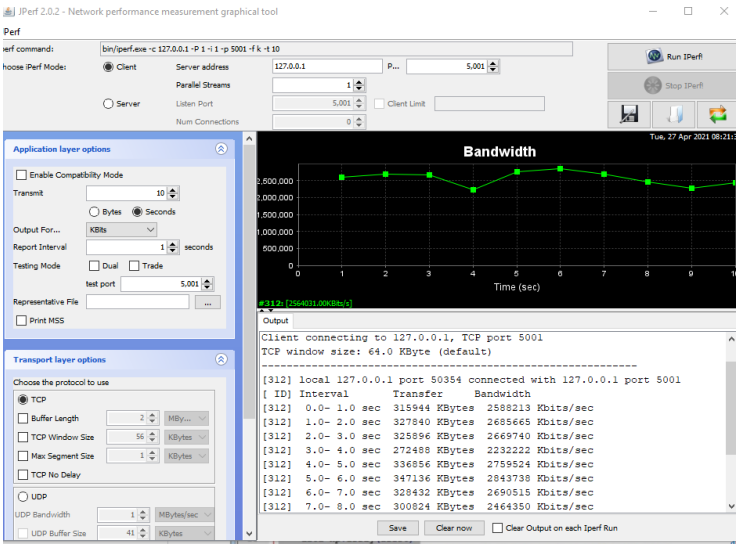
II. Basics of iperf and jperf

Iperf is a tool to measure the bandwidth, loss and other parameter of a specific IP network. It runs in a CLI (Command Line Interface) and supports analysis for the UDP and the TCP protocols. The latest released version is v3.1.3.

Jperf is a GUI interface executable for the Iperf tool. Coded in Java, it essentially reduces the complexity of writing the commands with several continuous flags and numbers and having to repeat the process in an "uncomfortable" development environment. Its latest version is the v2.0.2.

III. Experiments using your own PC

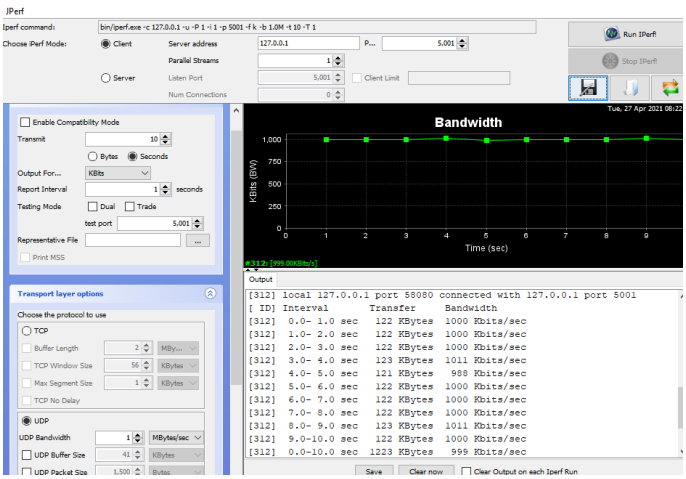
##################**TCP**##############################




```
# SERVER
iperf3.exe -s
-----------------------------------------------------------
Server listening on 5201
-----------------------------------------------------------
Accepted connection from 127.0.0.1, port 50132
[  5] local 127.0.0.1 port 5201 connected to 127.0.0.1
port 50133
[ ID] Interval           Transfer     Bandwidth
[  5]   0.00-1.01   sec   456 MBytes  3.80 Gbits/sec
[  5]   1.01-2.00   sec   480 MBytes  4.05 Gbits/sec
[  5]   2.00-3.00   sec   539 MBytes  4.52 Gbits/sec
[  5]   3.00-4.00   sec   491 MBytes  4.12 Gbits/sec
[  5]   4.00-5.00   sec   452 MBytes  3.80 Gbits/sec
[  5]   5.00-6.00   sec   528 MBytes  4.43 Gbits/sec
[  5]   6.00-7.00   sec   657 MBytes  5.51 Gbits/sec
[  5]   7.00-8.00   sec   388 MBytes  3.26 Gbits/sec
[  5]   8.00-9.00   sec   397 MBytes  3.33 Gbits/sec
[  5]   9.00-10.00  sec   606 MBytes  5.09 Gbits/sec
[  5]  10.00-10.00  sec  0.00 Bytes  0.00 bits/sec
- - - - - - - - - - - - - - - - - - - - - - - - -
[ ID] Interval           Transfer     Bandwidth
[  5]   0.00-10.00  sec  0.00 Bytes  0.00 bits/sec
sender
[  5]   0.00-10.00  sec  4.88 GBytes  4.19 Gbits/sec
receiver
-----------------------------------------------------------
Server listening on 5201
-----------------------------------------------------------
# CLIENT
iperf3.exe -c 127.0.0.1
Connecting to host 127.0.0.1, port 5201
[  4] local 127.0.0.1 port 50133 connected to
127.0.0.1 port 5201
[ ID] Interval           Transfer     Bandwidth
[  4]   0.00-1.01   sec   457 MBytes  3.81 Gbits/sec
[  4]   1.01-2.00   sec   480 MBytes  4.05 Gbits/sec
[  4]   2.00-3.00   sec   539 MBytes  4.52 Gbits/sec
[  4]   3.00-4.00   sec   491 MBytes  4.12 Gbits/sec
[  4]   4.00-5.00   sec   452 MBytes  3.79 Gbits/sec
[  4]   5.00-6.00   sec   528 MBytes  4.43 Gbits/sec
[  4]   6.00-7.00   sec   657 MBytes  5.51 Gbits/sec
[  4]   7.00-8.00   sec   388 MBytes  3.26 Gbits/sec
[  4]   8.00-9.00   sec   396 MBytes  3.33 Gbits/sec
[  4]   9.00-10.00  sec   606 MBytes  5.08 Gbits/sec
- - - - - - - - - - - - - - - - - - - - - - - - -
[ ID] Interval           Transfer     Bandwidth
```

```
[  4]   0.00-10.00  sec  4.88 GBytes  4.19 Gbits/sec
sender
[  4]   0.00-10.00  sec  4.88 GBytes  4.19 Gbits/sec
receiver

iperf Done.
##################UDP##############################
```




```
# SERVER
iperf3.exe -s
-----------------------------------------------------------
Server listening on 5201
-----------------------------------------------------------
Accepted connection from 127.0.0.1, port 50294
[  5] local 127.0.0.1 port 5201 connected to 127.0.0.1 port
62702
[ ID] Interval           Transfer     Bandwidth       Jitter
Lost/Total Datagrams
[  5]   0.00-1.00   sec   120 KBytes   979 Kbits/sec  0.125 ms
0/15 (0%)
[  5]   1.00-2.00   sec   128 KBytes  1.05 Mbits/sec  0.221 ms
0/16 (0%)
[  5]   2.00-3.01   sec   128 KBytes  1.04 Mbits/sec  0.267 ms
0/16 (0%)
[  5]   3.01-4.01   sec   128 KBytes  1.05 Mbits/sec  0.294 ms
0/16 (0%)
[  5]   4.01-5.01   sec   128 KBytes  1.05 Mbits/sec  0.358 ms
0/16 (0%)
[  5]   5.01-6.01   sec   128 KBytes  1.05 Mbits/sec  0.428 ms
0/16 (0%)
[  5]   6.01-7.00   sec   128 KBytes  1.05 Mbits/sec  0.468 ms
0/16 (0%)
[  5]   7.00-8.01   sec   128 KBytes  1.05 Mbits/sec  0.473 ms
0/16 (0%)
[  5]   8.01-9.00   sec   128 KBytes  1.05 Mbits/sec  0.542 ms
0/16 (0%)
[  5]   9.00-10.00  sec   128 KBytes  1.05 Mbits/sec  0.413 ms
0/16 (0%)
[  5]  10.00-10.00  sec  0.00 Bytes  0.00 bits/sec  0.413 ms
0/0 (0%)
- - - - - - - - - - - - - - - - - - - - - - - - -
[ ID] Interval           Transfer     Bandwidth       Jitter
Lost/Total Datagrams
[  5]   0.00-10.00  sec  0.00 Bytes  0.00 bits/sec  0.413 ms
0/159 (0%)
-----------------------------------------------------------
Server listening on 5201
-----------------------------------------------------------

# CLIENT
iperf3.exe -c 127.0.0.1 -u
Connecting to host 127.0.0.1, port 5201
[  4] local 127.0.0.1 port 62702 connected to 127.0.0.1 port
5201
[ ID] Interval           Transfer     Bandwidth       Total
Datagrams
[  4]   0.00-1.00   sec   128 KBytes  1.04 Mbits/sec  16
[  4]   1.00-2.00   sec   128 KBytes  1.05 Mbits/sec  16
[  4]   2.00-3.01   sec   128 KBytes  1.04 Mbits/sec  16
[  4]   3.01-4.00   sec   128 KBytes  1.05 Mbits/sec  16
[  4]   4.00-5.01   sec   128 KBytes  1.05 Mbits/sec  16
[  4]   5.01-6.01   sec   128 KBytes  1.05 Mbits/sec  16
[  4]   6.01-7.00   sec   128 KBytes  1.05 Mbits/sec  16
[  4]   7.00-8.00   sec   128 KBytes  1.05 Mbits/sec  16
[  4]   8.00-9.00   sec   128 KBytes  1.05 Mbits/sec  16
[  4]   9.00-10.00  sec   128 KBytes  1.05 Mbits/sec  16
- - - - - - - - - - - - - - - - - - - - - - - - -
[ ID] Interval           Transfer     Bandwidth       Jitter
Lost/Total Datagrams
[  4]   0.00-10.00  sec  1.25 MBytes  1.05 Mbits/sec  0.413 ms
0/159 (0%)
[  4] Sent 159 datagrams

iperf Done.
```

IV. Experiments to test a remote server

```
iperf3.exe -c iperf.biznetnetworks.com
Connecting to host iperf.biznetnetworks.com, port 5201
[  4] local 192.168.0.5 port 50323 connected to
117.102.109.186 port 5201
[ ID] Interval           Transfer     Bandwidth
[  4]   0.00-1.01   sec   256 KBytes  2.09 Mbits/sec
[  4]   1.01-2.01   sec   256 KBytes  2.09 Mbits/sec
[  4]   2.01-3.01   sec   256 KBytes  2.10 Mbits/sec
[  4]   3.01-4.00   sec   128 KBytes  1.06 Mbits/sec
[  4]   4.00-5.01   sec   128 KBytes  1.04 Mbits/sec
[  4]   5.01-6.01   sec  0.00 Bytes  0.00 bits/sec
[  4]   6.01-7.01   sec   128 KBytes  1.04 Mbits/sec
[  4]   7.01-8.01   sec   128 KBytes  1.05 Mbits/sec
[  4]   8.01-9.00   sec   128 KBytes  1.06 Mbits/sec
[  4]   9.00-10.00  sec   128 KBytes  1.05 Mbits/sec
- - - - - - - - - - - - - - - - - - - - - - - - -
[ ID] Interval           Transfer     Bandwidth
[  4]   0.00-10.00  sec  1.50 MBytes  1.26 Mbits/sec
sender
[  4]   0.00-10.00  sec  1.31 MBytes  1.10 Mbits/sec
receiver

iperf Done.
```

V. Conclusions

Through the project the student learned how to analyze the network performance and parameters with the CLI tool iperf and its GUI release jperf. The student gained insight on how to manipulate the variables to oversee tests in the TCP and UDP protocols and learned to acquire the throughput and bandwidth information from the tools.

VI. References

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