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Portfolio 1

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# Introduction

An introduction should tell the reader why this work is interesting.

It should describe:

1. the key topic(s)
2. the problem(s) that you are solving
3. references to the relevant work (for example: iperf)
4. your approach to the solution
5. limitations and outcomes
6. how the rest of the document is organised

# Simpleperf

Implementation details of simpleperf. Describe the building blocks of simpleperf and the communication between the server and client.

# Experimental setup

Describe the virtual network/topology that you used to evaluate your simpleperf tool. Feel free to copy my image.

# Performance evaluations

## Network tools

Explain the tools that you have used in your experiment – iperf, ping etc.

## Performance metrics

performance metrics that you use to evaluate your simpleperf tool.

## Test case 1: measuring bandwidth with iperf in UDP mode

### Results

With the use of ‘IPerf’ a command line tool to test network throughput between two network hosts, we can measure the bandwidth of three separate host to client connections.

The measurements are generated through UDP load (traffic) from a host to a client, and in return, gives results regarding maximum data transfer rate from client or host, total data sent and loss.

Client-host pairs:

H1 – (R1 – R2) > h4

H1 – (R1 – R2 – R3) > h9

H7 – (R2 – R3 – R4) > h9

Between client-server pair h1 – h4:

Client bandwidth – 29.4 Mbits/sec

Server bandwidth – 28.1 Mbits/sec

Between h1 – h9:

Client bandwidth – 21.0 Mbits/sec

Server bandwidth – 18.9 Mbits/sec

Between h7 – h9:

Client bandwidth – 21.0 Mbits/sec

Server bandwidth – 18.9 Mbits/sec

### Discussion

#### Which rate (X) would you choose to measure the bandwidth here? Explain your answers.

Choosing the maximum bandwidth according to the capacity of the bottleneck link passed, will ensure an accurate measurement of the maximum bandwidth that the link(s) can support. Though, it is possible to achieve a lower throughput if the bottleneck link is congested and if there are other interrupting network factors in play. Choosing a client rate higher than what is supported, will only lead to congestion, higher worktime, and more loss of data.

(Expected rates are retrieved from Canvas, “portfolio-guidelines.pdf”)

Between the pair h1 – h4, choosing a rate of 28M results in a server bandwidth of 28.1 Mbits/sec. The bottleneck link is L2 with an expected rate of 30 Mbits/sec (Canvas). The outputted server rate recorded is slightly lower than the expected rate, to be expected, taken interference and other network variables into consideration.

Between h1 – h9, choosing a rate of 20M gives a server bandwidth of 18.9 Mbits/sec. The connection passes all links, including the bottleneck link L3 with an expected bandwidth of 20 Mbits/sec. The actual outputted rate is slightly lower, and we carry the same assumptions as the previous measurement.

Between h7 – h9, the same bottleneck link is passed, and with a client rate of 20M and a server rate of 18.9 Mbits/sec. The results are expected to be the same as h1 – h9, since the same bottleneck link is passed and the expected maximum rate is unaffected.

#### If you are asked to use iPerf in UDP mode to measure the bandwidth where you do not know anything about the network topology, what approach would you take to estimate the bandwidth? Do you think that this approach would be practical? Explain your answers.

Identify the optimal packet size and test duration for achieving highest bandwidth. Do this by performing multiple sessions between the same endpoints whilst varying the parameters. In addition, perform multiple tests under different network conditions, as various network factors such as network congestion, network traffic etc. can affect the measurements.

Analyze the bandwidth measurements from both client and server, and packet loss to get a better understanding of the network performance.

In my case, I would start a test with a lower (than usual) rate to ensure that the network doesn’t become congested or negatively impact other network traffic. Steadily increasing the rate, until the test results level out or peak at a certain rate, doing this during periods of low network utilization, minimizing any potential interference. In the end, analyzing the results and performing multiple tests with what is considered optimal, ensuring accurate measurements and as low as possible impact on network performance.

## Test case 2: link latency and throughput

### Results

In this task, data such as RTT and bandwidth are measured between three individual links between routers. Ping, a networking utility is used to test reachability to a target host, while outputting a measurement of round-trip time (RTT). Simpleperf, a network throughput measurement tool to send and receive packets between a client and server using sockets with “Transmission Control Protocol (TCP)”.

### Discussion

## Test case 3: path Latency and throughput

### Results

### Discussion

## Test case 4: effects of multiplexing and latency

### Results

### Discussion

## Test case 5: effects of parallel connections

### Results

### Discussion

# Conclusions

A concise statement of your work’s important results and their significance. Here you should state any shortcomings/limitations of your work, problems that you failed to address and so on..

# References (Optional)

NOTE:

The report cannot exceed 20 pages, including the list of references. The page format must be A4 with 2 cm margins, single spacing and Arial, Calibri, Times New Roman or similar 11-point font.