LAB 5

# Summary

This lab focuses on evaluating TCP congestion protocol by collecting, visualizing, and analyzing data. Firstly, we run iperf, and get the data in a tcpprobe.dat file. We then share this file from the cloud lab server to our personal computer using SCP. Then, using bash shell and scripting code, we convert this into a CSV file and extract 3 CSV files separated by source IPs. Using these we generate graphs to analyze data.

## Exercise 1:

A screenshot of a computer program

Description automatically generated

5. iperf running;

A screenshot of a computer

Description automatically generated

Iperf output;

A screenshot of a computer

Description automatically generated

SCP:

A computer screen with white text

Description automatically generated

## Exercise 2

A screen shot of a computer

Description automatically generated

This is the shell script I used to extract data from specific IP addresses from the tcpprobe.csv file. The tcpprobe.csv file was converted to a CSV file from the tcpprobe.dat file by removing white spaces and adding commas in its place. This was done by using awk in bash shell.

Plots



A graph with a line drawn on it

Description automatically generated



A graph with a line drawn on it

Description automatically generated



A graph with a line drawn on it

Description automatically generated



Annotation:

**Explanation of behavior of TCP different from Slow Start and Congestion Avoidance**

In slow start, because there isn’t any congestion initially, TCP aggressively increases the sending rate, which can lead to rapid network congestion if not controlled.

Congestion avoidance on the other hand employs a more gradual approach, increasing the congestion window linearly. This prevents a sudden spike in network traffic and ensures a more stable data transfer process.

**Explanation of what happens to congestion window and slow start threshold when 3 duplicate ACKs are received.**

When 3 duplicate ACKs are received, TCP assumes that a packet has been lost and enters fast recovery. In this phase, the sender reduces its congestion window to a fraction of its previous value, thereby avoiding further congestion.

## Exercise 3:

Termination

A screenshot of a computer

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