Assignment 3

Environment Setup

OS

Both the client and the server are using Ubuntu 22.04.

TCP Buffer Size and CC Algorithm

To ensure we always have enough TCP buffer to prevent from insufficient buffer space occurring and affecting the performance, we set the buffer size to a very large number (64MB).

```
sudo sysctl -w net.ipv4.tcp_rmem="67108864 67108864 67108864"
sudo sysctl -w net.ipv4.tcp_wmem="67108864 67108864 67108864"
```

Then we choose `cubic` algorithm for the client and `bbr` for the server since `cubic` is sensitive to packet loss, which could be caused by the insufficient TX Queue.

```
sudo sysctl -w net.ipv4.tcp_congestion_control=bbr
sudo sysctl -w net.ipv4.tcp_congestion_control=cubic
```

Disable TCP Segmentation Offload (TSO)

TSO offloads some workloads to NICs, but it bypasses the queue discipline (`qdisc`), which we are investigating, so we should disable this functionality to make the queue discipline work.

The command below is executed only on the client side.

```
sudo ethtool -K ens160 tcp-segmentation-offload off
sudo ethtool -K ens160 generic-segmentation-offload off
```

Use Single BFIFO as Queue Discipline

The modern OS may use `mq` as queue discipline, which could leverage the multiple queue design that the modern NIC adopts to gain speedup. However, `mq` makes things very complex. To simplify our experiment setup, we only use one `bfifo` as the queue discipline.

```
sudo tc qdisc del root dev ens160
sudo tc qdisc add dev ens160 root bfifo limit 3000
```