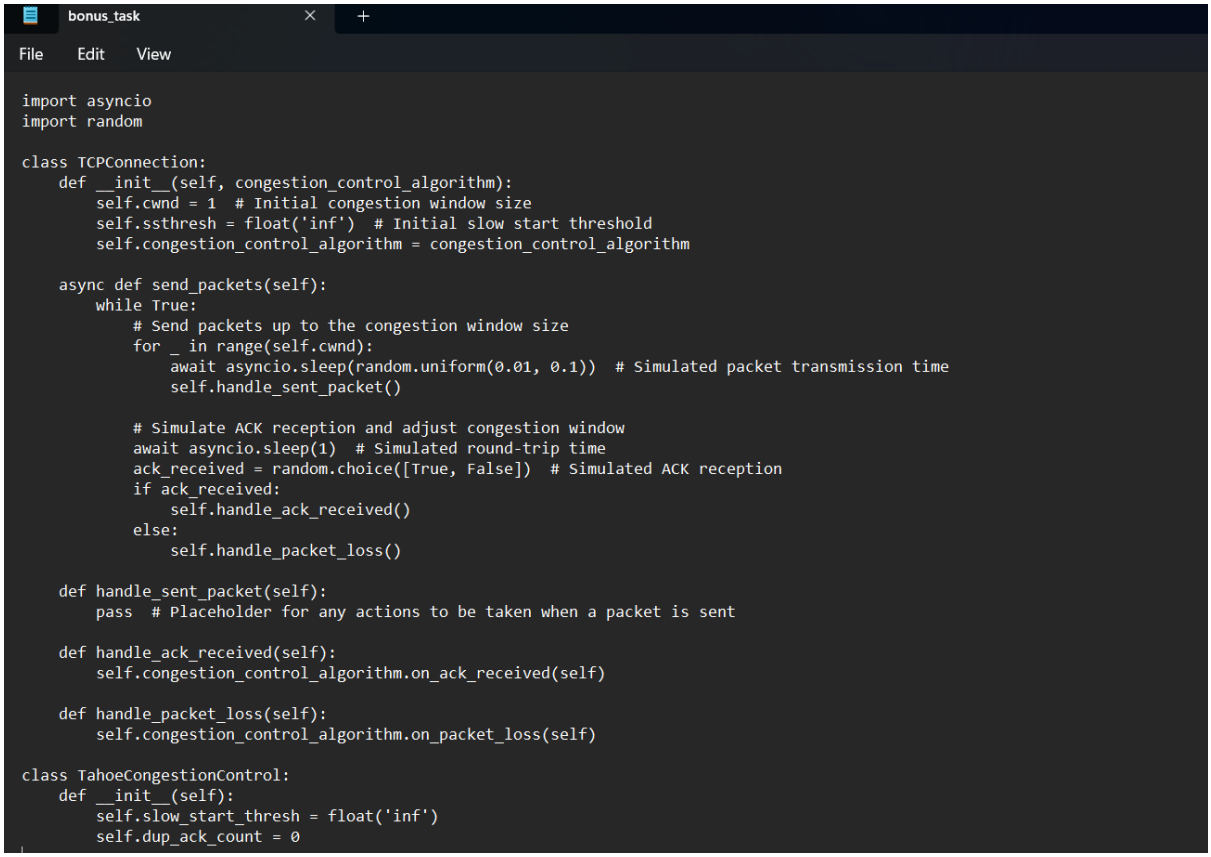
Group 16

CS420(G) Computer Networks
Python programming Assignment part 1 of 2
Bonus task from Milestone 3

By Sushma Gajulapalli, Sathvika Kumbham, Aishwarya Khatpe, Meghana Kandala

***Write an algorithm in Python to demonstrate TCP congestion control.



```
class TahoeCongestionControl:
    def __init__(self):
        self.slow_start_thresh = float('inf')
        self.dup_ack_count = 0

    def on_ack_received(self, connection):
        if self.dup_ack_count == 3:
            self.handle_triple_dup_ack(connection)
        else:
            self.handle_regular_ack(connection)

    def on_packet_loss(self, connection):
        self.handle_packet_loss(connection)

    def handle_regular_ack(self, connection):
        connection.cwnd += 1
        if connection.cwnd >= self.slow_start_thresh:
            connection.cwnd += 1  # Congestion avoidance phase

    def handle_triple_dup_ack(self, connection):
        connection.ssthresh = max(connection.cwnd / 2, 2)
        connection.cwnd = 1
        self.dup_ack_count = 0

    def handle_packet_loss(self, connection):
        self.dup_ack_count += 1

async def main():
    congestion_control_algorithm = TahoeCongestionControl()
    connections = [TCPConnection(congestion_control_algorithm) for _ in range(5)]  # Create multiple TCP connections

    # Start sending packets for each connection
    await asyncio.gather(*[connection.send_packets() for connection in connections])

asyncio.run(main())
```

Save the code in the filename as bonus_task.py

This code sets up a basic simulation of multiple TCP connections with simulates ACK reception and packet loss.

It defines a TCPConnection class managing congestion window and packet transmission, and a TahoeCongestionControl class handling ACK reception and packet loss events.

The main function creates multiple TCP connections with the Tahoe congestion control algorithm and starts sending packets asynchronously, simulating packet transmission, ACK reception, and packet loss based on random events and congestion control logic

The congestion control algorithm adjusts the congestion window size and slow start threshold based on the received ACKs and packet loss events.