COMP 3980
Computer Systems Technology
September 2022
Datacommunications & Internetworking

Project

This is a pairs project.

Objectives

- Create a simple client/server chat program.
- Understand the traffic flow of TCP traffic with a packet capture tool such as tcpdump or Wireshark.

Tasks

- You have been provided with a simple program to send a message from one computer to another.
- Pressing enter (\n) sends the message from one computer to another.
- Pressing ctrl-z (end of file) closes the connection.
- Run the program on **two computers** and analyze the TCP traffic flow between them.
- The programs are peer-to-peer, which means there is no central server.
- Either program can initiate a connection:

```
# listens on 192.168.0.1 port 9999
./chat -a 192.168.0.1 9999

# connects to 192.168.0.1 on port 9999
./chat -c 192.168.0.1 9999
```

- Once connected, users can type in text and send it.
- At the same time, they can receive text from the other client and display it.
- Use I/O multiplexing, threads, or processes to send/receive messages at the same time.
- Instead of typing, you can use I/O redirection:

```
./chat -c 192.168.0.1 9999 < words-to-send.txt
```

Constraints

- You must clearly explain:
    - The start of a session (3-way handshake)

    - The end of a session
    - The differences between two packets that have the same data
        - Type in “hello” <enter> and “hello” <enter>
        - You must clearly explain the differences between the two packets
    - Show the TCP stream (Analyze | Follow)
    - Provide a written analysis of the traffic, including, at a minimum:
        - Statistics | Protocol Hierarchy
        - Statistics | Flow Graph
    - Do not simply show the statistics for the analysis.
    - You must provide proof that you understand what the graphs mean.
- Ensure you cover ***all*** of the packets from the start of the handshake to the end of the close.
- Only type hello\nhello\n<ctrl-z>
- Be sure to analyze the traffic on both hosts.
- The client and server must be written in C18.

Submission Requirements

Use the following directory structure:

Directory	Purpose
report	Report files in .pdf format
pcap	Any relevant packet captures

Notes

- Follow the appropriate report format (samples).
- During the test, you will capture network traffic on any relevant machines and then submit the pcap files as specified above.
- Please set the appropriate packet capture filter to limit the size and scope of the data collected to be what is necessary.

Format

You must hand in a pax.Z file to the assignment submission folder on Learning Hub (https://learn.bcit.ca).

You can hand in as many versions as you like. The last submission, based on the timestamp, will be the one to be marked.

```
pax -w report/ pcap/ -f assign-3-v#.pax
```

compress -f assign-3-v#.pax

Hand in the resulting assign-3-v#.pax.Z file.

Note: failure to follow the submission requirements may result in a loss of marks, up to 100%.

Evaluation

Item	Value
Report clarity	10%
Session (startup/teardown)	5%
Traffic Analysis (client and server)	10%
Packet differences	10%
Analysis	10%
Packet Captures	5%
Design	20%
Implementation	30%
Total	**100%**