CS307 Systems Practicum
Assignment 6
Networking 1 (TCP)

Instructions :

• Make a pdf file to write your findings and comments for each problem and also write contributions of each member.
• For all questions write C programs.
• You must follow a coding standard for all programs such as DONlab C.
• Use tcp connections in each case.
• Each application should have proper termination criteria (CTRL-C should not be the only way
to make it stop). Don't forget to close the ports before terminating the application.
• Any attempt of plagiarism will have severe consequences.

Use socket() system calls for creating tcp connections

1. Use tcpdump to observe all the packets being transmitted to the moodle server. Try out different command line options to analyze the packets. (eg -A,-n,-t,-ttt,-X -s and so on). Visit a website and see html code and http header in tcpdump. Is there any difference in output of tcpdump if you visit http and https pages. write down your observations and findings.

2. Write a client server application in which client sends a string to the server and the server sends back the string after changing cases of each alphabet (lower case to upper case and vice-verse). Implement it over two PCs, both act as client as well as server ie both PC can send string to other PC and both can reply to incoming strings. The program should work for as many inputs as given don't show it for single input only.

3. Write a 1-1 chat application in client server architect. There is only one server in the setup and each client chat with other through that server only. The server should work for at least three simultaneous connections. One connection means two clients chatting with each other. Implement it on two PCs only. Use different port numbers for simulating different clients.

Bonus: Write a script to test your application. The script should simulate large number of clients and cover different test cases and produce a proper report.

4. Design(Don't code) a model for question 3 using peer to peer architect instead of client server using block diagrams. What are issues in this architect?

5. Design a file transfer application in client-server architect which supports multiple clients simultaneously. Client sends file name to the server which checks its local disk for the file, if found it will send the file to the requesting client. Use sufficiently large files and check the difference between original file and the file that client has received.(use scp to copy the same file on client or store the original file on client beforehand for testing) Client can also ask server for its usage details (list of files client has downloaded so far, size of data transferred etc). Usage details are client specific. Connection should terminate properly after completion of file transfer. If file is not found on server, server should inform this to client. Think how will you differentiate between different types of messages (request for file, file not found,request for usage details etc)

Bonus: Make it a reliable transfer. (no packet loss and in-order packet reception)

6. Explore following (Theory) :
   - **6.1** What is **DNS, DHCP**.
   - **6.2** What are differences between **TCP** and **UDP**.
   - **6.3** What is meant by layers in networking.
   - **6.4** Login to a lab PC with your account (your roll no) Add some files in your home folder. Login again on a different PC. Is the home folder is same or different when you are using a different PC(same account)? What kind of file-system it is? What is special about **10.8.0.200** in IIT Mandi ?
   - **6.5** Which are the two service providers that provide services to IIT Mandi.
   - **6.6** Find out IP address of your laptop using **ifconfig**. Now go to **ip2location.com** and check ip there. Do it using other laptops. Explain your observation.
   - **6.7** What is special about **10.8.0.1** in IIT Mandi.
   - **6.8** What is special about **0.0.0.0** and **255.255.255.255**.
   - **6.9** Can you host a web server on a PC in the lab, or on your laptop in IIT Mandi? Why or why not? Is the situation different if you were at your home?
   - **6.10** Use **traceroute** on servers outside India and for find out location of each intermediate hop using ip2location or similar services.