Indian Institute of Technology, Mandi
Feb-June 2021
CS307 - System Practicum
Assignment 4

Course Instructor: Aditya Nigam
18 May 2021

Instructions:

- Plagiarism is strictly prohibited. In case of violation, a zero will be awarded for this assignment as a warning and a quick F grade if repeated later.
- Students need to create a 10 minute demo video and upload it on youtube with unlisted settings. The demo must contain the walk-through of all functionalities by running them as well as a brief walk-through of code. The 10 minute restriction is strict and the demo will not be evaluated if it is more than 10 minutes.
- In moodle students need to submit 2 things:
    - The link of the youtube video demo as online text.
    - A zip file containing:
        - Report file with youtube link of demo, answers for question 4, any other information if you want to mention for other questions.
        - Readme file for compiling the code.
        - Code for question 1 and 2.
- Use tcp connections in each question of this assignment.
- 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.
- Use socket() system calls for creating tcp connections
- Contact **Prajjwal(B17051)** for any queries.

Question 1: Design a file transfer application based on client-server architecture which supports multiple clients simultaneously. Implement it over one PC utilizing two or more VMs (Virtual Machines). Let one VM be the server. This VM will have all the files that can be transferred to clients. Other VM's will act as client and connect with server and request files.

- **Functionalities:**
    - 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.
    - Clients can ask the server for its usage details (list of files client has downloaded so far, size of data transferred etc). Usage details are client specific.
    - Different kinds of errors/messages should be reported to the client. Eg: If a file is transferred successfully then print the same on the console of the client. Similarly, do the same for failed transfers, or files not found. Report such errors to the client.
    - Think how you will differentiate between different types of messages (request for file, file not found,request for usage details etc).
    - 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
- **Demo and Viva Requirements:**
    - Show that the server is handling multiple clients simultaneously.(You can request 2 large files simultaneously from two different clients).
    - Show that the application can support different types of files: Eg .png, .pdf, .txt etc.
    - Show that the application can support different file sizes: From a few KBs to a few GBs.
    - Connection should terminate properly after completion of file transfer.
    - Make it a reliable transfer(no packet loss and in-order packet reception).

Question 2: Error Control

Error Control is important as it ensures that data transferred over the network doesn't get corrupted. In this task, you have to perform error detection. **Error detection** is a challenging task because the receiver has to decide if received data is correct or not, without having a copy of the original message. **Burst errors** are errors in which 2 or more bits in the data unit have changed**. Cyclic Redundancy Check(CRC)** is an algorithm that is used to detect such errors.

Functionalities:

- In this task, use a single pair of server and client.
- Instead of actual bits, generate strings consisting of '0' and '1'. Apply CRC algorithm on these strings.
- Agree upon any divisor of length 5(eg 11001).
- Generate a message of length 8*N in server. Apply CRC on it and send it to the client.
- Apply the algorithm on each 8 length blocks of the original message.
- On the client detect if there is any error or not.

Question 3: Theory Questions

- Find out the IP address of your laptop using ifconfig. Now go to ip2location.com and check ip there. Do this on the laptop of each team member. Explain your observations.
- Use traceroute on servers outside India and for finding out location of each intermediate hop using ip2location or similar services.

----------XXX----------