Indian Institute of Technology Roorkee

Department of Computer Science and Engineering

CSN-361: Computer Networks Laboratory (Autumn 2019-2020)

Lab Assignment-3 (L3) **Date: August 8, 2019** **Duration: 2 Weeks**

General Instructions:

1. Every Lab Assignment will be performed by the students individually. No group formation is required and the evaluations will be done every week for the students individually.
2. Use of Linux OS is mandatory for this Lab to complete all the Lab Assignments.
3. The student should use Deoxygen tool (http://www.doxygen.nl) for getting automatic documentation of the codes written by him/her.
4. For version control of the written codes, the students are being instructed to learn and use any open-source CSV tool (https://www.nongnu.org/cvs) or GitHub (https://github.com).

Submission and Evaluation Instructions:

1. **Submit your** zipped folder (**<filename>.zip** or **<filename>.tar.gz**) through your account in Moodle through the submission link for this Lab Assignment in Moodle course site: https://moodle.iitr.ac.in/course/view.php?id=47
2. **Hard deadline for Final submission in Moodle: August 22, 2019 (9:00 am Indian Time).** For any submission after Final Deadline, 20% marks will be deducted (irrespective of it is delayed by a few seconds or a few days). The key to success is starting early. You can always take a break, if you finish early.
3. The submitted zipped folder (**<filename>.zip** or **<filename>.tar.gz**) must contain the following:
   (a) The source code files in a folder.
   (b) A report file (**<filename>.DOC** or **<filename>.PDF**) should contain the details like:
      i. Title page with details of the student
      ii. Problem statements
      iii. Algorithms and data structures used in the implementation
      iv. Snapshots of running the codes for each of the problems
4. The submission by each student will be checked with others' submission to identify any copy case (using such detection software). If we detect that the code submitted by a student is a copy (partially or fully) of other's code, then the total marks obtained by one student will be divided by the total number of students sharing the same code.

Instructions for L3:

1. Objective of this Lab Assignment L3 is to make the students familiar with the hardware and software aspects of computer networking and extracting information related to computer networking using C programs, TCL programs and NS2.
2. The students are expected to have a basic knowledge computer networking.
3. It is mandatory to learn and use gdb (GNU Debugger) for debugging the programs in Linux platform after installing gdb (https://www.gnu.org/software/gdb). There is also an interesting online GDB tool to learn: https://www.onlinegdb.com
4. The student will have to demonstrate and explain the coding done for this Lab Assignment L3 in the next laboratory class to be held on **August 22, 2019** for evaluation.

Problem Statement 1:
Write a socket program in C to determine class, Network and Host ID of an IPv4 address.

Input: 1.4.5.5
Output:
Given IP address belongs to Class A
Network ID is 1
Host ID is 4.5.5

Problem Statement 2:
Write a C program to demonstrate File Transfer using UDP.

Problem Statement 3: Write a TCL code for network simulator NS2 to demonstrate the **star** topology among a set of computer nodes. Given N nodes, one node will be assigned as the central node and the other nodes will be connected to it to form the star. You have to set up a TCP connection between k pairs of nodes and demonstrate the packet transfer between them using Network Animator (NAM). Use File Transfer protocol (FTP) for the same. Each link should have different color of packets to differentiate the packets transferred between each pair of nodes. The program should take the number of nodes (N) as input followed by k pairs of nodes.

Problem Statement 4: Write a TCL code for network simulator NS2 to demonstrate the **ring** topology among a set of computer nodes. Given N nodes, each node will be connected to two other nodes in the form of a ring. You have to set up a TCP connection between k pairs of nodes and demonstrate packet transfer between them using Network Animator (NAM). Use File Transfer protocol (FTP) for the same. Each link should have different color of packets to differentiate the packets transferred between each pair of nodes. The program should take the number of nodes (N) as input followed by k pairs of nodes.

Problem Statement 5: Write a TCL code for network simulator NS2 to demonstrate the **bus** topology among a set of computer nodes. Given N nodes, each node will be connected to a common link. You have to set up a TCP connection between k pairs of nodes and demonstrate packet transfer between them using Network Animator (NAM). Use File Transfer protocol (FTP) for the same. Each link should have different color of packets to differentiate the packets transferred between each pair of nodes. The program should take the number of nodes (N) as input followed by k pairs of nodes.