CS301: Computer Networks
Assignment 01: Basic Networking Tools

Goal: Study and use various network diagnostic tools.

Instructions:

1. **Deadline: August 19, 2024 11:59 PM.**
2. Perform the experiments on a Unix/Linux-based computer.
3. Create a directory with your roll number (use the **mkdir** command for the same) and perform the operations under your directory (use the **cd** command to set the terminal with your directory).
4. Attach screenshot(s) of the output terminal (roll number should be visible) for each command that has been executed or wherever required.
5. Any **plagiarism** case will be considered unethical practice, and appropriate action will be taken against them.

Q1. Answer the following questions related to the **IFCONFIG** command. **[3 Points]**

1) Run the ifconfig command and briefly describe its output (important attribute). **[1.5]**
2) What options can be provided with the ifconfig command? Mention and explain at least four options. **[1.5]**

Q2. Answer the following questions related to the **PING** command. **[4 Points]**

1) What is the use of the ping command? **[1]**
2) Select three hosts of your choice on the Internet and experiment with pinging each host 10 times at three different hours of the day. You can use the following online tool or some other tool for this experiment.

   Link: https://subnetonline.com/pages/network-tools/online-ping-ipv4.php

   a) List out the average RTT for each host in tabular form and explain whether RTT has a correlation with the geographical distance of the destinations from the source. **[1]**
   b) Pick one of the above-used hosts and repeat the experiment with different packet sizes ranging from 64 bytes to 2048 bytes. Plot average RTT vs packet size. **[1]**
   c) Explain how the change in packet size and time of the day impact RTT. **[1]**

Q3. Answer the following questions related to TRACEROUTE. **[8 Points]**

1) What is the use of traceroute tool? **[1]**
2) Inspect the cases when the traceroute does not find complete paths to some hosts and explain the reasons. **[2]**
3) Is it possible to find the route to specific hosts which fail to respond to the ping experiment? Give reasoning. **[2]**
4) Use the traceroute program to find the route to three of your favorite sites on the Internet. Draw a graph of your results, labeling each node with the IP address of the hops between your location and the destinations. The links between them should be marked with the measured delays between each link. **[3]**

Q4. Answer the following questions related to **NMAP**. **[7]**

1) what is the usage of the NMAP tool? **[1]**
2) Identify open ports of iitbhilai.ac.in and briefly describe the usage of each service running on open ports. Can we identify the service version of services running on the host? If yes, list the services along with their version and briefly describe the process. **[2]**
3) Can you identify the operating system running on iitbhilai.ac.in using Nmap? Mention the underlying OS running on the host and briefly describe the process. **[1]**
4) Repeat steps in 4.2 and 4.3 for any two websites used earlier in problem 2.2 **[2]**

Q5. Answer the following questions related to the **NETSTAT** command. **[5 Points]**

1) What is the use of the netstat command? **[1]**
2) Find all the active TCP ports on your system. Identify the ports and PIDs of your web browser. Can you identify the port number and PID of a specific TAB in your browser? Find out if any of the services running in your system use the standard ports of HTTP, DHCP, DNS, SMTP, and FTP. **[3]**
3) What netstat option can be used to show the statistics of all UDP connections? Run the command on your computer and show the output. **[1]**

Deliverables in a tar ball on GC:

- Submission Guidelines: Upload the Assignment Report, pcap in GC as a tar ball with file name as <your roll no>_<your name>.tar
- Readable Report [3 Points for report quality] enumerating steps followed with screenshots for each of the important steps.
    - Pcap trace collected and mention the command/tool used.
    - Put the screenshots (**mandatory**) to validate your answers in the report.
    - Clear and concise writing.

Check Web sources for more information.