Indian Institute of Technology, Bhilai

CSL351: Computer Networks

Assignment - 1 (Basic Network Tools)

Full Marks: 30 *Deadline: 10/01/26, 11:59PM*

Submission Instructions:

1) Answer all the questions.
2) Follow the instructions given in the TODO section.
3) Prepare a PDF that contains the question number and corresponding commands, explanation and screenshots of the results:
    a) Perform the experiments on a Unix/Linux-based computer.
    b) Create a directory with your roll number (use the mkdir command for this) and perform the operations within your directory (use the cd command to set the terminal to your directory).
    c) Attach a screenshot(s) of the output terminal (roll number should be visible) for each command that has been executed or wherever required.
4) You can use latex/word to make the pdf.
5) Deliverables in a .zip:
    a) Submission Guidelines: Upload the Assignment Report, pcap in .zip file.
    b) Readable Report **[3 Points for report quality]** enumerating steps followed with screenshots for each of the important steps:
        i) Pcap trace collected and mention the command/tool used.
        ii) Put the screenshots (mandatory) to validate your answers in the report.
        iii) Clear and concise writing.
6) The naming of the file should strictly follow the given format: <Roll_No>_<Name>_<Assignment No>. If your name is Alex, your roll number is B23CS055, then the filename should be: B23CS055_Alex_01.zip
7) **Any plagiarism case will be considered an unethical practice, and appropriate action will be taken against the individual.**

Objectives:

1. Learn the purpose and functionality of essential networking commands.
2. Conduct practical experiments to analyze network configurations and performance.
3. Evaluate metrics like RTT, packet size effects, and service vulnerabilities.

4. Draw conclusions from collected data and present findings.

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1. Answer the following questions related to the IFCONFIG command. **[3 Points]**
   a. Run the ifconfig command and briefly describe its output (important attribute). **[1.5 Points]**
   b. What options can be provided with the ifconfig command? Mention and explain at least four options. **[1.5 Points]**
2. Answer the following questions related to the NETSTAT command. **[5 Points]**
   a. What is the use of the netstat command? **[1 Point]**
   b. 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 Points]**
   c. 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 Point]**
3. Answer the following questions related to the PING command. **[4 Points]**
   a. What is the use of the ping command? **[1 Point]**
   b. 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
      i. 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 Point]**
      ii. 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 Point]**
      iii. Explain how the change in packet size and time of the day impact RTT. **[1 Point]**
4. Answer the following questions related to the TRACEROUTE. **[8 Points]**
   a. What is the use of traceroute tool? **[1 Point]**
   b. Inspect the cases when the traceroute does not find complete paths to some hosts and explain the reasons. **[2 Points]**
   c. Is it possible to find the route to specific hosts which fail to respond to the ping experiment? Give reasoning. **[2 Points]**
   d. 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 Points]**
5. Answer the following questions related to NMAP. **[7 Points]**
   a. What is the usage of the NMAP tool? **[1 Point]**
   b. 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. **[3 Points]**
   c. 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 Point]**
   d. Repeat steps in 5.b and 5.c for any two websites used earlier in problem 3.b. **[2 Points]**

Check Web sources for more information.