National University of Computer and Emerging Sciences

Laboratory Manuals

for

Computer Networks - Lab

(CL -3001)

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Lab Manual 02

Objectives:

- To learn basic commands of Linux related to Directory and File Manipulation, Process management and Network Management
- GNU Debugger using a C Language Program

In-lab Statement

1. **Find out the purpose of the following commands and execute them on your system with different parameters. [1]**

   ls, cd, pwd, mkdir, rmdir, rm , cp, mv, touch

2. **Some commands may be new for most of you. Practice these terms on your own: [9]**

top	The top program provides a dynamic real-time view of a running system. It can display system summary information as well as a list of tasks currently being managed by the Linux kernel.	top
ps	ps displays status of a selection of the active/currently running processes.	ps
kill pid	Kill is used to send a signal to a process. Where pid stands for process id Default syntax for this is **kill [-signal number or name)] pid** On your terminal to see the list of available signals. **Kill -L** **A PID of -1 is special; it indicates all processes except the kill process itself and in it. It will terminate all programs and log off. BEWARE!**	kill –SIGKILL pid
chmod	This command is used to grant or revert reading, writing, and executing permissions from a user, group or others. Following are the symbolic representation of three different roles: You can check the details by typing **man chmod** chmod 400 lab1.txt Check what happened to your file.	

	Now write chmod 700 lab1.txt What happened to your file?	
ifconfig	ifconfig is used to configure the kernel-resident network interfaces. If no arguments are given, ifconfig displays the status of the currently active interfaces. If a single interface argument is given, it displays the status of the given interface only; if a single -a argument is given, it displays the status of all interfaces, even those that are down. Otherwise, it configures an interface.	ifconfig ifconfig -a ifconfig eth0
route	Route manipulates the kernel's IP routing tables. Its primary use is to set up static routes to specific hosts or networks via an interface.	route
ss	The command is used to investigate socket statistics. Use ss-u for udp and ss-t for tcp sockets to analyze which sockets are being used for which protocol.	
wget	wget stands for "web get". It is a command-line utility which downloads files over a network. It supports HTTP, HTTPS, and FTP protocols, as well as retrieval through HTTP proxies. wget has been designed for robustness over slow or unstable network connections; if a download fails due to a network problem, it will keep retrying until the whole file has been retrieved. If the server supports rejects permission, it will instruct the server to continue the download from where it left off. The simplest way to use wget is to simply provide it with the location of a file to download over HTTP. For example, to download the file http://website.com/files/file.zip, this command: wget http://website.com/files/file.zip Where will this file be downloaded?	
traceroute	traceroute prints the route that packets take to a network host. traceroute gives an insight to the entire path that a packet travels through, names and identity of routers and devices in your path,	

	network latency (the time taken to send and receive data to each devices on the path). It's a tool that can be used to verify the path that your data will take to reach its destination, without actually sending your data. Write on your terminal traceroute nu.edu.pk	
nslookup	nslookup is a network administration tool for querying the Domain Name System (DNS) to obtain domain name or IP address mapping or any other specific DNS record. It is also used to troubleshoot DNS related problems. Write on your terminal window nslookup www.google.com	
host	It is an alternative of nslookup but with more details. Write up on your terminal window: host www.google.com	

3. **Ping command: [2]**

   Ping is a command that is used to check the connection and latency rate between two computers in a network. One network pings another in order to exchange data packets (Response) to calculate the latency and exchange rate.

   Syntax for Pinging is:

   ping [other network's ID (Domain/IP Address)]

   Question - You are required to ping at least 5 other networks (including your own address i.e. 127.0.0.1) and compare the latency rate of all networks.

4. Write a C program to find out the host byte ordering (little endian/big endian) of your machine. Your program must output the byte ordering of your machine along with the data stored in the individual bytes e.g, you can store a number in hex as 0x3412 and visualize how data is stored in the memory (either in little endian or big endian). You must be able to debug your program using **GNU Debugger i.e.,** to view variable values during running program, to insert breakpoints, to check some condition etc. **[3]**
   - **Hint: C has a datatype short. It takes 2 bytes. Now, you can store some data in your short datatype and read memory byte wise. Well you can use other datatypes too.**

Post Lab [5]

Write a C Program to find out the Average CPU Utilization Percentage in Linux System over the entire time your program is executing. You can read the first line of the file named stat having the path "/proc/stat" to get the string depicting the CPU usage. It will look like this:

cpu %user %nice %system %idle %iowait %irq %softirq

You will then parse the string to extract the relevant information and print it out on the terminal. As this file keeps on getting updated, so you have to keep on reading the file in an infinite loop, process the information and then print the Average CPU utilization percentage on the terminal. You have to read the two samples with a gap of 1 sec and find out the average CPU utilization percentage over these two intervals with this sequence repeating indefinitely.

Hint: The time CPU has remained idle is represented by %idle and %iowait fields.