ARBA MINCH INSTITUTE OF TECHNOLOGY

FACULTY OF COMPUTING & SOFTWARE ENGINEERING

Network Design

ASSIGNMENTS

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OBJECTIVES

The objectives of these assignments are:

a. *To cover basic concepts of networking*

b. *To understand how networking protocols work*

c. *To understand basic Linux installation and setting up of the operating environment*

d. *To study LAN setup and understand basic LAN principles*

e. *To study tools for network analysis*

Assignment Completion Sheet

Sr. No	Assignment Name	Assignment Type	Marks
1	Linux Installation	**Individual**	10
2	Networking commands in Linux	**Individual**	10
3	Study of LAN environment	**Group**	10
4	Use of Wireshark tool	**Group**	10
	Total out of 40%		

Deadline: **After 3 weeks, then presentations**

Assignment 1: Linux Installation and Operating Environment

Instructors should demonstrate:

1. Linux installation
2. Creating users
3. Creating user groups
4. Setting permissions for home directory of users
5. Important files and directories in Linux and their use
6. Configuring Apache server and Apache Tomcat
7. Configuring database using PostgreSQL

Self-study questions for students:

1. List the stages of Linux boot process
2. What is run level? What are the predefined run levels?
3. Find out the run level of your computer
4. Find out the kernel version of your machine
5. What is NIS and NFS?
6. What is the use of RPM? List various options of **rpm command** with syntax
7. State the purpose of the following files and directories:
    a. /home
    b. /boot
    c. /dev
    d. /usr
    e. /mnt
    f. /media
    g. /etc
    h. /bin
    i. /usr/bin
    j. /etc/fstab
    k. .bashrc

Signature of the instructor ☐ Date ☐

Assignment Evaluation

0: Not done ☐ 2: Late Complete ☐ 4: Complete ☐

1: Incomplete ☐ 3: Needs improvement ☐ 5: Well, Done ☐

Assignment 2 : Networking Commands in Linux

Execute the following commands and write their output

1. **ping:**

This command is used to test connectivity between two nodes. Ping use ICMP (Internet Control Message Protocol) to communicate to other devices. You can ping host name or ip address using below command.

example: ***ping 201.54.100.1*** or **ping www.google.com**

$ping <server-ip-address>
Output:
$ping localhost
Output:
$ping <other-ip-in-network>
Output:

2. hostname

Gives the host name of the computer they are logged into. To set the hostname permanently use /etc/sysconfig/network file.

$hostname
Output :

3. traceroute

traceroute is a network troubleshooting utility which shows number of hops taken to reach destination also determine packets traveling path.

$traceroute ip-address
Output :

4. netstat

Netstat (**Network Statistic**) command displays interfaces, connection information, routing table information etc.

$netstat
Output :

Execute it with the following options and write the output:

netsta

t –t

netsta

t –s –t

netsta

t -i

5. ifconfig

ifconfig is used for displaying network interface information.

$/sbin/ifconfig
Output :

6. who

Displays information of all users who are logged in

$who
Output :

7. whoami

The whoami command writes the user name (i.e., login name) of the owner of the current login session to standard output.

$whoami
Output :

8. nmap

Network mapper tool to discover hosts and services on a computer network.

$ nmap <ip-address>
Output :

$ nmap <server-ip-address>
Output :

9. tcpdump

Tcpdump prints out a description of the contents of packets on a network interface that match the boolean expression; the description is preceded by a time stamp, printed, by default, as hours, minutes, seconds, and fractions of a second since midnight.

Sample output for ARP protocol:

arp who-has 128.3.254.6 tell 128.3.254.68
arp reply 128.3.254.6 is-at 02:07:01:00:01:c4

$ **tcpdump**
Output :

Signature of the instructor

Date

Assignment Evaluation

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Assignment 3 : Study of LAN environment (Group Assignments)

Find out information about the network in your lab and fill in details below:

1. Total Number of computers in your lab:
2. Find details of any 5 computers:

	MAC address	IP address	LAN speed	Default mask	hostname
1					
2					
3					
4					
5					

3. Are the IP addresses assigned to the machines statically or dynamically?
4. Does the network have a DHCP server?
5. If yes, what is the address of the server ?
6. How many servers are configured? :

   Details of servers :

	IP address	MAC address	Purpose
1			
2			
3			

7. Cables
   a. Type :
   b. Is it coaxial / twisted pair or fiber optic cable ?
   c. Cable bandwidth
   d. Maximum cable length limit
   e. Connector used
8. Switches:

No	Company Name	MAC address	No. of ports	Managed / Unmanaged	IP's of Machines connected to

					the switch
1					
2					
3					
4					
5					

9. Routers:

No	Company Name	No. / Types of ports	Port speed	IP address	
1					
2					
3					

10. Is there wi-fi capability in the LAN? If yes,
    i. What is the Wi-fi access point address?
    ii. How many devices / IP addresses does it support?
    iii. What is the bandwidth? if no?
        - What additional devices are needed?
        - Where will you connect them?
        - What will be its IP address?
11. Is there internet access in the lab?
    If not, what changes to the hardware / software must be made? If yes, what is the IP address of the router / gateway ?
12. Draw the Network Topology (show how machines and servers are connected using connectivity devices)
13. If 20 more machines must be added to the network, what changes must be made to the network?
14. If the network is to be divided into four subnetworks having 50 machines each, give a plan to do so. What additional devices will be needed? Give the IP address of each subnetwork and the address ranges for hosts in each subnetwork.

Signature of the instructor | | Date | |

Assignment Evaluation

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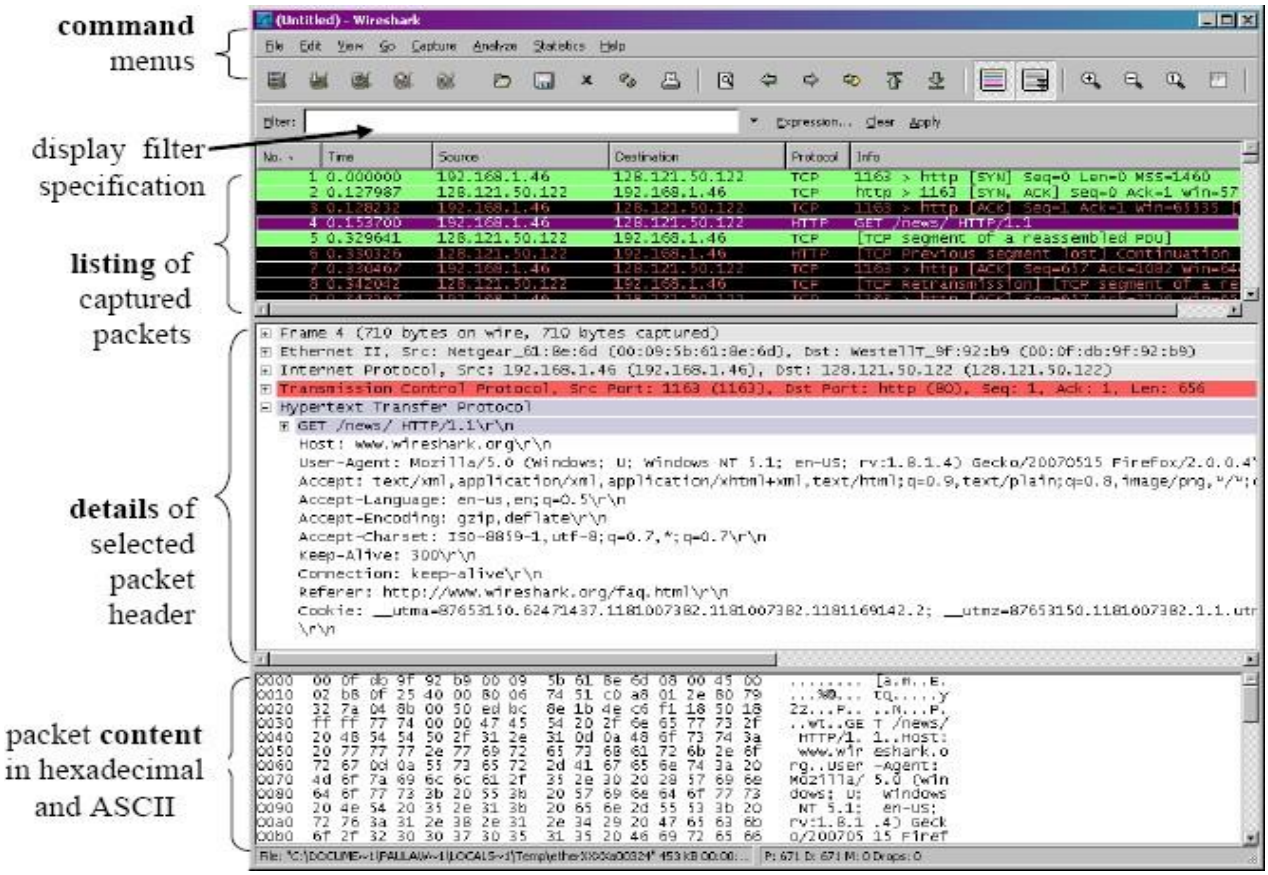
Assignment 4 : Use of Wireshark tool (Group Assignments)
Demonstrate the use of Wireshark tool for network analysis

Wireshark is a free and open source packet analyzer. It is also a protocol analyzer tool which captures network traffic and analyzes it. It is used for network troubleshooting, analysis, software and communications protocol development, and education. Originally named Ethereal, the project was renamed Wireshark in May 2006.

Purpose:

- Network administrators use it to **troubleshoot network problems**
- Network security engineers use it to **examine security problems**
- Developers use it to **debug protocol implementations**
- People use it to **learn network protocol** internals

The wireshark GUI is as shown :



1. Capture and view network traffic
2. Look at the packet headers of various protocols
3. View the detailed contents of the following packets in hexadecimal.
    i. Ethernet
    ii. IP
    iii. TCP
    iv. ARP

4. Write the contents of Ethernet frame header and list down the values of all fields in the header.

Header values in hexadecimal

i. What is the Source MAC address
ii. What is the destination MAC address
iii. Is the destination MAC address of the server?
iv. What is the value of CRC field?
v. What is the destination MAC address of the Ethernet frame containing an ARP request?

5. View protocol hierarchy statistics

6. Follow TCP stream

Signature of the instructor Date

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