CS -603: Network Programming

Introduction: 4 L

Day Time Client/Server, Concurrent Client/Server, Error Handling, Protocol Independence, Port Numbers.

[1], Chapter1-sections 1.1 - 1.5, Chapter2-sections 2.1 - 2.11]

Sockets: 9 L

Address structures, value – result arguments, Byte ordering and manipulation function and related functions, Elementary TCP sockets – Socket, connect, bind, listen, accept, fork and exec function, concurrent servers, Close and related function.

[1], Chapter3-sections 3.1 - 3.7, Chapter4-sections 4.1 - 4.10]

TCP Client Server 8 L

Introduction, TCP Echo server functions, Normal startup, terminate and signal handling server process termination, Crashing and Rebooting of server host shutdown of server host.

[1],Chapter5-sections 5.1 – 5.18]

I/O Multiplexing and socket options: 8 L

I/O Models, Select function, Batch input, shutdown function, Poll function, TCP Echo server, getsockopt and setsockopt functions. Socket states, Generic socket option, IPV6 socket option, ICMPV6 socket option, IPV6 socket option and TCP socket options.
[1], Chapter6-sections 6.1 - 6.8, Chapter7]

Elementary UDP sockets: 4 L

Introduction UDP Echo server function, lost datagram, summary of UDP example, Lack of flow control with UDP, determining outgoing interface with UDP.

[1], Chapter 8,-sections 8.1 – 8.9, 8.11]

Elementary name and Address conversions: 4 L

Domain Name System, gethostbyname function, RES_USE_INET6 Resolver option, gethostbyname2 function and IPv6 support, gethostbyaddr function, uname function, gethostname function, getservbyname and getservbyport functions.

[1], Chapter11-sections 11.2 – 11.5]

IPv4 and IPv6 interoperability: 4 L

IPv4 client,IPv6 server, IPv6 client, IPv4 server .

[1], Chapter 13-sections 13.1-13.3]

Network Management and Debugging: 7 L

Troubleshooting a Network, ping, traceroute, netstat, Packet Sniffers, Network Management Protocols, SNMP.

[2] Chapter 21]

Recommended Reading Material

Text Books

1. R. W. Stevens, B. Fenner, A. M. Rudoff, *Unix Network Programming: The Sockets Networking API*, 3rd edition, vol.1, PHI, 2010.
2. E. Nemeth, G. Snyder, T. R. Hein, B. Whaley, *UNIX and Linux System Administration Handbook 4th Edition,* Pearson Education 2011.

Reference Books

3. A.S. Tanenbaum; *Computer Networks*, 5th edition, Pearson, 2012.
4. B.A. Forouzan, *Data Communications and Networking*, 4th edition, Tata McGraw Hill, 2006.

LIST OF PRACTICALS PAPER NO CS-603: NETWORK PROGRAMMING

1. Implement TCP Echo client and TCP Echo server (Iterative).

2. Implement TCP Echo client and TCP Echo server (Concurrent).

3. Implement TCP daytime client and TCP daytime server (Iterative).

4. Implement TCP daytime client and TCP daytime server (concurrent).

5. Implement UDP Echo Client and UDP Echo Server.

6. Implement UDP daytime Client and UDP daytime server.

7. Implement TCP client and server (concurrent) where client gets input from the user and sends it to server. Server displays it on the screen. Server then gets another input from the user and sends it to client. Client displays it on the screen. The process continues till server or client sends "bye" to the other party.

8. Implement TCP client and server (concurrent) where client requests server to transfer a file. Assume file is smaller than 1K size. If the file is present on the server, it is sent to the client otherwise an error message is sent to client. Client copies the file on the hard disk and disconnects.

9. Implement UDP client and UDP server where server displays the IP address and port number of the client sending the datagram. Client sends a datagram (size 64 bytes) three times to the same server. Server sends the message back to client. Client reports the time elapsed in sending and receiving of the message. Use connected UDP sockets.

10. Write to program to
    i. display name of the host
    ii. all IP addresses of the host.
    iii. Check whether FTP and HTTP services are running on the system.
    iv. Display the name of the service running on port number specified by user.