UNIX NETWORK PROGRAMMING

(Common to CSE & IT)

Course Code :13CT1130

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Course Educational Objectives:

To teach the students how to write programs that communicates with other programs across a computer network.

- The student shall be able to write their own network programs in UNIX.
- To provide an opportunity to do network programming using TCP sockets.
- To provide an opportunity to do network programming using UDP sockets.
- To provide to do IPC programs.
- To know The importance of platform independent networks

Course Outcomes:

At the end of the course the student should be able to:

- Get familiar with the variety of interfaces and frameworks for writing network applications.
- Get the knowledge of Interfaces, STREAMS, sockets, and remote procedure call libraries.
- Know the basic steps and underlying mechanisms of writing programs using the client-server model.
- To get knowledge on I/O Multiplexing, UDP Sockets, Name and Address Conversions.
- Using UNIX socket system calls (socket, bind, listen, connect etc.). Writing a client. Using select to manage multiple I/O streams

UNIT-I (10 Lectures)

INTRODUCTION TO NETWORK PROGRAMMING:

OSI model, Unix standards, TCP and UDP, TCP connection establishment and termination, Buffer sizes and limitations, Standard Internet services, Protocol usage by common internet applications.

UNIT-II (14 Lectures)

SOCKETS:

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

UNIT-III (10 Lectures)

TCP CLIENT SERVER EXAMPLE:

Introduction, TCP Echo server and client functions, Normal startup and Termination, Signal handling, Server process termination, Crashing and Rebooting of server host, Shutdown of server host.

I/O MULTIPLEXING: I/O Models, select function, Batch input, shutdown function, poll function, TCP Echo server.

UNIT-IV (13 Lectures)

ELEMENTARY UDP SOCKETS:

Introduction, recvfrom and sendto functions, UDP Echo server and client functions, Lost datagrams, , Lack of flow control with UDP, determining outgoing interface with UDP, TCP and UDP echo server using select.

ELEMENTARY NAME AND ADDRESS CONVERSIONS:

DNS, gethostbyname function, Resolver option, gethostbyname2 function and IPV6 support, uname function, getserverbyname and getservbyport functions, other networking information.

UNIT-V (14 Lectures)

IPC:

Introduction, File and record locking, Pipes, FIFOs, streams and messages, Message queues, Semaphores, Shared memory.

REMOTE LOGIN:

Terminal line disciplines, Pseudo-Terminals, Terminal modes, Control Terminals, RPC Transparency Issues.

TEXT BOOKS:

1. W.Richard Stevens, UNIX Network Programming, Sockets API, Volume I, 3rd Edition, PHI , 2010.
2. W.Richard Stevens, UNIX Network Programming, Volume II, 1st Edition, PHI, 2009.

REFERENCES:

1. T Chan, *"UNIX Systems Programming using C++"*, 1st Edition, PHI, 2010.
2. Graham Glass, King abls, *"UNIX for Programmers and Users"*, 3rd Edition, Pearson Education, 2010.
3. M.J. Rochkind, *"Advanced UNIX Programming"*, 2nd Edition, Pearson Education, 2008