I Year M.Tech. CNIS I - Semester

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CS631 NETWORK PROGRAMMING

(Elective –I)

Objectives of the Course :

- *To state the major components and describe the architecture of the UNIX operating system*
- *To teach advanced C systems programming and debugging techniques in a Unix/Linux environment*
- *To review basic concepts covered in the core Operating Systems course prerequisite as they are realized in the Linux platform*
- *To organize and manipulate files and directories*
- *To use UNIX utilities to create simple tools for the information processing*

- *To introduce Network Programming covering TCP, and UDP connections*
- *To explain Socket programming to design client- server environment*
- *To explain inter process communication consisting of pipes, FIFOs, Semaphores and message Queues*

UNIT - I

Linux Utilities-File handling utilities, Security by file permissions, Process utilities, Disk utilities, Networking commands, Filters, Text processing utilities and Backup utilities, sed, awk. Basics of Perl - Scalars and their operations, assignment statements and simple I/O, control statements, arrays, hashes, references, functions, pattern matching, file I/O, example programs. Working with the Bourne again shell(bash): Introduction, shell responsibilities, pipes and input Redirection, output redirection, here documents, running a shell script, the shell as a programming language, shell meta characters, file name substitution, shell variables, command substitution, shell commands, the environment, quoting, test command, control structures, arithmetic in shell, shell script examples, interrupt processing, functions, debugging shell scripts.

UNIT - II

Linux Files- File Concept, File Structure, File System Layout, File types, kernel support for files, The standard I/O library (C), System calls, low level file access - usage of open, creat, read, write, close, lseek, stat family, umask, dup, dup2, fcntl.file and directory management - chmod, chown, links(soft links & hard links - unlink, link, symlink), mkdir, rmdir, chdir, getcwd, opendir, readdir, closedir,rewinddir, seekdir, telldir functions. Linux Process – Process concept, Kernel support for process, process attributes, process hierarchy, process creation, waiting for a process, process termination, Orphan process, zombie process, system call interface for process management-fork, vfork, exit, wait, waitpid, exec family, system. Linux Signals – Introduction to signals, Signal generation and handling, Kernel support for signals, Signal function, unreliable signals, reliable signals, kill, raise , alarm, pause, abort, sleep functions.

UNIT - III

Interprocess Communication - Introduction to IPC, IPC between processes on a single computer system, IPC between processes on different systems, Pipes, FIFOs, Introduction to three types of IPC(Linux)-Message queues, Semaphores and Shared memory.

Message Queues- Kernel support for messages, Linux APIs for messages, client/server example,Semaphores-Kernel support for semaphores, Linux APIs for semaphores,File locking with semaphores,Shared Memory- Kernel support for shared memory, Linux APIs for Shared memory, Semaphore and Shared memory example.

UNIT - IV

Network IPC (Part-I)-Introduction to Unix Sockets, Socket descriptors, Addressing-Byte Ordering, Address formats, Socket system calls for Connection oriented-Communication-socket, bind, listen, accept,, send, recv, Socket system calls for Connectionless-Communication-socket, connect, send to, recvfrom, Example-Client, / Server Programs., Out-of-Band Data..Network IPC (Part-II)-Windows Sockets, Socket Server functions, Socket Client
functions, Ex. A Socket-based client, A Socket-based server, Comparison of IPC methods.

UNIT - V

Advanced Socket System calls, Socket options-setsockopt, getsockopt, fcntl, ioctl system calls. Remote Procedure Calls-Introduction, RPC model, Transparency issues, Sun RPC-actual RPC implementation with the Sun RPC System, Transparency issues handling in Sun RPC.

TEXT BOOKS:

1. Unix system programming using C++, T.Chan, PHI / Pearson Education, rp-2008.
2. Unix Concepts and Applications, 4th Edition, *Sumitabha Das*, TMH,2006.
3. Unix Network Programming, *W.R.Stevens*,PHI/Pearson.
4. Windows system Programming, *J.M.Hart*, Pearson.

REFERENCE BOOKS:

1. Windows Sockets Network Programming, *Bob Quinn* and *D.Shute,* Addison-Wesley.
2. Beginning Linux Programming, 4th Edition, N.Matthew, R.Stones,Wrox, Wiley India Edition,rp-2008.
3. Linux System Programming, Robert Love, O'Reilly, SPD, rp-2007.
4. Internetworking with TCP/IP, Vol.III, Douglas Comer, PHI.
5. Unix for programmers and users, 3rd Edition, Graham Glass, King Ables, Pearson Education, 2003.
6. Advanced Programming in the Unix environment, 2nd Edition, *W.R.Stevens* & *S.A.Rago*, Pearson Education.
7. Learning Perl, *R.L. Schwartz, T.Phoenix*, *B.D. Foy*, O'Reilly, SPD.
8. Unix Programming*, Kumar Saurabh*, 1st Edition, Wiley India pvt Ltd.