PL106 UNIX Environment and Tools Lab

Prerequisites: Familiarity with using a computer.

Lab Contents:

Introduction to Unix Environment and Philosophy
The Unix OS, background, architecture and features, POSIX and Unix standards, using the documentation/manual, Logging in/out, users in Unix, special characters, running a few basic commands – who, date, cal, ps,t put, ls, passwd, etc, shell globbin characters, the role of the shell and shells' sequence of interpretation of a command; building block approach

Setting up a basic Unix/Linux system
Installation of LINUX and configuration for first time use.. Installing, upgrading and deleting packages using rpm or equivelent command.

The Umix File System, File and Directory management
Structure of Unix file system. Parent-child relationship. Directory handling and navigation. Absolute and relative pathnames Use of command: *mkdir, rmdir, pwd*, *ls* and *cd*. The PATH environment variable. Use of file management commands*: touch, cat, less, cp, mv* and *rm*. Viewing files using *pg*, *tail* and *head* commands. Concept of Home directory.

Concept of hard disk partitions, file system, Superblock and Inodes. General structure of Unix inode. Analyzing the output of ls -l command. File type and permission. Significance of directory permissions. Use of chmod command. Concept of ownership. Changing ownership. Use of chown and chgrp commands. Concept of symbolic links. Hard and soft links. Use of ln command to create hard and soft links. Modification and access times. Default file and directory permissions Use of umask command. Use of commands file, which.

Process Management

Concept of Unix process. Role of *init* in process creation and in spawning user shells. Process ID and exit status of a process. Displaying process attributes using *ps* command, Killing processes , foreground and background processes.. Job control commands, jobs, scheduling processes (cron).

Filters

Regular expressions, Command grep and tr.

Sed: sed command and sed scripts. Substitute, delete, insert, modify and append operations.

Awk: Selection criteria and action. Splitting a line into fields and using printf. Using regular expressions. Relational and Boolean operations. The BEGIN and END sections. Awk system variables. Using arrays with both numeric and nonnumeric subscript. Command line parameters and environment variables. String handling using built-in functions. Programming constructs: if, for, while. Getline function and reading input from files. Writing output to file and pipes.

System Administration

Adding, deleting and disabling user accounts. Changing passwords. Importance of /etc/passwd, /etc/shadow and /etc/group files. Manging user resource usage levels. Using ulimit. Shutting system down using shutdown, halt and reboot commands. File system maintenances : mounting and unmounting file systems. Creating and checking file systems using mkfs and fsck commands. Using commands du, df, tar and zip

Shell Programming

Shell scripts and execution methods. The dot command, Interactive and Non Interactive execution. Internal and external commands, Shell and environment variables. Use of export command, Aliases and command history. Built-in shell parameters. Command line arguments. Escaping and quoting. Difference between single and double quotes. The three standard files and redirection (>, < and >>). Connecting commands with pipes (|). Meta characters, pattern matching, Wild card characters, command substitution, brace and tilde expansion, Quoting, I/O using read and echo. 'test' command, arithmetic expressions, Control flow: For, If, While, Case. Setting positional parameters (set command), and shift, shell functions, Redirection and file descriptors. Variables substitution, quoting, flow control and loops, using the set and shift commands, parameters ,error handling, debugging.

Main Reading

1. Unix Concepts and Applications – Sumitaba Das Tata MacGraw Hill.
2. Unix and Shell Programming – Graham Glass and King Ables Pearson Education
3. C and Unix Programming – Kerningham and Pike
4. man pages