

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, tput, ls, passwd, etc, shell globbing 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 equivalent command.

The Unix 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. Managing 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