Suggested Teaching Guidelines for

Linux Operating System – PG-DHPCSA August 2024

Duration: 30 class room hours + 60 Lab hours

Objective: To introduce Linux environment and hands on Shell programming & Perl.

Prerequisites: Knowledge of Computer Fundamentals

Evaluation method: CCEE Theory exam– 40% weightage

Lab exam – 40% weightage

Internal exam – 20% weightage

List of Books / Other training material

Text Book:

Linux Pocket Guide: Essential Commands Daniel J. Barrett / O'Reilly

Reference:

1. Linux Administration: A Beginner's Guide 6th Edition by Wale Soyinka/TMH
2. Beginning Unix – Joe Marilino (Wrox Publication)
3. Linux Command Line and Shell Scripting Bible – Blum (Wiley – India)
4. Beginning Perl - Curtis "Ovid" Poe /Wiley

Note: Each session mentioned is for theory and of 2 hours duration. Lab assignments are indicatives, faculty need to assign more assignments for better practice.

Session 1:

Introduction to Operating System and it's Architecture

- Introduction to operating systems and terminologies
- Kernel Components and Non-kernel Components
- User-space vs Kernel-space
- H/W Interrupts/ handler

Session 2:

Process Management

- Process management
- Process Scheduling
- CPU Scheduling
- Preemptive vs Non-Preemptive
- Algorithm-FCFS, RR

Session 3:

Memory Management & File System Management

- Virtual Memory Techniques
- Page Replacement Algorithm
- Segmentation/ Paging
- File System Organization

- Physical File System Organization Techniques FAT/NTFS file system manager in the kernel

Session 4:
Introduction to Linux

- Introduction to Linux
- Brief history, Evolution, Variants, Installation options (Direct, Virtual machine, WSL on Windows)
- Getting Acquainted with the Linux Environment
- Use various commands in Linux system.
- (ls, cp, mv, lpr, sort, grep, cat, tac, more, head, tail, man, whatis, whereis, locate, find, diff, file, rm, mkdir, rmdir, cd, pwd, ln and ln –s, gzip and gunzip, zip and unzip, tar an its variants, zcat, cal, bc and bc –l, banner date, time, wc, touch, echo, who, finger, w, whoami, who am i, alias, unalias, touch, push, pop, jobs, ps, etc.)

Assignment – Lab: Getting acquainted with the Linux Environment Use various commands in Linux system.

Session 5 & 6:
Working with Linux

- Introduction to editors: vi and nano
- The Linux File System
- Disk Partition
- Working with Files and Directories
- File permissions and access control
- Process-related commands: Process concept - fork, kill
- Linux Boot process
- Startup files
- Installation of Linux operating system

Session 7:

- Controlling and managing Services
- Access control list and chmod command
- chown and commands
- Network Commands like telnet, ftp, ssh, and sftp, finger
- Overview of Log management

Assignment:

- Write a single command that creates a directory, creates 10000 files under it, gives all files 755 as permissions and the removes read permissions of others from all files.
- Set a permission in a way that a normal user create files with default permission 644 and directory with default permission 755.
- Write a command that displays permission of a file in numeric format

Session 8:

- System Configuration Files
- Network Configuration
- Network Monitoring and Troubleshooting (netstat/iproute2)
- Basic network/remote access: Setting IP addresses, ping, ssh

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Session 9 & 10:

- Introduction to BASH Command Line Interface (CLI)
- Shell variables and User-defined variables, Command-line arguments
- Expansions: Pathname, Tilda, Arithmetic, Brace, Parameter, Command substitution
- Relational and Logical operators, User input and output, Arithmetic, Bash calculator
- If, Nested if, case
- Loop : for, while, break, continue
- Variable & String

Assignment – Lab:

- Create a shell script that will return the following set of system information.
  1. Hostname and Logged-in users
  2. File system disk space usage
  3. Free and used memory
  4. System uptime and Load

- Write a shell script that adds an extension ".new" to all the files in a directory
- Write a shell script to perform addition or subtraction. Pass arguments while running the script.

Session 11 & 12:

- Search: grep and find
- Error Handling
- Debugging & Redirection of scripts
- Conditional Statement Regular Expressions

Session 13 & 14:

- Automate Task Using Bash Script
- Security patches

Session 15:

- Logging & Monitoring using script

Assignments:

- Hands on Linux Commands, Vim Editor
- Creating partitions in Linux OS.
- Practices on – sudo, chown and chmod
- Perform adding a user, Delete user, Modify user, Hidden Files
- Hands On Ps command, Top command, Kill command, Expect
- Creating scripts (shell & Perl) for various purpose (automation, monitoring, scheduling, etc.,)
- Case studies to enhance proficiency in Linux OS and administration.
- A sample program with error and exception handling written using the Coding standard
- Implementing all OOPS concept in the Perl program.
- Hands on Working with MySQL and Passing values using HTML form.