Duration: 28 Classroom hours + 22 Lab hours

Objective: To introduce Linux environment and hands on Linux commands.

Prerequisites: Knowledge of Computer Fundamentals

Evaluation method: Theory exam– 40% weightage
Lab exam – 40% weightage
Internal exam– 20% weightage

List of Books / Other training material

Reference:

1. Linux: The Complete Reference – Petersen/ TMH 6th Edition
2. The Linux Programming Interface: Linux and UNIX System Programming Handbook
3. Pro Bash Programming: Scripting the GNU/Linux Shell, Second Edition
4. Beginning Unix – Joe Marilino (Wrox Publication)
5. Linux Command Line and Shell Scripting Bible – Blum (Wiley – India)

Linux Programming
Session 1 & 2:

Lecture:

Linux History and Operation

- The Evolution of Linux
- The GNU Movement and the GPL
- Linux Operations as a Server
- The Architecture and Structure of Linux

Installing and Configuring Linux (Ubuntu and CentOS)

- Introduction to Installation and Media Types
- Performing a Custom Linux Server Installation
- Run Levels and the Startup/Shutdown Sequence
- Logging In and Out of a Linux System

Basic Commands

(ls, cp, mv, sort, grep, cat, head, tail, man, locate, find, diff, file, rm, mkdir, rmdir, cd, pwd, ln and ln -s, gzip and gunzip, zip and unzip, tar and its variants, touch, echo, who, whoami, ps, kill, makefile, etc.)

Assignment – Lab:

1. Getting Acquainted with the Linux Environment
2. Use various commands in the Linux system.
3. As root, create a directory dbda and under it create a directory named test and create 100 files under it with names file1, file2, ..., file100 - all this using a single command.

Session 3:

Lecture:

Gaining Confidence with Linux

- Access control list and chmod command, chown and chgrp commands
- Commands like telnet, ftp, ssh, and sftp
- Basics of I/O system with mount and unmount.

Vi/vim/gedit Editor

- Features and different modes of vi editor
- Editing using vi editor
- Find and replace commands
- Cut-copy-paste commands
- The set command
- Other related commands of vi

Assignment – Lab:

- Create the file /tmp/acl_file.
  1. Allow Larry and Curly to rwx the file.
  2. Don't allow Moe to access the file (rwx).
  3. All members of the group stooges (except Moe) should be able to access the file (rw).

Session 4, 5, & 6:

Lecture:

Linux Shell Programming

- Introduction to Shells
  a. shell
  b. Different types of Linux shells
  c. Bourne Again Shell (BASH)
  d. Shell variables (environment and user-defined)
  e. Shell files (.bashrc, .profile, .bash_profile, .bash_logout)
  f. Positional parameters
- Get started with simple scripts (User variable, expr, multiple commands)
- Wildcards (* and ?)
- Command line arguments
- Arithmetic in shell scripts
- read and echo commands in shell scripts
- The tput command
- Taking decisions:
  - if-then-fi
  - if-then-else-fi
  - The test command (file tests, string tests)
  - Nested if-else
  - The case control structure
- The loop control structure
  - The while, until, and for loop structures
  - The break and continue statements
- Shell metacharacters

- Command line expansion
- Directory stacks manipulation
- Job control, history, and processes
- Built-ins and functions
- Shell Files

Assignment – Lab:

- Change the shell of user3 to nologin. Now login as user4 and try to switch to user3. Observe the result.
- Login as root, create a file filewithacl and apply ACL on it in such a way that only user5 is able to read and write to it. Note: root will do all its work under the dbda folder.

Session 7:
Lecture:

Git / GitHub

- Introduction to Version Control Systems
- Creating GitHub repository
- Using Git – Introduction to Git commands.

Cloud Computing Reference Books:
Reference:

1. Cloud Computing Black Book by Kailash Jayaswal, Dreamtech
2. Mastering Cloud Computing by Rajkumar/ McGraw Hill Education
3. Cloud Computing a Practical Approach by Anthony T. Velte/ McGraw Hill Education
4. Architecting the Cloud: Design Decisions for Cloud Computing Service Models (SaaS, PaaS, and IaaS)
5. Cloud Computing
6. An Introduction to Parallel Computing: Design and Analysis of Algorithms (Authors: Vipin Kumar, Ananth Grama, Anshul Gupta, George Karypis)
7. High Performance Cluster Computing: Architectures & Systems (Volume-1) by Rajkumar Buyya, Pearson
8. Parallel Programming in C with MPI and Open MPI, Michael, TMH
9. High-Performance Computing on Complex Environments

Session 8:
Lecture:

- Introduction to Cloud
- paradigms
- Characteristics and benefits
- Understanding Cloud Vendors (AWS/Azure/GCP)
- Definition
- Characteristics
- Components

Lab Assignments:

- Study about cloud and other similar configurations.
- Explore available solutions.
- Cloud Architecture.

Session 9 & 10:
Lecture:

- Introduction to SaaS
- Pros and Cons of SaaS Model
- Traditional Packaged Software vs. SaaS
- SaaS Examples
- Introduction to IaaS
- Examples
- Introduction to Virtualization
- Types and Uses of Virtualization
- Virtual Machine Provisioning
- Virtual Machine Migration Services
- Private Cloud Computing Deployment
- Introduction to PaaS
- Challenges of Cloud Environment
- Hypervisor
- Comparisons of Web Services
- Organizational Scenarios of Clouds

Lab Assignments:

- Provide a solution on cloud as SaaS using available systems.

Session 11 & 12:
Lecture:

- Administering & Monitoring Cloud Services
- Benefits and limitations
- Deploy application over cloud.
- Comparison among SaaS, PaaS, IaaS
- Cloud Computing Basics
- Cloud Products and Solutions
- Cloud Pricing
- Compute Products and Services

Session 13 & 14:
Lecture:

- Elastic Cloud Compute
- Dashboard
- Launching Linux VM
- Accessing Linux VM

- Launching & Accessing Windows Server VM
- Introduction to AWS
- Introduction to Virtual Private Cloud (VPC) Setup
- Services provided by AWS: EC2, Lambda, AWS Storage Services S3
- Introduction to Azure
  - Azure Platform (Azure Portal, Azure CLI, Azure PowerShell)
  - Azure Data Services (Azure SQL Database, Cosmos DB)
  - Azure Storage (Blob Storage, File Storage, Queue Storage)
  - Azure Functions

Lab:

- Study about cloud and other similar configurations.
- Exposure to big data technologies on cloud.
- Create AWS EC2 instance.
- Create AWS Lambda.
- Create AWS Storage Services S3.
- Create AWS VPC.
- Deployment of application on AWS using GitHub.
- Deployment of application on Azure using GitHub.
- Deployment of application on Azure using Azure DevOps.
- Deploy AI and analytics workloads on cloud environments with a sample mini project.