

Suggested Teaching Guidelines for
Linux Programming and Cloud Computing
PG-DBDA September 2021

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:

Getting Acquainted with the Linux Environment
Use various commands in Linux system.

Session 3 & 4

Lecture:

Gaining confidence with Linux

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

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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

Session 5, 6, & 7

Lecture: Linux shell programming

- ° Introduction to Shells
 - a. What is 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 start with simple scripts (User variable, expr, multiple command)
- ° Wild cards (* 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-elses
 - The case control structure
- ° The loop control structure
 - a. The while, until and for loop structures
 - b. 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:

Review Exercises

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Cloud Computing

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 AnthonyT 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

Sessions 8:

Lecture

- Introduction to cloud
- What computing paradigms are there?
- Characteristics and benefits
- Understanding Cloud Vendors (AWS/Azure/GCP)
- Definition
- Characteristics
- Components

Lab Assignments:

- Study about cloud and other similar configuration
- 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
- Storage as Service(RAID)

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- 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.

Sessions 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

Lab Assignments:

- Study about cloud and other similar configuration
- Exposure to big data technologies on cloud