

Annexure A – Course I

Curriculum for all Departments under Faculty of Science and Technology

Linux Server and Database Management Systems
Course Objective <ul style="list-style-type: none">• To learn about the Linux operating system fundamentals• To learn process management and system management• To understand about the scheduling algorithms• To understand about the Database Management systems
Course Outcome <ul style="list-style-type: none">• Decide and apply scheduling strategies to solve given problem• Able to build linux kernel• Able to create databases using PL/SQL
UNIT I - INSTALLING LINUX AS A SERVER & LINUX ADMINISTRATION Linux Distributions –Open source software and GNU- Difference between Windows and Linux, Installing Linux in a server configuration. Managing users – User text files –User management tools, Command Line, Boot loaders, File Systems, Core System services, Compiling Linux kernel, Linux Firewall.
UNIT II- BUILDING LINUX KERNEL & PROCESS MANAGEMENT Obtaining the Kernel Source, The Kernel Source Tree, Building the Kernel—Configuring the Kernel, Minimizing Build Noise, Spawning Multiple Build Jobs, Spawning Multiple Build Jobs, Installing the new Kernel, GNU C, No memory protection, Synchronization and concurrency. The Process, Process Descriptor and the Task Structure, Process Creation, The Linux Implementation of Threads, Process Termination.
UNIT III- LINUX PROCESS SCHEDULING & SHELL PROGRAMMING Multitasking, Linux’s Process Scheduler, Policy, The Linux Scheduling Algorithm, The Linux Scheduling Implementation—Process Selection, Scheduler entry point, Sleeping and Waking up, Preemption and Context Switching, Real Time Scheduling Policy, Scheduler related System Calls. Linux process environment – parent child relationship – process variable- process monitoring – Invoking foreground and background process – terminating process - Daemons. Introduction to Shell programming – Shell scripts – executing shell scripts - creating scripts – simple examples
UNIT IV- LINUX SYSTEM CALLS Communicating with Kernel, API, POSIX and C library, Syscalls, System call Handler—Denoting the correct system calls, parameter passing, System call Implementation—verifying the parameters, System call context—Final steps in binding the system calls, accessing the system call from user space, why not to implement a system call.

UNIT V- DATABASE MANAGEMENT SYSTEMS

Introduction to Database Management Systems, Purpose of Database Systems, Database-System Applications, View of Data, Database Languages, Database System Structure, Data Models, Database Design and ER Model: Entity, Attributes, Relationships, Constraints, Keys, Design Process, Entity Relationship Model, ER Diagram, Design Issues, Extended E-R Features, converting E-R & EER diagram into tables.

UNIT VI- SQL AND PL/SQL

SQL: Characteristics and advantages, SQL Data Types and Literals, DDL, DML, DCL, TCL, SQL Operators, Tables: Creating, Modifying, Deleting, Views: Creating, Dropping, Updating using Views, Indexes, SQL DML Queries: SELECT Query and clauses, Set Operations, Predicates and Joins, Set membership, Tuple Variables, Set comparison, Ordering of Tuples, Aggregate Functions, Nested Queries, Database Modification using SQL Insert, Update and Delete Queries. PL/SQL: concept of Stored Procedures & Functions, Cursors, Triggers, Assertions, roles and privileges, Embedded SQL, Dynamic SQL.

TEXT BOOKS

1. Robert Love, "Linux Kernel Development", Addison-Wesley, ISBN-13:978-0-672-32946-3, 3rd Edition
2. Silberschatz A., Korth H., Sudarshan S., "Database System Concepts", McGraw Hill Publishers, ISBN 0-07-120413-X, 6th edition

REFERENCES

1. Silberschatz, Galvin, Gagne, "Operating System Principles", 9 Edition, Wiley, ISBN 978-1-118-06333-0
2. Dhamdhare D., "Systems Programming and Operating Systems", McGraw Hill, ISBN 0 -07 -463579 - 4
3. Stallings W., "Operating Systems", 6th Edition, Prentice Hall, ISBN-978-81-317-2528-3

Linux Server and Database Management Systems Lab

Pre-requisites: C Programming, operating system fundamentals, database management

Course Objectives

- To learn about the operating system fundamentals
- To learn about the database management concepts
- To learn about the cloud service configuration

Course Outcome

- Able to build linux kernel and perform diagnostics
- Able to implement and install database server
- Able to use AWS cloud services like EC2, S3 etc.

List of Experiments

- 1) How to build, configure and install custom Linux kernels in Ubuntu 16.04.
- 2) a) Write a C program that makes a copy of a file using system calls
b) Write a C program that creates child from parent process using fork () and counter counts till 5 in both processes and displays.
- 3) a) Write a C program that demonstrate round robin scheduling algorithm and calculates average waiting time and average turn around time.
b) Write a C program to implement priority based scheduling algorithm and calculate average waiting time and average turn around time.
- 4) a) Write a C program using Internet domain socket programming
b) Demonstrate setting up a simple web server and host website on your own Linux computer.
- 5) Demonstration of Installation of wordpress with LAMP (Linux, Apache, MySQL & PHP) server on ubuntu 16.04
- 6) Execute various Network Diagnostic Commands to manage and diagnose network issues from Linux CLI interface.
- 7) Implementing Data Definition Language (DDL) commands in ORACLE SQL Developer.
- 8) Implementing Data Manipulation Language (DML) and Data Control Language (DCL) in ORACLE SQL Developer.
- 9) a) Write trigger program for displaying grade of the student in Oracle SQL Developer and Oracle 11g Database.
b) Write procedure to insert number in table and function to write factorial of given number in Oracle SQL Developer and Oracle 11g Database.
- 10) Implement Embedded SQL program form bonus calculation and generating multiplication table in Oracle SQL Developer and Oracle 11g Database.
- 11) Implement a Linux Virtual Machine on AWS cloud with Amazon EC2 service and execute shell scripts.
- 12) Host a static website on AWS cloud using Amazon S2 and Amazon Route 53 service.

Annexure B – Course II

Linux & Cloud Skills
Pre-requisites: LINUX OS; Python Programming; Data Analytics Basics, Cloud Basics All sessions will be strictly using open-source non-proprietary technologies and tools.
Course Objective: <ul style="list-style-type: none">• To study configuration and installation of Linux Kernel.• To understand handling, processing and inferring useful information from large database and displaying results in form of meaningful charts.• To study the working of GSM, VoLTE related protocols
Course Outcomes: <ul style="list-style-type: none">• Ability to understand and implement Linux functions.• Ability to understand and relate Data which helps to generate finite predictions.• Ability to understand working of wireless communications that form the backbone of the cloud and related internet technologies.
List of Sessions: Section A: Linux based session <ol style="list-style-type: none">1. How to build, configure and install custom Linux kernels in GNU-Debian.2. Implementation of Wordpress with LAMP (Linux, Apache, MySQL & PHP) server on GNU-Debian.3. Develop a smart irrigation system which observes and displays soil moisture sensor value in real time over cloud via Data Visualization technique. This system must be intelligent enough to send alert messages whenever moisture content in soil exceeds permitted threshold so that irrigation process could be stopped.4. Read babynames database, which includes data of 2000 US Babies/year born in between 1880 to 2010 and find out the total birth happened by sex and year. Also fetch top 1000 male and female babies based on proportion of occurrence of name every year and also analyze and plot trending name year wise.5. Implement a Linux Virtual Machine instances on a cloud set up in the lab.6. Hosting a static website on the cloud set up in the lab. Section B: Suggested topics on Telecom <ol style="list-style-type: none">7. Current GSM network ecosystem - GSM network architecture / system architecture including the Base Station Subsystem, Network & Switching Subsystem, Operation and

Support Subsystem.

8. VoLTE- Voice over Long-Term Evolution - Utilising IMS technology, it is a digital packet voice service that is delivered over IP via an LTE access network. Explaining existing ecosystem by demonstrating aspects of protocols SIM and tower over traditional 2G/3G/4G LTE over VoLTE. Explaining concept of eSIMs and its future.
9. Carrier-Grade WiFi - wireless connectivity over short distances, WiFi is hard to beat. Theoretically, it's faster than the leading alternative, 4G LTE, and can handle bandwidth-hogging services like mobile video for a fraction of the cost. Telecom is striving towards to offering carrier grade wireless hotspots for faster and quicker connectivity.
10. Cloud Computing - Telecom sector is moving towards digital transformation, there is huge potential to use cloud computing to deliver higher quality, more flexible and more scalable enterprise IT services at lower cost than on-premise solutions. eg. replacing exploring cable and DVR services that live in cloud to eliminate need to outdated set-top-boxed (STBs). Demonstrate the working of cloud using OpenStack.