

Network and System Administration

Course Title: Network and System Administration

Course No: CSC472

Nature of the Course: Theory + Lab

Semester: VIII

Full Marks: 60 + 20 + 20

Pass Marks: 24 + 8 + 8

Credit Hrs: 3

Course Description:

The course covers different concepts of network and system administration including subjects ranging from initial installation of OS to day-to-day administrative tasks such as Network and Server Configurations, management of user accounts and disk space, and even imparting the trouble-shooting skills future system administrators will need to cope with unexpected behavior.

Course Objectives:

The main objective of this course is to provide knowledge of different concepts of network and system administration, configuration, and management.

Course Contents:

Unit 1: Networking Overview (4 Hrs.)

- 1.1 Overview of Reference Model (OSI, TCP/IP)
- 1.2 Overview of IPv4 and IPv6 addressing
- 1.3 Windows and Linux Networking Basics
- 1.4 Switching and Routing basics
- 1.5 Overview of SDN and OpenFlow

Unit 2: Server Administration Basics (8 Hrs.)

- 2.1 Open Source Server and Client Installation
- 2.2 Linux installation, disk partitioning, logical volume manager
- 2.3 Boot Process and Startup Services: Xinetd/Inetd
- 2.4 Managing accounts: users, groups and other privileges
- 2.5 File Systems and Quota Management
- 2.6 Job Scheduling with cron, crontab, anacron and system log analysis
- 2.7 Process controlling and management
- 2.8 Online Server upgrade/update process
- 2.9 Administering Database, web, and proxy server
- 2.10 Shell programming fundamentals

Unit 3: Network Configuration Basics (7 Hrs.)

- 3.1 Network Interface Configuration
- 3.2 Diagnosing Network startup issues
- 3.3 Linux and Windows Firewall configuration
- 3.4 Network troubleshooting commands
- 3.5 Introduction to network programming with Mininet
- 3.6 SDN controller and dataplane communication
- 3.7 Routing configuration in SDN
- 3.8 Open source networking monitoring (e.g. Nagios)

Unit 4: Dynamic Host Configuration Protocol (DHCP) (3 Hrs.)

- 4.1 DHCP Principle
- 4.2 DHCP Options, Scope, Reservation and Relaying
- 4.3 DHCP Troubleshooting

Unit 5: Name Server and Configuration (7 Hrs.)

- 5.1 DNS principles and Operations
- 5.2 Basic Name Server and Client Configuration
- 5.3 Caching Only name server
- 5.4 Primary and Slave Name Server
- 5.5 DNS Zone Transfers
- 5.6 DNS Dynamic Updates
- 5.7 DNS Delegation
- 5.8 DNS Server Security
- 5.9 Troubleshooting

Unit 6: Web and Proxy Server Configuration (7 Hrs.)

- 6.1 HTTP Server Configuration Basics
- 6.2 Virtual Hosting
- 6.3 HTTP Caching
- 6.4 Proxy Caching Server Configuration
- 6.5 Proxy ACL
- 6.6 Proxy-Authentication Mechanisms
- 6.7 Troubleshooting

Unit 7: FTP, File, and Print Server (4 Hrs.)

- 7.1 General Samba Configuration
- 7.2 CUPS configuration basics
- 7.3 FTP Principles
- 7.4 Anonymous FTP Server
- 7.5 Troubleshooting

Unit 8: Mail Server basics (5 Hrs.)

- 8.1 SMTP, POP and IMAP principles
- 8.2 SMTP Relaying Principles
- 8.3 Mail Domain Administration
- 8.4 Basic Mail Server Configuration (Sendmail, postfix, qmail, exim..)
- 8.5 SPAM control and Filtering
- 8.6 Troubleshooting

Laboratory work:

The laboratory work includes all the features mentioned in the course.

Samples:

1. Server/Client Installation over VMware Environment
2. Packet Analysis by using TCPDUMP and WIRESHARK

3. Network Practice with Packet Tracer
4. System Administration: User/Group management, File System Management
5. Network Configuration: Start/Stop network Service, network interface configuration
6. Firewall Configuration
7. DNS and DHCP Configuration and Troubleshooting
8. Web and Proxy Server Configuration and Troubleshooting
9. Basic Mail Server Configuration and Troubleshooting
10. SAMBA, NFS, CUPS and FTP configuration and Troubleshooting
11. SDN controller installation and client network implementation (OpenDaylight)
12. Network topology programming with Mininet and visualization

Recommended Books:

1. The Practice of System and Network Administration, Second Edition
Thomas A. Limoncelli, Christina J. Hogan, Strata R. Chalup
2. Advanced Linux Networking, Roderick W. Smith, Addison-Wesley Professional (Pearson Education), 2002.
3. Linux Network Administrator's Guide, Tony Bautts, Terry Dawson, Gregor N. Purdy, O'Reilly, Third Edition, 2005

Prerequisite: Computer Networking Course