

LFS211 - Linux Networking and Administration

Duration: 48 Hours (6 Days)

Overview

The LFS211 – Linux Networking and Administration certification is a professional credential that recognizes an individual's expertise in managing and operating networks on Linux systems. It covers foundational concepts such as configuring and securing TCP/IP networking, understanding Network routing, and Managing network services. Industries utilize this certification to ensure that IT professionals have the necessary skills to maintain robust and secure network infrastructures, essential for modern business operations. Certified individuals can implement High availability of services, automate network tasks, and troubleshoot network issues effectively, making them valuable assets in any organization that relies on Linux-based networking solutions.

Audience Profile

Intermediate to advanced IT professionals seeking Linux networking skills

System administrators aiming to enhance network management capabilities

Linux enthusiasts interested in professional certification preparation (e.g., LFCE)

IT staff responsible for maintaining Linux-based infrastructure

DevOps engineers focusing on Linux environment automation and configuration

Course Syllabus

Prerequisites:

Basic Linux Knowledge:

- Understanding of Linux file systems and basic commands.
- Familiarity with Linux shell and command-line operations.
- Experience with text editors like vim

Networking Fundamentals:

- Basic understanding of networking concepts such as IP addresses, subnets, and gateways.
- Familiarity with common networking tools and protocols (e.g., TCP/IP, DNS, HTTP).

System Administration:

- Experience with system administration tasks such as user management, file permissions, and service management.
- Basic knowledge of package management in Linux environments.

Prerequisite Courses or Equivalent Knowledge:

- Completion of introductory Linux courses or equivalent experience in Linux system administration.

Course Objectives:

Understanding Linux Networking Concepts:

- Gain a comprehensive understanding of Linux networking concepts, including IP configuration, subnetting, and advanced networking techniques.
- Review and apply fundamental networking concepts in a Linux environment.

Configuring and Managing Network Interfaces:

- Learn to configure static and dynamic IP addresses, manage routes, and handle network interface settings.
- Develop skills in network troubleshooting and monitoring using various tools.

Implementing Remote Access and Services:

- Configure secure remote access using SSH, and set up file transfers
- Implement and manage essential network services such as DNS, HTTP servers, and email servers.

Setting Up and Securing Network Services:

- Install and configure advanced network services including HTTP caching, file sharing, and database management.

Advanced Networking and Security:

- Explore advanced networking topics such as network bonding, and bridging.
- Understand and implement basic network security practices, including firewalls

Containerization and Package Management:

- Learn the basics of containerization with Docker and manage containers effectively.
- Master package management using RPM and YUM to install, update, and manage software packages.

Hands-On Experience:

- Gain practical experience through lab exercises that cover configuration, troubleshooting, and management of network services.
- Develop problem-solving skills and apply theoretical knowledge to real-world scenarios.

1. Introduction

Theory:

- Overview of Linux Networking.
- The role of networking in Linux systems.
- Overview of common networking tools in CentOS 9.

Lab:

- Objective: Get familiar with the CentOS 9 environment and basic network commands.
- Navigating the CentOS 9 command line.
- Using basic networking commands (ip, ifconfig, hostname, ping).
- Verifying network configurations.

2. Linux Networking Concepts and Review

Theory:

- Introduction to TCP/IP Networking.
- OSI Model Layers and their functions.
- Differences between IPv4 and IPv6.
- Subnetting, CIDR (Classless Inter-Domain Routing).

Lab:

- Objective: Understand and configure IP addressing, subnetting,
- Configuring network interfaces with static and dynamic IPs.
- Practicing subnetting exercises.

3. Network Configuration

Theory:

- Understanding static vs. dynamic IP configurations.
- Configuring network interfaces in CentOS 9.
- Managing routes and gateways.

Lab:

- Objective: Configure network interfaces, routing, and gateways.
- Configuring network interfaces using nmtui .

4. Network Troubleshooting and Monitoring

Theory:

- Common network issues and troubleshooting methods.
- Overview of network troubleshooting tools: ping, traceroute, netstat, ss, iftop, nmap.

Lab:

- Objective: Diagnose and resolve network issues using various tools.
- Troubleshooting connectivity issues with ping and traceroute.
- Analysing network connections and ports with netstat and ss.
- Monitoring real-time network traffic with iftop.
- Scanning networks with nmap to identify hosts and services.

5. Remote Access

Theory:

- Introduction to SSH and its importance in remote administration.
- Remote file transfer methods: SCP and SFTP.

Lab:

- Objective: Set up secure remote access and file transfer.
- Configuring SSH and setting up key-based authentication.
- Transferring files between systems using SCP and SFTP.

6. Domain Name Service (DNS)

Theory:

- DNS concepts: forward and reverse lookups, DNS records, and zones.
- Installing and configuring BIND DNS server.
- DNS query tools: dig, nslookup.

Lab:

- Objective: Configure and test a DNS server.
- Installing BIND on CentOS 9.
- Configuring DNS zones and creating DNS records.
- Testing DNS resolution using dig and nslookup.

7. HTTP Servers (4 hours)

Theory:

- Basics of HTTP protocols.
- Installing and configuring Apache HTTP Server.
- Hosting and serving websites using Apache.

Lab:

- Objective: Set up and configure Apache to host websites.
- Installing Apache on CentOS 9.
- Configuring virtual hosts to serve multiple websites.

8. Email Servers (3 hours)

Theory:

- Basics of email protocols: SMTP, IMAP, POP3.
- Installing and configuring Postfix for SMTP.
- Setting up Dovecot for IMAP/POP3.

Lab:

- Objective: Configure a basic email server using Postfix and Dovecot.
- Installing Postfix and configuring it for outgoing mail.
- Setting up Dovecot for email retrieval using IMAP/POP3.
- Testing email sending and receiving with command-line tools.

9. File Sharing

Theory:

- Configuring NFS for Unix/Linux environments.
- Setting up Samba for cross-platform file sharing.
- Managing file sharing permissions and security.

Lab:

- Objective: Implement file sharing using NFS and Samba.
- Setting up an NFS server and configuring NFS clients.
- Configuring Samba for file sharing between Linux and Windows.
- Managing file sharing permissions and testing access.

10. Advanced Networking

Theory:

- Advanced networking concepts: VLANs, bonding, and bridging.
- Network bonding for high availability.
- Tuning network performance in Linux

11. HTTP Caching

Theory:

- Introduction to caching concepts and benefits.
- Configuring Squid as a forward proxy.
- Implementing HTTP caching with Varnish.

12. Network File Systems (NFS)

Theory:

- NFS concepts and architecture.
- Configuring NFS on CentOS 9.
- Mounting and accessing NFS shares.

Lab:

- Objective: Configure NFS for file sharing across the network.
- Setting up an NFS server and creating shared directories.
- Configuring NFS clients to access shared resources.
- Managing permissions and securing NFS shares.

14. Introduction to Network Security

Theory:

- Overview of network security concepts: firewalls
- Best practices for securing Linux networks.

Lab:

- Objective: Implement basic network security measures.
- Configuring firewall rules using firewalld.
- Setting up SELinux to enforce security policies.

13. Firewalls - Iptables

Theory:

- Introduction to Iptables.
- Creating and managing firewall rules with Iptables.

Lab:

- Objective: Configure Iptables for network security.
- Setting up basic Iptables rules

14.Docker Basics

Theory:

- Introduction to containerization and Docker.
- Installing and configuring Docker on CentOS 9.
- Basic Docker networking concepts.

Lab: we will take any cloud like {aws/gcp/digital ocean etc}

- Objective: Set up and manage Docker containers.
- Installing Docker and configuring the environment.
- Creating and managing Docker containers.

15.Database - MariaDB Basics (3 hours)

Theory:

- Introduction to MariaDB.
- Installation and configuration of MariaDB.
- Basic database operations: creating databases, tables, and users.

Lab:

- Objective: Set up and manage a MariaDB database server.
- Installing MariaDB.
- Creating databases

16.System Log Basics

Theory:

- Overview of system logging in Linux.
- Log management and analysis.
- Configuring and managing rsyslog.

Lab:

- Objective: Manage and analyse system logs.
- Configuring rsyslog for centralized logging.
- Analysing logs for troubleshooting and security purposes.

17.Package Management - rpm and yum

Theory:

- Introduction to RPM package management.
- Using yum for package installation, updates, and removals.
- Managing repositories and system updates.

Lab:

- Objective: Manage packages and repositories on CentOS 9.
- Installing, updating, and removing packages using rpm and yum.
- Configuring and managing software repositories using yum(local).