Champion on Linux in 40hrs:

OS: CentOS 9

Course Duration: 40 Hours

Prerequisites

- Basic understanding of computer hardware and software
- Familiarity with the command line interface (CLI)
- Basic knowledge of operating systems concepts
- Access to a computer with virtualization software (e.g., VirtualBox or VMware) installed

Module 1: Introduction to CentOS 9 (2 Hours)

- **Lecture:**
    - Overview of Linux and CentOS
    - Differences between CentOS 9 and previous versions
    - Installation of CentOS 9
    - Understanding the CentOS 9 filesystem hierarchy
- **Lab:**
    - Installing CentOS 9 on a virtual machine
    - Navigating the filesystem using basic commands (`ls`, `cd`, `pwd`, `cp`, `mv`, `rm`)

Module 2: Basic Command Line Usage (3 Hours)

- **Lecture:**
    - Understanding the shell
    - Basic commands and utilities
    - Using text editors (vi, nano)
    - File and directory permissions
- **Lab:**
    - Practicing basic commands
    - Using `vi` and `nano` to edit files
    - Changing file permissions with `chmod`, `chown`, and `chgrp`

Module 3: User and Group Management (3 Hours)

- **Lecture:**
    - User account management
    - Group management
    - Password policies and management
- **Lab:**
    - Creating and deleting users and groups
    - Modifying user and group information
    - Implementing password policies

Module 4: Package Management (3 Hours)

- **Lecture:**
    - Introduction to package management
    - Using `dnf` for package management
    - Repositories and managing them
- **Lab:**
    - Installing, updating, and removing packages
    - Adding and removing repositories
    - Troubleshooting package dependencies

Module 5: System Configuration and Management (4 Hours)

- **Lecture:**
    - Managing system services
    - Configuring network settings
    - Understanding and configuring SELinux
    - Using `firewalld` for firewall management
- **Lab:**
    - Starting, stopping, and enabling services
    - Configuring network interfaces
    - Managing SELinux contexts and policies
    - Configuring firewall rules with `firewalld`

Module 6: Storage Management (4 Hours)

- **Lecture:**
    - Disk partitioning and file systems
    - Managing Logical Volume Manager (LVM)
    - Mounting and unmounting file systems
- **Lab:**
    - Creating and managing partitions
    - Setting up and managing LVM
    - Mounting and unmounting file systems

Module 7: Shell Scripting and Automation (4 Hours)

- **Lecture:**
    - Introduction to shell scripting
    - Basic scripting concepts and syntax
    - Automating tasks with scripts
- **Lab:**
    - Writing and executing basic shell scripts
    - Automating system tasks using cron jobs and `at`

Module 8: System Monitoring and Performance Tuning (4 Hours)

- **Lecture:**
  - Monitoring system performance
  - Using `top`, `htop`, `iotop`, and other monitoring tools
  - Basic performance tuning techniques
- **Lab:**
  - Monitoring system resources in real-time
  - Analyzing system logs
  - Applying performance tuning techniques

Module 9: Security and Hardening (4 Hours)

- **Lecture:**
  - Security best practices
  - Configuring and using `sudo`
  - Understanding and using `auditd` for auditing
- **Lab:**
  - Configuring `sudo` access
  - Implementing security policies
  - Setting up and using `auditd`

Module 10: Advanced Networking (4 Hours)

- **Lecture:**
  - Advanced network configuration
  - Setting up network services (DNS, DHCP, NTP)
  - Network troubleshooting
- **Lab:**
  - Configuring and managing advanced network settings
  - Setting up and managing DNS, DHCP, and NTP services
  - Troubleshooting network issues

Module 11: Backup and Recovery (3 Hours)

- **Lecture:**
  - Backup strategies and best practices
  - Using `tar`, `rsync`, and other backup tools
  - Disaster recovery planning
- **Lab:**
  - Performing backups with `tar` and `rsync`
  - Restoring from backups
  - Creating a disaster recovery plan

Module 12: Virtualization (3 Hours)

- **Lecture:**
  - Introduction to virtualization (KVM, QEMU)
- **Lab:**
  - Setting up and managing virtual machines using KVM/QEMU

Module 13: Troubleshooting and Maintenance (2 Hours)

- **Lecture:**
  - Common troubleshooting techniques
  - Maintaining system health and performance
  - Using logs for troubleshooting
- **Lab:**
  - Identifying and resolving common issues
  - Regular system maintenance tasks
  - Analyzing and resolving issues using logs

Final Project and Assessment (3 Hours)

Project Duration: 3 Hours

Project Overview

This mini project will cover several essential aspects of CentOS 9 system administration, excluding the Docker module. You will install and configure CentOS 9, manage users and groups, handle basic network and firewall configurations, and perform a simple backup and recovery task.

Project Tasks

Task 1: System Installation and Basic Configuration

Objective:

- Install CentOS 9 on a virtual machine.
- Create a user with administrative privileges and configure network settings.

Task 2: User and Group Management

Objective:

- Manage users and groups effectively.

Task 3: System Services and Network Configuration

Objective:

- Configure and manage system services and network settings.

Task 4: Storage Management

Objective:

- Manage disk partitions and file systems.

Task 5: Backup and Recovery

Objective:

- Implement a simple backup strategy.

Final Project Submission

- **Deliverables:**
    - Detailed documentation of each task, including commands used and configurations made.
    - A final report summarizing the project's objectives, processes, and outcomes.

Assessment Criteria

- **Accuracy and completeness of tasks:** Ensure all tasks are completed as described.
- **Quality of documentation:** Clear and detailed documentation of each step taken.
- **Efficiency and best practices:** Use of efficient and best practice methods for system administration tasks.

This mini project will provide hands-on experience in essential CentOS 9 system administration tasks, reinforcing the knowledge and skills gained during the course.