



# Linux System Administration

Course LFS307      Four Days      Instructor-led Hands-on

## Introduction

Linux dominates web servers, the cloud & smartphones. Ensure your long-term career prospects by learning high-demand Linux skills including how to administer, configure & upgrade Linux systems & the tools & concepts you need to build & manage an enterprise Linux infrastructure.

In this live, instructor-led course you will learn with a cohort of fellow IT professionals while gaining key knowledge & skills related to the Linux Foundation Certified System Administration (LFCS) exam.

## At Course Completion

Upon successful completion of this course, students will gain the following skills and knowledge as you deploy, test, secure, manage, optimize, and troubleshoot a cloud solution.

- Preliminaries
- How to Work in OSS Projects
- Compilers
- Libraries
- Make
- Source Control
- Debugging and Core Dumps
- Debugging Tools
- System Calls
- Files and Filesystems in Linux
- File I/O
- Advanced File Operations
- Processes I
- Processes II
- Pipes and Fifos
- Asynchronous I/O
- Signals I
- Signals II
- POSIX Threads I
- POSIX Threads II
- Networking and Sockets
- Sockets Addresses and Hosts
- Sockets Ports and Protocols
- Sockets Clients

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- Sockets Servers
- Sockets Input/Output Operations
- Sockets Options
- Netlink Sockets
- Sockets Multiplexing and Concurrent Servers
- Inter Process Communication
- Shared Memory
- Semaphores
- Message Queues

## **Prerequisites**

This course is designed to provide students with the necessary skills and abilities to work as a professional Linux system administrator. Students should have basic knowledge of Linux and its most common utilities and text editors.

## **Student Materials**

The student kit includes the following:

- Comprehensive digital workbook

## **Course Outline**

### **Module 1: Introduction**

- The Linux Foundation
- The Linux Foundation Training
- The Linux Foundation Certifications
- The Linux Foundation Digital Badges
- Laboratory Exercises, Solutions and Resources
- Things Change in Linux and Open Source Projects
- E-Learning Course: LF207
- Distribution Details
- Labs

### **Module 2: Linux Filesystem Tree Layout**

- One Big Filesystem
- Data Distinctions
- FHS Linux Standard Directory Tree
- root (/) directory
- /bin
- /boot
- /dev
- /etc

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- /home
- /lib and /lib64
- /media
- /mnt
- /opt
- /proc
- /sys
- /root
- /sbin
- /srv
- /tmp
- /usr
- /var
- /run
- Labs

### **Module 3: User Environment**

- Environment Variables
- Command History
- Command Aliases
- Labs

### **Module 4: User Account Management**

- User Accounts
- Shell Startup Files
- Management of User Accounts
- Locked Accounts
- Passwords
- /etc/shadow
- Password Management
- Password Aging
- The root Account
- SSH
- Labs

### **Module 5: Group Management**

- Groups
- Group Membership
- Group Management
- User Private Groups
- Labs

## **Module 6: File Permissions and Ownership**

- File Permissions and Ownership
- File Access Rights
- chmod, chown and chgrp
- umask
- Filesystem ACLs
- Labs

## **Module 7: Package Management Systems**

- Why Use Packages?
- Software Packaging Concepts
- Package Types
- Available Package Management Systems
- Packaging Tool Levels and Varieties
- Package Sources
- Creating Software Packages
- Revision Control Systems
- Available Source Control Systems
- The Linux Kernel and git
- Labs

## **Module 8: dpkg**

- DPKG (Debian Package)
- Package File Names and Source
- DPKG Queries
- Installing/Upgrading/Uninstalling
- Labs

## **Module 9: APT**

- APT
- APT Utilities
- Queries
- Installing/Removing/Upgrading Packages
- Cleaning Up
- Labs

## **Module 10: RPM**

- RPM (Red Hat Package Manager)
- Package File Names
- RPM Database and Helper Programs
- Queries
- Verifying Packages

- Installing and Removing Packages
- Updating, Upgrading and Freshening RPM Packages
- Upgrading the Linux Kernel
- rpm2archive and rpm2cpio
- Labs

## **Module 11: dnf and yum**

- dnf
- yum
- Queries
- Installing/Removing/Upgrading Packages
- Additional dnf Commands
- Labs

## **Module 12: zypper**

- zypper
- Queries
- Installing/Removing/Upgrading Packages
- Additional zypper Commands
- Labs

## **Module 13: GIT Fundamentals**

- Revision Control
- Basic Commands
- Try some git commands
- Get Software with Git
- Labs

## **Module 14: Processes**

- Programs and Processes
- Process Limits
- Creating Processes
- Process Control
- Starting Processes in the Future
- Process States
- Execution Modes
- Daemons
- niceness
- Labs

## **Module 15: Process Monitoring**

- Process Monitoring

- Troubleshooting
- ps
- pstree
- top
- Labs

## **Module 16: Memory Monitoring, Usage and Configuring Swap**

- Memory Monitoring and Tuning
- /proc/sys/vm
- vmstat
- Swap
- Out of Memory Killer (OOM)
- Labs

## **Module 17: I/O Monitoring**

- I/O Monitoring
- iostat
- iotop
- Labs

## **Module 18: Containers Overview**

- Containers
- Containers vs Virtual Machines
- Docker
- Cowsay Example
- Reproducible Builds
- Labs

## **Module 19: Linux Filesystems and the VFS**

- Filesystem Basics
- Filesystem Concepts
- Virtual Filesystem (VFS)
- Available Filesystems
- Journalling Filesystems
- Special Filesystems
- Labs

## **Module 20: Disk Partitioning**

- Common Disk Types
- Disk Geometry
- Partitioning
- Partition Tables

- Naming Disk Devices
- blkid and lsblk
- Sizing up partitions
- Backing Up and Restoring Partition Tables
- Partition table editors
- fdisk
- Labs

## **Module 21: Filesystem Features: Attributes, Creating, Checking, Usage, Mounting**

- Extended Attributes
- Creating and formatting filesystems
- Troubleshooting Filesystems
- Checking and Repairing Filesystems
- Filesystem Usage
- Disk Usage
- Mounting filesystems
- NFS
- Mounting at Boot and /etc/fstab
- automount
- Network Block Devices
- Labs

## **Module 22: The Ext4 Filesystems**

- ext4 Features
- ext4 Layout and Superblock and Block Groups
- dumpe2fs
- tune2fs
- Labs

## **Module 23: Logical Volume Management (LVM)**

- Logical Volume Management (LVM)
- Volumes and Volume Groups
- Working with Logical Volumes
- Resizing Logical Volumes
- LVM Snapshots
- Labs

## **Module 24: Kernel Services and Configuration**

- Kernel Overview
- Kernel Boot Parameters
- Kernel Command Line



- Boot Process Failures
- sysctl
- Labs

## **Module 25: Kernel Modules**

- Kernel Modules
- Module Utilities
- modinfo
- Module Configuration
- Labs

## **Module 26: Devices and udev**

- udev and Device Management
- Device Nodes
- Rules
- Labs

## **Module 27: Network Addresses**

- IP Addresses
- IPv4 Address Types
- IPv6 Address Types
- IP Address Classes
- Netmasks
- Hostnames
- NTP
- Labs

## **Module 28: Network Devices and Configuration**

- Network Devices
- Predictable Network Interface Device Names
- Network Configuration Files
- Network Manager
- Routing
- Virtual Network Interfaces
- DNS and Name Resolution
- Network Troubleshooting
- Network Diagnostics
- Labs

## **Module 29: LDAP**

- LDAP Authentication
- Labs

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## **Module 30: Firewalls**

- Firewalls
- Interfaces
- firewalld
- Zones
- Source Management
- Service and Port Management
- Port Redirection
- Labs

## **Module 31: System Init: systemd history and customization**

- The init Process
- Startup Alternatives
- systemd
- systemctl
- Labs

## **Module 32: Backup and Recovery Methods**

- Backup Basics
- Backup vs Archive
- Backup Methods and Strategies
- tar
- Compression: gzip, bzip2 and xz and Backups
- dd
- rsync
- Backup Programs
- Labs

## **Module 33: Linux Security Modules**

- Linux Security Modules
- SELinux
- AppArmor
- Labs

## **Module 34: System Rescue**

- Rescue Media and Troubleshooting
- Using Rescue/Recovery Media
- System Rescue and Recovery
- Emergency Boot Media
- Using Rescue Media
- Emergency Mode
- Single User Mode