

**Enterprise Linux System Administration**

**Course Number:** LNX-116
**Duration:** 5 days

**Overview**

This Enterprise Linux System Administration training class explores the installation, configuration, and maintenance of Linux systems. Attendees deep-dive into the issues universal to every workstation and server.

NOTE: This class can be taught using the Linux distribution of your choice.

**Prerequisites**

Students should already be comfortable working in a Linux or Unix environment. Fundamentals such as the Linux filesystem, process management, and how to edit files will not be covered in class. An understanding of network concepts and the TCP/IP protocol, as taught in our [Linux Fundamentals](file:////training/linux-fundamentals) course, is helpful.

**Materials**

All Linux training attendees receive comprehensive courseware.

**Software Needed on Each Student PC**

Attendees will not need to install any software on their computer for this class. The class will be conducted in a remote environment that Accelebrate will provide; students will only need a local computer with a web browser and a stable Internet connection. Any recent version of Microsoft Edge, Mozilla Firefox, or Google Chrome will be fine.

**Objectives**

All attendees learn:

* Installation and configuration
* The boot process
* User and group administration
* Filesystem administration, including quotas, FACLs, RAID and LVM
* Task automation
* Client networking
* SELinux
* Software management
* Log files
* Troubleshooting

**Outline**

* Introduction
* Linux Kernel & Devices
	+ Hardware Discovery Tools
	+ Configuring New Hardware with hwinfo
	+ Kernel Hardware Info – /sys/
	+ /sys/ Structure
	+ udev
	+ Managing Linux Device Files
	+ List Block Devices
	+ SCSI Devices
	+ USB Devices
	+ USB Architecture
	+ Kernel Modules
	+ Configuring Kernel Components and Modules
	+ Handling Module Dependencies
	+ Configuring the Kernel via /proc/
	+ Console
	+ Virtual Terminals
	+ Keyboard & locale configuration
	+ Serial Ports
	+ Random Numbers and /dev/random
* Systemd Overview
	+ System Boot Method Overview
	+ Systemd System and Service Manager
	+ Modifying systemd services
	+ Systemd Service Sandboxing Features
	+ Systemd Targets
	+ Using systemd
	+ Linux Runlevels Aliases
	+ Legacy Support for SysV init
* GRUB2/Systemd Boot Process
	+ Booting Linux on PCs
	+ GRUB 2
	+ GRUB 2 Configuration
	+ GRUB 2 Security
	+ Boot Parameters
	+ Initial RAM Filesystem
	+ Init
	+ Systemd local-fs.target and sysinit.target
	+ Systemd basic.target and multi-user.target
	+ Legacy local bootup script support
	+ System Configuration Files
	+ RHEL7 Configuration Utilities
	+ SLES12 Configuration Utilities
	+ Shutdown and Reboot
* Software Maintenance
	+ Managing Software
	+ RPM Features
	+ RPM Architecture
	+ RPM Package Files
	+ Working With RPMs
	+ Querying and Verifying with RPM
	+ Updating the Kernel RPM
	+ Dealing With RPM & Yum Digest Changes
	+ Yum Plugins & RHN Subscription Manager
	+ YUM Repositories
	+ YUM Repository Groups
	+ Compiling/Installing from Source
	+ Manually Installed Shared Libraries
	+ Rebuilding Source RPM Packages
* Local Storage Administration
	+ Partitioning Disks with fdisk & gdisk
	+ Resizing a GPT Partition with gdisk
	+ Partitioning Disks with parted
	+ Non-Interactive Disk Partitioning with sfdisk
	+ Filesystem Creation
	+ Persistent Block Devices
	+ Mounting Filesystems
	+ Resizing Filesystems
	+ Filesystem Maintenance
	+ Managing an XFS Filesystem
	+ Swap
	+ Filesystem Structures
	+ Determining Disk Usage With df and du
	+ Configuring Disk Quotas
	+ Setting Quotas
	+ Viewing and Monitoring Quotas
	+ Filesystem Attributes
* LVM & RAID
	+ Logical Volume Management
	+ Implementing LVM
	+ Creating Logical Volumes
	+ Activating LVM VGs
	+ Exporting and Importing a VG
	+ Examining LVM Components
	+ Changing LVM Components
	+ Advanced LVM Overview
	+ Advanced LVM: Components & Object Tags
	+ Advanced LVM: Automated Storage Tiering
	+ Advanced LVM: Thin Provisioning
	+ Advanced LVM: Striping & Mirroring
	+ Advanced LVM: RAID Volumes
	+ SLES Graphical Disk Tool
	+ RAID Concepts
	+ Array Creation with mdadm
	+ Software RAID Monitoring
	+ Software RAID Control and Display
* Remote Storage Administration
	+ Remote Storage Overview
	+ Remote Filesystem Protocols
	+ Remote Block Device Protocols
	+ File Sharing via NFS
	+ NFSv4+
	+ NFS Clients
	+ NFS Server Configuration
	+ YaST NFS Server Administration
	+ Implementing NFSv4
	+ AutoFS
	+ AutoFS Configuration
	+ Accessing Windows/Samba Shares from Linux
	+ SAN Multipathing
	+ Multipath Configuration
	+ Multipathing Best Practices
	+ iSCSI Architecture
	+ Open-iSCSI Initiator Implementation
	+ iSCSI Initiator Discovery
	+ iSCSI Initiator Node Administration
	+ Mounting iSCSI Targets at Boot
	+ iSCSI Multipathing Considerations
* User/Group Administration
	+ Approaches to Storing User Accounts
	+ User and Group Concepts
	+ User Administration
	+ Modifying Accounts
	+ Group Administration
	+ Password Aging
	+ Default User Files
	+ Controlling Login Sessions
	+ RHEL DS Client Configuration
	+ SLES DS Client Configuration
	+ System Security Services Daemon (SSSD)
* Pluggable Authentication Modules (PAM)
	+ PAM Overview
	+ PAM Module Types
	+ PAM Order of Processing
	+ PAM Control Statements
	+ PAM Modules
	+ pam\_unix
	+ pam\_nologin.so
	+ pam\_limits.so
	+ pam\_wheel.so
	+ pam\_xauth.so
* Security Administration
	+ Security Concepts
	+ Tightening Default Security
	+ SuSE Security Checker
	+ Security Advisories
	+ Fine Grained Authorizations with Polkit
	+ File Access Control Lists
	+ Manipulating FACLs
	+ Viewing FACLs
	+ Backing Up FACLs
	+ File Creation Permissions with umask
	+ User Private Group Scheme
	+ Alternatives to UPG
	+ AppArmor
	+ SELinux Security Framework
	+ SELinux Modes
	+ SELinux Commands
	+ Choosing an SELinux Policy
	+ SELinux Booleans
	+ Permissive Domains
	+ SELinux Policy Tools
	+ SUSE Basic Firewall Configuration
	+ FirewallD
* Basic Networking
	+ IPv4 Fundamentals
	+ TCP/UDP Fundamentals
	+ Linux Network Interfaces
	+ Ethernet Hardware Tools
	+ Network Configuration with ip Command
	+ Configuring Routing Tables
	+ IP to MAC Address Mapping with ARP
	+ Starting and Stopping Interfaces
	+ NetworkManager
	+ DNS Clients
	+ DHCP Clients
	+ SUSE YaST Network Configuration Tool
	+ Network Diagnostics
	+ Information from ss and netstat
	+ Hardware and System Clock
	+ Managing Network-Wide Time
	+ Continual Time Sync with NTP
	+ Configuring NTP Clients
	+ Useful NTP Commands
* Advanced Networking
	+ Multiple IP Addresses
	+ Configuring a DHCP server
	+ IPv6
	+ Interface Aggregation
	+ Interface Bonding
	+ Network Teaming
	+ Interface Bridging
	+ 802.1q VLANS
	+ Tuning Kernel Network Settings
* Log File Administration
	+ System Logging
	+ systemd Journal
	+ systemd Journal's journalctl
	+ Secure Logging with Journal's Log Sealing
	+ gnome-system-log
	+ Rsyslog
	+ /etc/rsyslog.conf
	+ Log Management
	+ Log Anomaly Detector
	+ Sending logs from the shell
* Monitoring & Troubleshooting
	+ System Status – Memory
	+ System Status – I/O
	+ System Status – CPU
	+ Performance Trending with sar
	+ Determining Service to Process Mapping
	+ Real-time Monitoring of Resources — Cgroups
	+ Troubleshooting Basics: The Process
	+ Troubleshooting Basics: The Tools
	+ strace and ltrace
	+ Common Problems
	+ Troubleshooting Incorrect File Permissions
	+ Inability to Boot
	+ Typos in Configuration Files
	+ Corrupt Filesystems
	+ RHEL7 Rescue Environment
	+ SUSE Rescue Environment
* Pre-Installation Considerations
	+ Pre-Installation Considerations
	+ Hardware Compatibility
	+ Multi-OS Booting
	+ Partition Considerations
	+ Filesystem Planning
	+ Selecting a Filesystem
* Installing RHEL7
	+ Anaconda: An Overview
	+ Anaconda: Booting the System
	+ Anaconda: Common Boot Options
	+ Anaconda: Loading Anaconda and Packages
	+ Anaconda: Storage Options
	+ Anaconda: Troubleshooting
	+ FirstBoot
	+ Kickstart
	+ Network Booting with PXE
	+ A Typical Install
* Installing SLES12
	+ YaST Install Program Interface
	+ Network Installation
	+ SLP for SUSE Linux Installation
	+ Installation Choices
	+ Kernel Crash Dump Configuration
	+ Network Booting with PXE
	+ Creating AutoYaST2 Files
	+ Using AutoYaST2 files
	+ linuxrc Automation
	+ Installation Diagnostics
	+ After The First Reboot
	+ A Typical Install
* Manage Virtual Machines
	+ Virtualization: What and Why?
	+ Introducing libvirt
	+ libvirt: Basic Concepts
	+ libvirt: Storage Architecture
	+ libvirt: Network Architecture
	+ libvirt: Graphical Tools
	+ libvirt: Command Line Tools
	+ virsh: Basics
	+ virsh: Common Tasks
	+ virt-install
	+ Virtual Machine Guest Tools & Drivers
	+ libguestfs and guestfish
* Backups
	+ Backup Software
	+ Managing Optical Media
	+ Tape Libraries
	+ Backup Examples
* Conclusion