Linux System Administration Training

Duration: **5 Day**

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Overview

Linux system administration requires extensive interaction with operating system components such as the kernel, hardware devices, and various management tools. This course provides a hands-on learning experience designed to help participants build strong system administration and management skills for Linux environments.

Throughout the training, participants will explore system administration, networking, and troubleshooting techniques while also learning best practices for performance optimization and system security.

A key focus of the course is developing proficiency in **command-line administration**, enabling participants to confidently manage Linux servers in real-world environments.

The program is also well suited for **Unix administrators transitioning to Linux**. With its fast-paced structure and numerous practical exercises, the course offers a comprehensive skill-building experience.

This {*training} is typically delivered using **Red Hat–based distributions such as CentOS or Scientific Linux**, while also covering important differences between SUSE, Debian, and Ubuntu systems.

Prerequisites

Participants should have:

- Completed a Linux fundamentals course or possess equivalent knowledge
- Several months of hands-on Linux experience
- Alternatively, experience administering a Unix-based system

Who Should Attend

This training is designed for:

- Linux system administrators
- Developers and technical analysts
- IT professionals responsible for managing Linux servers
- Unix administrators migrating their skills to Linux environments

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What You Will Learn

By the end of this {*training}, you will have gained knowledge and skills in the following areas:

- Compare different Linux distributions
- Understand the differences between Linux and UNIX administration
- Install and configure Linux systems
- Configure and customize the Linux kernel architecture
- Manage and configure hardware components
- Install software packages from repositories and source code
- Automate software updates
- Configure and troubleshoot system startup and boot processes
- Manage disk partitions and filesystems including LVM
- Secure filesystems using ACLs and extended attributes
- Implement SELinux and AppArmor security policies
- Strengthen user authentication using PAM
- Configure Samba and CIFS for network file sharing
- Use SSH for secure remote access
- Perform network configuration and troubleshooting
- Implement firewall protection with iptables and firewalld

Outline

Getting Started
Linux server market; Introduction to distributions considered in our courses; Red Hat, Debian (and their derivatives) and SUSE; Understanding kernel versions; Web resources and forums

Preparing For Installation
Understanding PC hard disks: PC hard disk drives: IDE and SCSI; Disk preparation: primary, extended and logical partitions; Understanding memory; Linux swapping and paging: planning swap area, adding swaps; Disk tools: fdisk, parted, hdparm

Installation Methods
Preparing for installation; Installation sources; Selecting system 'personality'; Gathering information; Installation planning and process; Installing Linux from CD-ROM; Post-installation steps; Repeatable

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installation with installer script

Software Management

- Linux software and source code; Shared and static libraries; Library related tools: ldd, ldconfig; Using 'tarballs' and related tools
- Packages in SUSE, Red Hat and derivatives; Packaging method: RPMs; Package management tools: rpm and yum; SUSE management tool: zypper
- Packages in Debian derivatives; Packaging method - DEBs; Package management tools: dpkg, apt-get, aptitude, tasksel

Boot Management
Bootstrap procedure; Traditional BIOS and MBR; Comparison with modern UEFI and GPT; Using and configuring GRUB 'Legacy' bootloader; GRUB disk numbering; GRUB configuration; Using and configuring GRUB 2; grub2 'global' directives configuration; /boot/grub/grub.cfg; initrd versus initramfs; grub2 tools; Recovering from boot problems; GRUB Legacy vs. GRUB 2 CLI commands

Hardware and Architecture
Types of platforms Linux will run on; Minimum hardware requirements; Selected 3.X onwards features; Supported devices; Configuring sysfs devices with udev; Hardware troubleshooting tools

Kernel Configuration
Kernel runtime parameters; /proc/sys/* and /etc/sysctl.conf; Device drivers in the kernel; Monolithic vs. modular design; Handling modules with lsmod, depmod and modprobe; Creating a customised Kernel; Why rebuild?; Prescriptive sequence of steps; Kernel interesting locations: /usr/src/*, /boot, /lib/modules/$(uname -r)

System Service Control
SysVinit startup sequence; Single and multi-user run levels; The init process and its configuration in /etc/inittab; SysVinit startup files (rc files); Systemd method for service control; Units and targets; Configuration files; Using systemctl tool; Integration with SysVinit method

System Logging
Auditing and logging; Basic Unix log files; Simple data tools for working with logs - touch, tail, tail -f, grep; Syslog daemon; Rotating logs; Monitoring logs. Brief Introduction to journald

User Accounts
User-related configuration files: /etc/passwd, /etc/group, /etc/shadow; Creating an account; Basic attributes; Secondary group membership; Password requirement; Customising an account; User home directory; Start-up files

User Account Security, incl PAM
Security aspects of basic accounts; Terminal and shell control files; Testing account usage and activity: lastlog, last, lastb; Identity power as dictated by UID; Role based identity; PAM; User authentication principles; User account control

Extended File Attributes
Recap of basic file and directory permissions: r/w/x, SUID, SGID and sticky bit; File Access Control List (ACL); Making use of individual user and group assignments; Understanding mask property; Using setfacl and getfacl of files and directories; Applying additional file attributes through chattr; Using chattr to set

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additional attributes; Applying privileged attributes; Using lsattr to explore extended attributes

Managing Filesystems
Linux native filesystems: ext*, reiserfs, xfs, btrfs ; Configuring filesystems; Performance - mkfs command; Security - mount command; Troubleshooting and diagnosing filesystems: fsck, tune2fs, debugfs, fuser, dumpe2fs, xfs*; Restricting disk assignments with user/group

Storage Management with LVM
Overview of disk partitioning; Using fdisk to create physical partitions; LVM structure: PV, VG, LV; Logical volumes must have filesystem created; Standard mkfs, mount and /etc/fstab treatment applies; Logical volumes can be dynamically resized

Networking Infrastructure
Number crunching; Network related files and directories: interface configuration files, name resolving; Modern tools - the ip and ss command: general syntax and usage; Network parameters in the kernel; Configuring proxy; Static routes; Interface parameters with ethtool; Interface bonding: modes and configuration

Perimiter Network Protection
Firewall concepts; Infrastructure and DMZ; Types and implementations; Kernel's role; Network parameters in /proc/sys/net; NetFilter module; Linux firewalls: iptables and firewalld; Understanding firewalld zones and firewall-cmd tool; Alternatives products: IPCop, Shorewall, ufw and many others...; knockd to open holes in your firewall on demand

Introduction to SELinux
DAC vs. MAC security policies; Problems with traditional, discretionary, methods; Products providing mandatory access methods; Main SELinux features; Policies, enforcements, control; Scope, coverage and availability; SELinux configuration and management; SELinux states; Labelling and access policies; Policy database and run-time flow; Modifying existing, and creating new, policies

Network Services
Protocols & Services; Network super-daemons: inetd, xinetd ; TCP wrapper with tcpd; Network time protocol; Hardware vs. software clock; Daemons and configuration

Samba and CIFS
What is Samba; SMB and CIFS protocols; Installing and configuring Samba components; Configuration file: /etc/samba/smb.conf; Special and user sections; Configuring the [global] section; Samba daemon and diagnostic tools: smbd, nmbd, smbstatus, testparm, SWAT; Samba client tools: nmlookup, smbclient, smbtree, smbtar; Viewing Samba shares in Windows;

SSH Hints and Tricks
SSH purpose; Recap of basic SSH use; SSH client and server configuration ; Using SSH keys; Creating public/private key pair; Configuring and using SSH agent; Tunnelling X application in SSH; Port forwarding; Principles of local and remote port forwarding; Forwarding through a firewall and multiple gateways