

Linux Technician Training.

a. Essential Linux for Windows and other operating system users.

Introducing Linux Enterprise

1. Linux Ideas and History

- What is Open Source?
- Linux Origins
- Linux Distributions
- The Fedora Project
- Linux Principles

2. Linux Usage Basics

- Logging into Enterprise Linux
- Starting X from the Console
- Accessing the Command Line from X
- Changing Your Password
- The root User
- Elevating Your Privileges
- Editing Text Files

3. Running Commands and Getting Help

- Running Commands
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- The whatis Command
- The --help Option
- Reading Usage Summaries
- The man and info Commands
- Documentation

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- File and Directory Names
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- Using Nautilus
- Determining File Content
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- History Tricks
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- Command Editing Tricks
- gnome-terminal

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9. vi and vim

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- Executing Commands with find
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- E-mail, Encryption, and Digital Signatures
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- Encrypted Communications with ssh and scp
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- Connecting to Windows Disk Shares
- File Transfer with Nautilus
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- The Linux Security Model
- Users and Groups
- Permission Types
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- Changing Permissions Using Symbolic and Numeric Methods
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14. Advanced Topics in Users, Groups, and Permissions

- User and Group ID Numbers
- The /etc/passwd, /etc/shadow, and /etc/group files
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- Creating, Inspecting, and Extracting Files from File Archives
- Why Use File Compression?
- Compression Utilities
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- Managing Packages
- Securing the System

18. What Now?

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- LinuxDevelopment Classes
- System Administrator Duties
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- RHCA and RHCSS Skills Courses
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b) LinuxEnterprise Linux System Administration

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- Monitoring Processes and Resources

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- CUPS

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- Switching Accounts
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- Example: LDAP Configuration
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- The Sticky Bit
- Default File Permissions
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- SELinux
- SELinux: Targeted Policy
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- Preparing Domain-0
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- Installing a new Domain-U
- Domain Management with xm
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- Recovery Run-Levels
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- Rescue Environment Details

c) Linux System Administration & Linux Technician Lab

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Linux Engineer Training

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Linux Networking and Security Administration

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- Linux Enterprise Linux Network Components
- Connecting Networks
- Service Management
- Chkconfig
- xinetd Services
- The xinetd Daemon
- Fault Analysis

2. Organizing Networked Systems

- DNS Basics
- Internet DNS Hierarchy
- Name Server Hierarchy
- Client-Side DNS
- Server-Side DNS
- Berkeley Internet Name Domain (BIND)
- Configuring BIND
- Configuration File Basics
- Address Match Lists and acl
- rndc
- Zone Files
- Main Record Types
- Delegating Subdomains
- Caching-Only Name Server
- BIND Utilities
- BIND Syntax Utilities
- Configuring the DHCP server

3. Network File Sharing Services

- Configuring NFS Services
- Configuring FTP Services
- Samba Services
- Samba Daemons
- Configuring Samba
- Configuring File and Directory Sharing
- Printing to the Samba Server
- Authentication Methods
- Samba Client Tools: smbclient and smbmount

4. Electronic Mail Services

- sendmail Features
- Security and "Anti-Spam" Features
- An E-Mail Review
- Simple Operational Overview
- Main Configuration Files
- sendmail Configuration with the m4 Macro Language
- sendmail Client Configuration
- Blacklisting Recipients
- Debugging sendmail
- Postfix
- Using Postfix
- Additional Postfix Configuration Files
- procmail Local Delivery

5. The HTTP Service

- Apache Features
- Apache Configuration
- Apache Server Configuration
- Virtual Hosts
- Apache Namespace Configuration
- CGI
- Apache Encrypted Web Server
- Squid Web Proxy Cache

6. Security Concerns and Policy

- Security Terms
- Basic Network Security
- Which Services are Running?
- Remote Service Detection
- Definitions of Security
- Security Policy
- Backup Policies

7. Authentication Services

- Authentication Basics
- Service Profile: PAM
- PAM Operation
- Core PAM Modules
- Authentication Modules
- Password Security
- Password Policy
- Resource Limits
- User Access Control
- Single User Mode
- Authentication Troubleshooting
- NIS Overview
- NIS Server Topology
- Configuring an NIS Server
- NIS Client Configuration
- NIS Troubleshooting

8. System Monitoring

- Introduction to System Monitoring
- File System Analysis
- Set User and Group ID Permissions
- Typical Problematic Permissions
- EXT2 Filesystem Attributes
- Monitoring Data Integrity with tripwire
- Configuring tripwire
- System Log Files
- syslogd and klogd configuration
- Advanced syslogd configuration
- Log File Analysis
- Monitoring and Limiting Processes
- Monitoring Processes with top
- Monitoring Processes Graphically
- System Activity Reporting
- Process Accounting Tools

9. Securing Networks

- Packet Filtering Capabilities
- Netfilter Architecture
- Netfilter Packet Flow
- Chain Operations
- Rule Targets
- Rule Matching
- Network Address Translation (NAT)
- Connection Tracking
- Rule Persistence
- The "Bastion Host"

10. Securing Services

- SystemV Startup Control
- Securing the Service
- tcp_wrappers Configuration
- Daemon Specification
- Client Specification
- Advanced Syntax
- xinetd-Based Security
- xinetd Access Control
- Host Patterns, Advanced Security Options

11. Securing Data

- The Need for Encryption
- Cryptographic Building Blocks
- Random Numbers
- One-Way Hashes
- Symmetric Encryption
- Asymmetric Encryption
- Public Key Infrastructures
- Digital Certificates
- Generating Digital Certificates
- OpenSSH Overview
- The OpenSSH
- OpenSSH Authentication
- Protecting Your Keys, Applications: RPM

Hands-On Labs

1. Introduction to Network Services

2. Organizing Networked Systems

3. Network File Sharing Services

4. Electronic Mail Services

5. The HTTP Service

6. Security Concerns and Policy

7. Authentication Services

8. System Monitoring

9. Securing Networks

10. Securing Services

11. Securing Data

1. Hardware and Installation

- Hardware Compatibility
- CPU and SMP Support
- New Hardware Detection
- Plug and Play
- Block and Other Devices
- Disk Addressing and Partitioning
- Peripheral Devices and Their Configuration
- The Linux Installer
- Performing and Validating the Installation

2. The Boot Process

- Virtual Consoles
- The Boot Process
- Kernel Initialization
- init and /etc/inittab
- Exploration of the init Process
- The GRUB Boot Loader

3. Filesystem and Software Administration

- Partitioning Utilities
- Journaling Filesystems
- Formatting Filesystems
- mount
- The Automounter
- /etc/fstab
- LinuxNetwork Implementation
- Maintaining Software with RPM
- Performing RPM Queries
- RPM Related Utilities

4. User Administration

- PAM
- Creating User Accounts
- Maintaining User Accounts
- Creating and Maintaining Groups
- The User Private Group Model
- SGID Directories
- The Initial User Environment
- Configuring Quotas
- NIS Server and Client Configuration

5. System Administration Tools

- Installing with Kickstart
- cron Scheduling
- Daily cron Scripts
- Network Interface Configuration
- CUPS Configuration and Administration
- LPRng Configuration and Administration
- syslog Configuration

6. Kernel Services and Configuration

- Linux LVM Configuration and Administration
- Managing Kernel Modules
- Examining and Setting Kernel Parameters in /proc
- Software RAID Configuration and Recovery

7. Apache and Squid

- Squid Proxy Server Overview
- Apache Configuration
- Implementing Apache Virtual Hosts

8. NFS and Samba

- Configuring an NFS Server
- Samba Client Tools
- Samba Server Configuration
- Windows Passwords and Samba
- Sharing Files, Directories, and Printers with Samba

9. DNS and Electronic Mail

- Sendmail Configuration Files
- m4 Macro Language and the sendmail.mc File
- Additional sendmail Configuration Files
- Postfix Configuration Files
- Configuring BIND
- named.conf
- Configuring Forward and Reverse Lookup Zones
- Special Zones
- Zone Files

10. FTP, xinetd, and OpenSSH

- vsftpd Configuration
- DHCP Server Configuration
- OpenSSH Client Utilities
- OpenSSH Server Configuration
- OpenSSH Authentication Methods
- xinetd.conf, xinetd Service Files

11. The X Window System

- Configuring XFree86
- The X Protocol Overview
- X Protocol Network Transparency
- X Window System and ssh
- Window Managers
- Display Managers
- X Window System Security
- X Window System Modularity
- XFree86 Startup
- The X Font Server

12. Securing Services

- tcp wrappers Configuration
- netfilter Configuration
- Maintaining netfilter Rules
- netfilter Example
- netfilter Network Address Translation
- netfilter Connection Tracking

13. Troubleshooting

- Filesystem Corruption
- Filesystem Recovery
- Things to Check: The X Window System
- Things to Check: Services
- Things to Check: Networking
- Things to Check: Booting
- The Rescue Environment
- Recovery Runlevels
- Boot Floppies

Hands-on Labs:

Lab 1: Hardware and Installation, Lab 2: The Boot Process

Lab 3: User Administration, Lab 4: System Administration Tools

Lab 5: Kernel Services and Configuration, Lab 6: Apache and Squid

Lab 7: NFS and Samba, Lab 8: DNS and Electronic Mail

Lab 9: FTP, xinetd, and OpenSSH, Lab 10: The X Window System

Lab 11: Securing Services, Lab 12: Troubleshooting

Enterprise Linux Update Course

1. New Since Version 3

- Notable Changes: RHCT Level
- Notable Changes: RHCE Level
- LVM2 and Resizing Logical Volumes
- Software RAID Toolset Replacement
- More to come

2. Installation and System Initialization

- Updating vs. Reinstalling
- New Choices in the Installer
- Anacron Re-introduced
- New in Kickstart Installations
- Hands-on Lab: Installing LinuxEnterprise Linux, version 5

3. Package Management Using yum

- Using yum
- Configuring the yum Client to Connect to an LINUX Satellite Server
- Creating a yum Repository
- Configuring the yum client to Connect to a Private Repository
- Hands-on Lab: Using yum

4. The Kernel: Driver and Device Management

- The new Driver Update Model
- udev and hal
- Device Symbolic Links
- The kexec Fastboot Tool (beware!)
- Hands-on Lab: Exploring Device Management

5. New in Filesystem Management

- LVM Mirroring
- LVM Multipath
- Disk Encryption
- gnome-mount
- Updates to autofs
- Hands-on Lab: New in Filesystem Management

6. New in Networking

- NetworkManager
- Wireless Improvements
- IPV6
- IPV6 and Default Service Configuration
- Using /sbin/ip
- Hands-on Lab: New in Networking

7. SELinux: Introduction and Overview of Changes

- Understanding SELinux
- Protected Services
- Modularized Policy
- Introduction to MLS and MCS
- MCS Integration with Client Tools
- The semanage Utility
- Hands-on Lab: Exploring SELinux

8. Development Tools Update

- SystemTap
- The Frysk Technology Preview
- Hands-on Lab: SystemTap and Frysk

9. Introduction to Virtualization

- Understanding Virtualization
- Virtualization Terminology
- How Virtualization Works on Linux
- Creating Domain-0
- Using Xend
- Using xm
- Domain Configuration
- Virtual Block Devices
- Virtual CPUs
- Virtual Network Devices
- Creating DomainU
- Bootstrapping a Domain
- pygrub
- Monitoring Domains
- Accessing a Domain
- The Art of Virtualization Security
- Taking it Further
- Hands-on Lab: Introduction to Virtualization

Hands-on Lab on topics such as:

- LVM
- Software RAID
- BIND
- IMAP and POP
- SELinux

10. Version 4 to Version 5: Self-directed Labs

Hands-on Lab on topics such as:

- Installation
- yum
- Virtualization
- Kickstart
- autofs
- anacron
- Device Management

Linux Architect Training

Enterprise Deployment, Virtualization, and Systems Management

1. Essential System Management

- System management tasks
- Standardization, centralization, and scalability
- Provisioning and Automation
- Linux tools for system management

2. Installing a Linux Network Satellite Server

- Features and advantages of the LINUX Satellite Server
- Types of LINUX Satellite Servers
- LINUX Satellite Server hardware requirements
- Understanding software channels
- Installing an LINUX Satellite Server
- Populating an LINUX Satellite Server
- Troubleshooting an LINUX Satellite Server installation

3. Building RPMs

- Building open source software
- Using RPM macros
- Writing custom spec files
- Using rpmbuild to create and sign RPMs
- Guidelines for custom RPMs

4. Use of CVS to Manage Configuration Files

- Basics of CVS for system administrators
- Creating local and remote repository access
- Structuring a CVS project
- Using CVS to track, log, and reverse configuration changes

5. Managing the LINUX Satellite Server

- Preparing a client to use a LINUX Satellite Server
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6. LINUX Management and Provisioning

- Types of LINUX service
- Elements of a deployment system
- Use of custom channels in a deployment system
- Using configuration channels to maintain system configuration
- Automating installations through kickstart.

7. Linux Network Proxy Server

- Hosted LINUX vs. Proxy Server
- Proxy Server software and hardware requirements
- Installing LINUX Proxy Server
- Configuring clients to use LINUX Proxy Server

8. Monitoring Systems with LINUX

- LINUX monitoring architecture
- LINUX monitoring components
- Probes and notifications

9. Network Kernel Crash Dumps and netdump

- Saving crash signatures over the network
- Saving crash dumps over the network
- Configuring netdump servers
- Configuring netdump clients

10. DHCP and PXE boot

- DHCP server design and configuration
- Preboot Execution Environment
- Setup PXE and PXELINUX
- Kickstart and DHCP

11. Xen Technology Preview

- Understanding virtualization
- Xen terminology
- Hardware requirements
- Xen tools
- Creating and bootstrapping a domain
- Accessing and monitoring a domain
- The art of Xen security

Note: The Xen Technology Preview will be taught using Fedora Core 5. As of this writing, the Xen virtualization system is not available in Linux Enterprise.

Enterprise Directory Services and Authentication

1. Basic LDAP concepts

- The directory information tree
- Schemas, object classes, entries, and attributes

2. How to configure and manage an OpenLDAP server

- Configuration of slapd
- Managing your directory content

3. Using LDAP as a "white pages" directory service

4. Using LDAP for user authentication and management

- PAM and NSS
- Kerberos and SASL
- Working with Samba and Microsoft Active Directory
- Migrating from NIS

5. Integrating multiple LDAP servers

- Replication, referrals, and DIT partitioning
- Cross-platform integration issues

Enterprise Clustering and Storage Management

1. Review LinuxEnterprise Linux Storage Management Technologies

2. Data Storage Design: Data Sharing

- Analyze Storage Dynamics
- SNIA Shared Storage Model(SSM)
- Volume Management + File System Management = Data Management

3. Cluster Suite Overview

- Define Cluster Suite Implementation in the SSM
- Explain Cluster Suite Configuration

4. Implement Cluster Suite: HA NFS Global File System (GFS) Overview

- Define GFS Implementation in the SSM
- Explain GFS Configuration
- Explain Pools and Distributed Storage
- Introduce Fencing
- Explain Fencing Procedures
- Implement Fencing Methods

5. Describe GFS Management

- Describe GFS journals
- Explain GFS Modification
- Single/Redundant GFS Lockmanagers (SLM/RLM)
- Increasing Data Storage Capacity

6. Modify the Online GFS Environment: Managing Data Capacity

7. Monitor GFS

8. Implement GFS modifications

9. Migrating Cluster Suite NFS from DAS to GFS

10. Revisit Cluster Suite using GFS

Enterprise System Monitoring and Performance Tuning

1. Architecture

- Overview of system components and architecture as they related to system performance.
- Performance characteristics of current standard PC hardware.
- Translating manufacturers' hardware specifications into useful information.

2. Monitoring

- Using standard monitoring tools effectively
- Gathering and analyzing trend information

3. SNMP

- Basics of SNMP
- Using SNMP to gather performance related data
- Graphing SNMP based information with MRTG

4. Benchmarking

- Using open source benchmarking utilities
 - Benchmarking systems as a holistic entity
 - Application/resource specific benchmarking utilities

5. Tuning

- Using /proc to tune operating system characteristics
 - Module level tuning
 - modinfo
 - tuning device drivers (NIC's SCSI, etc.)
- Network performance tuning
- Application performance tuning considerations
- Tuning for specific configurations
 - Evaluating ext3 performance
 - Tuning for SMB/CIFS servers
 - Tuning for compute servers
 - Tuning for file servers
 - Tuning to tune for database servers

Enterprise Linux Security: Network Services

1. Securing BIND

- Name server topology: public vs. private, DMZs, etc.
- Configuring appropriate recursion and fetching policies
- Using authentication keys
- Running BIND in a chrooted environment

2. Improving NIS and NFS

- Configurations to avoid
- Restricting accounts

3. Securing LDAP

- Configuring TLS authentication
- Restricting access to directory schema

4. Locking Down Sendmail

- Configuring access control
- Authentication configuration options, including TLS
- Implementing the real-time Black Hole List and other
- Anti-spam features

5. Secure e-mail Alternatives: imaps and pop3s

- SSL-tunneled IMAP and POP3 mail

6. Restricting FTP Access

- Configuring restricted guest account

7. Mastering host-based access controls

- Advanced xinetd configuration
- Advanced tcp_wrappers configuration

8. Securing Apache

- Containing CGI risks
- Auditing PHP and scripts
- Controlling and monitoring hosted sites

9. Using Kerberos Authentication

- "Kerberizing" services
- Using Kerberos in heterogeneous environments

10. The Secure Shell: OpenSSH

- Using public-private key pairs for authentication
- Remote administration using OpenSSH
- Port-forwarding
- Alternate authentication methods

11. Database Security Issues

Linux Security Specialist Training

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Developing Firewall Solutions

1. Firewall Concepts and Topologies
2. Implementing a stateful firewall using Linux
3. Implementing proxies with open source tools
4. Vulnerability testing of firewalls and networks
5. Open source intrusion detection utilities

Enterprise Certificate Management

1. Review of Public and Private Key Encryption

- Identity, Public Keys, and Digital Certificates
- Symmetric and Public Key Encryption
- Authentication Using Public-Key Encryption
- Data Integrity Through Message Digests
- Applying and Verifying a Digital Signature
- X.509 Certificates

2. Public Key Infrastructure and the Linux System

- Certificates and Certificate Authorities
- Elements of a Public Key Infrastructure
- X.509 Certificates and Public Keys
- Linux System
- Users and Authorization
- Plug-In Modules
- Profiles
- Certificate Manager Graphical Console
- End Entity and Agent Services
- User Identity and Distinguished Names
- Certificate Extensions

3. Authentication, Authorization, and ACLs

- The Certificate System's Authorization Framework
- How Authorization Works
- Default Groups, ACLs, and ACIs
- Authentication Options for Certificate Enrollment
- End Entity Enrollment, Plug-Ins, and Server Certificate

4. CMS and Common Criteria

- What is Common Criteria (CC)?
- Why We Would Like to be CC Certified
- CC Security Levels
- What is a Protection Profile (PP)?
- Why CC for Linux Certificate System?
- Installing Certificate System for a CC Environment
- CC Deployment Scenarios
- Installing and Configuring a CA in CC Environment

5. Self-Signed Root CA and Chained CAs

- Self Signed Root CA and Subordinate CAs
- Certificate Manager Subordination and Constraints
- Subordination to Other CAs
- Certificate Chain
- Cloned CA

6. Profile and Policy Plug-Ins

- Using the Console to Configure Policy
- Policy Plug-Ins
- Applying Policies and Configuring Rules
- Policy Rules Ordering
- Basic Constraints
- Certificate Profiles

7. Command Line Tools

- Why Command Line Utilities?
- Displaying Certificate Information: PrettyPrintCert and PrettyPrintCrl
- Extracting Information from the Certificate Database: certutil
- Non-Certificate System-Based Tools

8. Troubleshooting Guide for CMS

- Command Line Utilities
- Error Messages and Log Files
- LDAP Monitor
- SSL Debug
- Troubleshooting Tools and Tips

9. Certificates, Enrollments, Publishing

- Enrollment: Servlets, Authentication, and Policy Modules
- Manual Authentication
- Automatic Authentication: LDAP-Based
- Registration: PIN-Based
- Issuance and Pick-Up
- Publish Certificates in LDAP

10. -CRLs and OCSP Responder

- CRLs and Revocation
- CRLs and CAs
- CRLs and Validation
- CRL Issuing Points
- OCSP Responder

11. Key Archival and Recovery

- PKI Setup for Key Archival and Recovery
- Data Recovery Manager Overview
- DRM: Key Archival and Recovery

12. Certificate Renewal

- Certificate Validity
- Renewing and Re-Issuing Certificates
- Renewal Policies
- Root CA Change Effects
- Possible Problems

13. Cross Certificates

- Issuing, Importing, and Publishing Cross-Pair Certificates

14. End Entity and Agent Services Interface Customization

- Service Interface Overview
- Responses and Output Templates
- Templates
- End Entity and Agent Services Interface Forms and Templates

Linux Datacenter Specialist Training

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