

## Course Outline

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### LINUX+

**Duration:** 5 days (30 hours)

**Learning Objectives:**

This course will help students prepare for the Linux+ Certification exam

**Target Audience:**

Any

**Prerequisites:**

Students should have knowledge and experience of personal computers and an understanding of networking technologies

**Topics Covered:**

- Planning the Implementation
  - Evaluating Computer Requirements
  - Workstations
  - Servers
  - Dedicated Appliances
  - Special Needs
  - Determining Available Resources
  - Utilizing Existing Hardware
  - Balancing Budgetary Limitations
  - Considering Available Expertise
  - Deciding What Hardware to Use
  - A Rundown of PC Hardware
  - CPU
  - RAM
  - Hard Disk Space
  - Network Hardware
  - Video Hardware
  - Miscellaneous Hardware
  - Checking Hardware Configuration before Installation
  - Checking Cabling
  - Checking IRQs, DMA, and I/O Settings
  - Checking EIDE Devices
  - Checking SCSI Devices
  - Checking BIOS Settings
  - Planning Disk Partitioning



- Understanding the PC Partitioning System
- Linux Partition Requirements
- Common Optional Partitions
- Linux Filesystem Options
- Partitioning Tools
- Linux and Non-Linux Solutions
- Linux vs. Proprietary OSs
- Linux vs. Other Open Source OSs
- A Rundown of Linux Distributions
- Determining Software Needs
- Common Workstation Programs
- Common Server Programs
- Useful Software on Any System
- Validating Software Requirements
- Understanding Software Licenses
- Open Source Software Licenses
- Commercial Software Licenses
- Miscellaneous Software Licenses
- Using Licensed Software in Linux
- Linux Distributions' Licenses
- Locating Linux Software
- Locating Open Source Software
- Locating Commercial Software
- Installing Linux
  - Selecting an Installation Method
  - Media Options
  - Methods of Interaction during Installation
  - Starting the Installation
  - Selecting Basic Installation Parameters
  - Language
  - License Terms
  - Installation Class and Hardware Detection
  - Installation Class
  - Disk Detection
  - Mouse and Keyboard
  - Configuring Disks
  - Disk Partitioning
  - Creating Filesystems
  - Choosing Packages for Installation
  - Install-Time User Configuration
  - root Password Options
  - User Account Creation
  - Miscellaneous Settings
  - Install-Time Network Configuration

- Mandrake Summary Configuration
  - Service Configuration
  - Boot Options
  - Initial X Configuration
  - Checking Post-Installation Log Files
  - Additional Possible Configuration Options
  - Post-Installation X Configuration
  - Selecting an X Server
  - Configuring X
  - Configuring Window Managers
  - Understanding the Role of the Window Manager
  - Common Window Managers for Linux
  - Running a Window Manager
  - Understanding Widget Sets
  - Configuring Desktop Environments
  - Common Desktop Environments for Linux
  - Running a Desktop Environment
  - Mixing and Matching Desktop Environment Components
- Software Management
- Basic Command Shell Use
  - Starting a Shell
  - Viewing Files and Directories
  - Manipulating Files
  - Launching Programs
  - Shell Shortcuts
  - Package Concepts
  - File Collections
  - The Installed File Database
  - Rebuilding Packages
  - Installing and Removing Packages
  - RPM Packages
  - Debian Packages
  - Tarballs
  - Converting between Package Formats
  - GUI Package Management Tools
  - Validating Proper Program Functioning
  - Checking an Application on a Test System
  - Checking an Application on a Production System
  - Ongoing Application Monitoring
  - Kernel Issues • The Role of the Kernel
  - Kernel Version Numbering
  - When to Recompile the Kernel
  - Configuring Boot Loaders
  - The Role of the Boot Loader

- Available Boot Loaders
- An Overview of the LILO Configuration File
- Adding a New Kernel to LILO
- Adding a New OS to LILO
- Users and Security
- Linux Multiuser Concepts
- User Accounts: The Core of a Multiuser System
- Groups: Linking Users Together for Productivity
- Mapping UIDs and GIDs to Users and Groups
- The Importance of Home Directories
- File Permissions
- File Access Permissions
- Changing File Ownership and Permissions
- Setting Default Permissions
- Configuring User Accounts
- Adding Users
- Modifying User Accounts
- Deleting Accounts
- Configuring Groups
- Adding Groups
- Modifying Group Information
- Deleting Groups
- Common User and Group Strategies
- The User Private Group
- Project Groups
- Multiple Group Membership
- Account Security
- Enforcing User Password Security
- Steps to Reduce the Risk of Compromised Passwords
- Disabling Unused Accounts
- Filesystem Security
- Evaluating Your User File Permissions Scheme
- Evaluating Permissions on Programs
- Removing Unnecessary Programs
- Keeping Software Up-to-Date
- Detecting Intruders
- Setting Process Permissions
- The Risk of SUID and SGID Programs
- When Is SUID or SGID Necessary?
- Finding SUID or SGID Programs
- Monitoring Log Files
- Locating Important Log Files
- Information Recorded in Log Files
- Usual and Unusual Log File Activity

- Tools to Aid in Log File Analysis
  - Physical Security
  - What an Intruder Can Do with Physical Access
  - Steps to Mitigate Damage from Physical Attacks
- Networking
- Understanding Networks
  - Basic Functions of Network Hardware
  - Types of Network Hardware
  - Network Packets
  - Network Protocol Stacks
  - Network Addressing
  - Types of Network Addresses
  - DNS and Routers: Linking It All Together
  - Network Ports • Basic Network Configuration
  - Clients and Servers
  - DHCP Configuration
  - Static IP Address Configuration
  - Using GUI Configuration Tools
  - Configuring Remote Client Access
  - Initiating a PPP Connection
  - Using ISDN Services
  - Using DSL or Cable Modem Services
  - Network Application Configuration
  - Using a Web Browser
  - Using an E-Mail Client
  - Using X Programs Remotely
  - Using an FTP Client
  - Accessing SMB/CIFS Shares
  - Accessing NFS Shares
  - Using an SNMP Client
  - Using NIS
  - Setting Up a Remote Access Server
  - Setting Remote Access Rights
  - Controlling Access via a Firewall
  - Controlling Access via TCP Wrappers
  - Controlling Access via xinetd
  - Controlling Access via Passwords
  - Controlling Access via File Permissions
  - Remote System Administration
  - Text-Mode Logins
  - GUI Logins
  - File Transfers
  - Remote Administration Protocols
  - Network Diagnostic Tools

- Managing Files and Services
  - Basic Configuration File Locations
  - User Configuration Files
  - System Configuration Files
  - Format of Common Configuration Files
  - Startup Scripts
  - /etc/inittab
  - /etc/fstab
  - /etc/modules.conf
  - /etc/profile
  - Additional Files
  - Setting Environment Variables
  - The Role of Environment Variables
  - Where to Set Environment Variables
  - The Meanings of Common Environment Variables
  - Starting and Stopping Services
  - Starting and Stopping via SysV Scripts
  - Editing inetd.conf
  - Editing xinetd.conf or xinetd.d Files
  - Custom Startup Files
  - Setting the Runlevel
  - Understanding the Role of the Runlevel
  - Using init or telinit to Change the Runlevel
  - Permanently Changing the Runlevel
  - Basic GUI Use
  - Features Offered by Window Managers
  - Features Offered by Desktop Environments
  - Launching an Xterm
  - GUI Administrative Tools
  - Basic Shell Scripting
  - Beginning a Shell Script
  - Using External Commands
  - Using Variables
  - Using Conditional Expressions
  - Documenting System Configuration
  - Maintaining an Administrator's Log
  - Backing Up Important Configuration Files
- Managing Partitions and Processes
  - Partition Management and Maintenance
  - Using fdisk to Create Partitions
  - Creating New Filesystems
  - Checking a Filesystem for Errors
  - Partition Control
  - Identifying Partitions

- Mounting and Unmounting Partitions
- Using df
- Understanding the Linux Filesystem Hierarchy
- The FSSTND and FHS
- Important Directories and Their Contents
- Using du
- Backing Up and Restoring a Computer
- Common Backup Hardware
- Common Backup Programs
- Planning a Backup Schedule
- Preparing for Disaster: Backup Recovery
- File Manipulation Commands
- Navigating the Linux Filesystem
- Manipulating Files
- Manipulating Directories
- Editing Files with Vi
- Vi Modes
- Basic Text Editing Procedures
- Saving Changes
- Managing Cron Jobs
- The Role of Cron
- Creating System Cron Jobs
- Creating User Cron Jobs
- Handling Core Dumps
- Understanding Core Dumps
- Locating and Deleting Unneeded Core Files
- Managing Processes
- Examining Process Lists with ps
- Restricting Processes' CPU Use
- Killing Processes
- Hardware Issues
  - Adding Swap Space
  - Evaluating Swap Space Use
  - Adding a Swap File
  - Adding a Swap Partition
  - Basic Printing
  - The Linux Printing Architecture
  - Using PostScript and Ghostscript
  - BSD and LPRng Configuration and Use
  - Monitoring and Controlling the Print Queue
  - Adding New Hardware
  - Locating Hardware Drivers
  - Configuring Hardware in Linux
  - Making Hardware Accessible to Users

- Managing Kernel Modules
- Kernel Module Configuration Files
- Inserting and Removing Kernel Modules
- Diagnosing Hardware Problems
- Core System Problems
- EIDE/ATA Problems
- SCSI Problems
- Problems with Peripherals
- Identifying Supported and Unsupported Hardware
- Using Linux with a Laptop
- Special Laptop Installation Issues
- Understanding Power Management
- Using PC Card Devices
- Troubleshooting
  - Localizing the Problem
  - Symptoms of Hardware Problems
  - Symptoms of Kernel Problems
  - Symptoms of Application Software Problems
  - Symptoms of Configuration Problems
  - Symptoms of User Problems
  - Problem Identification
  - Using Log Files to Identify Problems
  - Using System Status Tools to Identify Problems
  - Evaluating User Complaints
  - Diagnosing Software Problems
  - Filesystem Problems
  - Configuration File Problems
  - Server Software Problems
  - Backup and Restore Problems
  - Diagnosing Network Problems
  - Reviewing Your Network Configuration
  - Localizing the Source of the Problem
  - Handling LILO Boot Errors
  - LILO Boot Error Codes
  - Non-LILO Boot Techniques
  - Fixing LILO from an Emergency Boot System
  - Using an Emergency Disk Set
  - Locating a Ready-Made Emergency Disk
  - Creating a Custom Emergency Disk
  - Emergency Disk Recovery Tools
  - Stopping, Starting, or Restarting Processes
  - When to Stop, Start, or Restart a Process
  - Working Around Recurring Problems
  - Package Dependencies and Conflicts

- Real and Imagined Package Dependency Problems
- Workarounds to Package Dependency Problems
- Startup Script Problems
- Using Common Troubleshooting Commands
- File-Location Commands
- File-Examination Commands
- Redirection and Pipes