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## Linux Professional : System Administration

**Course Length:** 5 days

### Course Description

**Overview:** *Linux Professional System Administration* is a hands-on instruction book. It will introduce students to the basics of administering a server running the Linux operating system. The objective of this course is to provide students with the instruction necessary to prepare them for the Linux Professional Institute (LPI) Level 1 certification or the Level 1 Sair Linux and GNU certification. We organized each lesson into explanatory topics and step-by-step activities. Topics provide the theory you need to master the Linux operating system; activities allow you to apply this theory to practical hands-on examples.

**Prerequisites:** To ensure students' success with this course, we recommend that they first take the following courses or have equivalent knowledge:

- *A+ Certification: Core Hardware*
- *A+ Certification: Operating Systems*
- *Network+ Certification:*
- *Linux Workstation: Red Hat 7.0*

**Delivery Method:** Instructor-led with hands-on activities.

### Performance-Based Objectives

Lesson objectives help students become comfortable with the course, and also provide a means to evaluate learning. Upon successful completion of this course, students will be able to:

- Examine the history of Linux and review the basic architecture of the Linux operating system.
- Install Red Hat Linux using custom options.
- Use the bash shell and understand essential system navigation.
- Use various text editors and understand their effective uses.
- Configure and use the X Window server.
- Configure and use a Linux printer.
- Configure and administer system users and groups, and administer basic password management.
- Investigate Linux filesystem basics and the details of the ext2 filesystem.
- Configure and recompile the Linux kernel.
- Automate system administration tasks by creating basic shell scripts.
- Use RPM to install, verify, query, erase, and update packages to manage applications on a server.
- Manage server processes and daemons and identify the basics of system performance tuning.

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## Course Content

### Lesson 1: Linux History and Operation

- Topic 1A: The Evolution of Linux
  - Task 1A-1: Discussing the History of Linux
- Topic 1B: The GNU Movement and the GPL
  - Task 1B-1: Discussing the Open Source Movement
- Topic 1C: Linux Operations as a Server
  - Task 1C-1: Examining Linux Operations as a Server
- Topic 1D: The Architecture and Structure of Linux
  - Task 1D-1: Reviewing the Architectural Structure of Linux

### Lesson 2: Installing and Configuring Linux

- Topic 2A: Introduction to Installation and Media Types
  - Task 2A-1: Creating an Installation Boot Disk with Rawrite
- Topic 2B: Performing a Custom Linux Server Installation
  - Task 2B-1: Performing a Custom Linux Server Installation
- Topic 2C: Run Levels and the Startup/Shutdown Sequence
  - Task 2C-1: Examining Run Levels and the Startup/Shutdown Sequence
  - Task 2C-2: Examining the Shutdown Process
- Topic 2D: Logging In and Out of a Linux System
  - Task 2D-1: Logging In and Out of a Linux System
  - Task 2D-2: Securing the root Account Access

### Lesson 3: Shells, Commands, and Navigation

- Topic 3A: Introduction to Linux Shells, Commands, and Navigation
  - Task 3A-1: Discussing Linux Shells and Commands
- Topic 3B: Navigating the Linux Filesystem
  - Task 3B-1: Listing Files
  - Task 3B-2: Copying, Moving, and Deleting Files
  - Task 3B-3: Changing Directories
  - Task 3B-4: Navigating the Filesystem
  - Task 3B-5: Examining Symbolic Links
- Topic 3C: Using Shell Variables in Bash
  - Task 3C-1: Viewing Environment Variables
  - Task 3C-2: Creating and Assigning a Value to a Variable and then Exporting It
  - Task 3C-3: Creating Variable Values Containing Spaces
  - Task 3C-4: Creating a Variable Containing Another Variable
  - Task 3C-5: Removing Variables
- Topic 3D: The Bash Shell
  - Task 3D-1: Using Shell Metacharacters with ls
- Topic 3E: Commands for Obtaining System Information
  - Task 3E-1: Obtaining System Information
  - Task 3E-2: Using the find Command
- Topic 3F: Examining File Contents
  - Task 3F-1: Examining the Contents of a File
- Topic 3G: Customizing your Shell Environment
  - Task 3G-1: Working with Shell Aliases
  - Task 3G-2: Customizing the Command Prompt
  - Task 3G-3: Configuring a Directory for Temporary Files
  - Task 3G-4: Setting a Default Text Editor
- Topic 3H: Manipulating Commands and Their Input/Output
  - Task 3H-1: Piping Commands

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- Task 3H-2: Running a Process in the Background
  - Task 3H-3: Moving Processes Between the Background and Foreground
  - Task 3H-4: Using Virtual Terminals
  - Topic 3I: Getting Help
    - Task 3I-1: Viewing the System Manual
    - Task 3I-2: Using the --help Parameter
    - Task 3I-3: Discussing the Linux Documentation Project

#### **Lesson 4: Common Text Editors**

- Topic 4A: Using the Emacs Editor
  - Task 4A-1: Creating a File Using Emacs
  - Task 4A-2: Moving Around a Document in Emacs
  - Task 4A-3: Searching for Text in Emacs
  - Task 4A-4: Searching for and Replacing Text in Emacs
  - Task 4A-5: Editing Multiple Files in Emacs
- Topic 4B: Using the vi Editor
  - Task 4B-1: Creating a File Using vi
  - Task 4B-2: Moving Around in a Document
  - Task 4B-3: Editing an Existing Document
  - Task 4B-4: Searching Within a File
  - Task 4B-5: Searching and Replacing Text
- Topic 4C: Using the Pico Editor
  - Task 4C-1: Creating a File Using Pico
  - Task 4C-2: Moving Around a Document in Pico
  - Task 4C-3: Searching for Text in Pico
  - Task 4C-4: Cutting and Pasting Text in Pico
- Topic 4D: Manipulating Text Files From the Command Line
  - Task 4D-1: Examining the Results of Redirection
  - Task 4D-2: Creating Files with Cat and Echo
  - Task 4D-3: Appending to Files
- Topic 4E: Using Awk
  - Task 4E-1: Using Awk to Print Selected Fields
  - Task 4E-2: Including Text in Your Output
  - Task 4E-3: Searching for Patterns and Displaying the Results
  - Task 4E-4: Declaring a New Awk Field Delimiter
  - Task 4E-5: Using Awk to Search for Patterns in a Single Field
  - Task 4E-6: Including an Awk Command File in Your Awk Statement
- Topic 4F: Using Sed
  - Task 4F-1: Using Sed to Delete a Line from a File
  - Task 4F-2: Using Grep and Sed to Locate and Change a Text Field

#### **Lesson 5: Configuring and Using X Windows**

- Topic 5A: Introduction to X Windows
  - Task 5A-1: Examining X Windows
- Topic 5B: Configuring XFree86
  - Task 5B-1: Configuring XFree86
- Topic 5C: Window Managers and Desktop Environments
  - Task 5C-1: Using Window Managers
  - Task 5C-2: Examining Desktop Environments
  - Task 5C-3: Enabling Multiple X Servers

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## **Lesson 6: Linux Printing**

- Topic 6A: The Line Printer Daemon (lpd)
  - Task 6A-1: Creating a Printer Spool using Printtool
  - Task 6A-2: Editing a Printer Spool Using Printtool
  - Task 6A-3: Examining the /etc/printcap File
- Topic 6B: Printing
  - Task 6B-1: Printing a File
  - Task 6B-2: Formatting Text for Printing
- Topic 6C: Administering a Linux Printer Queue
  - Task 6C-1: Viewing the Contents of a Print Queue
  - Task 6C-2: Cancelling a Print Job
  - Task 6C-3: Using the lpc Command

## **Lesson 7: Users and Groups**

- Topic 7A: Introduction to Users and Groups
  - Task 7A-1: Discussing Users and Groups
  - Task 7A-2: Creating Users and Groups
  - Task 7A-3: Creating Groups
  - Task 7A-4: Managing Passwords
- Topic 7B: Essentials of Effective User, Group, and Password Management
  - Task 7B-1: Using su
  - Task 7B-2: Examining the Essentials of Effective Account Management
  - Task 7B-3: Using urandom

## **Lesson 8: The Ext2 Filesystem**

- Topic 8A: Introduction to the Second Extended (Ext2) Filesystem
  - Task 8A-1: The Ext2 Filesystem
- Topic 8B: Partitioning and Formatting
  - Task 8B-1: Exploring Disk Partitions
  - Task 8B-2: Formatting a Partition for the Ext2 Filesystem
- Topic 8C: Mounting and Configuring Filesystems
  - Task 8C-1: Mounting and Unmounting Filesystems
- Topic 8D: Administering Ext2 Filesystems
  - Task 8D-1: Using stat to Examining an Inode
  - Task 8D-2: Using sync to Flush Filesystem Buffers
  - Task 8D-3: Checking and Repairing an Ext2 Filesystem
  - Task 8D-4: Understanding Filesystem Fragmentation
- Topic 8E: Understanding Permissions
  - Task 8E-1: Setting Ownership of Files
  - Task 8E-2: Viewing File Permissions
  - Task 8E-3: Setting File Permissions
  - Task 8E-4: Changing the Default Permissions with umask

## **Lesson 9: The Linux Kernel**

- Topic 9A: Introduction to the Linux Kernel
  - Task 9A-1: Discussing the Kernel
- Topic 9B: Using Kernel Modules
  - Task 9B-1: Discussing Monolithic and Modular Kernels
  - Task 9B-2: Working with Kernel Modules
  - Task 9B-3: Examining the /etc/modules.conf File
- Topic 9C: Compiling the Linux Kernel
  - Task 9C-1: Downloading and Installing the Kernel Source
  - Task 9C-2: Configure the Linux Kernel Sources

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- Task 9C-3: Compiling the Linux Kernel and Linux Kernel Modules
  - Topic 9D: Installing the Linux Kernel
    - Task 9D-1: Copying the Kernel and Modules to the System and Creating an Initial Ramdisk
    - Task 9D-2: Understanding LILO
    - Task 9D-3: Configuring LILO to Boot the New Kernel

### **Lesson 10: Shell Scripting**

- Topic 10A: Introduction to Shell Scripting
- Topic 10B: Variables
  - Task 10B-1: Getting User Input
  - Task 10B-2: Performing Simple Arithmetic
- Topic 10C: Basic Control Structures
  - Task 10C-1: Using If-Then-Else
- Topic 10D: Loops
  - Task 10D-1: Using For Loops
  - Task 10D-2: Using While Loops
- Topic 10E: Command-line Arguments
  - Task 10E-1: Getting Arguments from the Command Line

### **Lesson 11: Linux Software Management**

- Topic 11A: The Software Life Cycle
  - Task 11A-1: Using the Internet for Locating Software
- Topic 11B: Querying Installation
  - Task 11B-1: Querying Software
  - Task 11B-2: Installing a Software Package
  - Task 11B-3: Upgrading Software Packages
  - Task 11B-4: Removing a Software Package
  - Task 11B-5: Building from Source

### **Lesson 12: Linux System Management**

- Topic 12A: Choosing a Server
  - Task 12A-1: Discussing Server Choices
  - Task 12A-2: Examining Linux Services
  - Task 12A-3: Starting Jobs and Processes
- Topic 12B: The /proc Filesystem
  - Task 12B-1: Tuning a Linux System for Optimal Performance
  - Task 12B-2: Using Performance Maintenance Utilities
- Topic 12C: The Swap Partition
  - Task 12C-1: Creating Additional Swap Space
- Topic 12D: The sudo Command
  - Task 12D-1: Configuring sudo
  - Task 12D-2: Using sudo