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## **CompTIA Linux+ with Command Line**

Format: Self-Pace Online / eLearning  
Program Duration: 6 Months  
Course Contact Hours: 375

### **The CompTIA Linux+ with Command Line Profession**

Linux is an open-source, UNIX-like operating system created by Linus Torvalds that runs a plethora of different devices today. When you do your online banking or use Google, Facebook or Twitter, you're talking to Linux servers in the cloud. In fact, nearly all supercomputers and cloud servers run Linux, as does your Android smartphone and many other devices around your home and workplace, such as firewalls and routers. Even your touch-screen refrigerator, home media center, smart thermostat and in-car GPS run Linux.

### **The CompTIA Linux+ with Command Line Program**

This program introduces students to the competencies required of an early career IT professional supporting Linux systems. The content provides thorough coverage of command-line skills that work on multiple distributions and prepares anyone who wants to acquire in-depth knowledge of common Linux tasks. In addition to topics traditionally associated with systems administration tasks, such as configuring, managing, operating and troubleshooting in a Linux environment, this program also focuses on security, kernel modules, storage and virtualization, enterprise-level device management, DevOps basics, through Git and automation. The program further walks through networking and firewalls, especially involving security issues, server-side and command line, troubleshooting and SELinux with a focus on implementation.

Finally, the program address the Linux Command Line Interface (CLI), which is a powerful tool for users, developers, and administrators. Quick changes to a system with no Graphical Interface, such as many servers or some recovery tasks, can be accomplished with command line tools. Repetitive tasks, such as file management and local access control changes, can be done more efficiently from the command line than through a point-and-click interface. Learning to use the Linux CLI also prepares for full automation with scripting tools.

### **Education and National Certifications**

- Students should have or be pursuing a high school diploma or GED.

- Students who complete this program can sit for the **CompTIA Linux+ (LX0-103 and LX0-104) exam or the Linux Professional Institute Certification (LPIC) Level 1 Certification Exam (Exams 101 and 102)**.
  - Successful completion of both LPIC-1 exams (101 and 102) is required to obtain the LPIC level 1 certification. The topics for these exams have been updated recently, with the latest version released in February 2015. This version of the exam introduces new topics such as databases and email server basics.
  - These exams are also offered as CompTIA's Linux+ certification. Linux+ has been “powered by LPI” (the Linux Professional Institute) since 2010, with the CompTIA and LPI exams being taken from the same pool of LPI questions. This partnership allows you to take the same exam through CompTIA under the LX0-103 and LX0-104 names to obtain Linux+ certification. Passing either LPIC level 1 or Linux+ will also earn you a SUSE Certified Linux Administrator certification, if you want to claim it.

### CompTIA Linux+ with Command Line Program Objectives

At the conclusion of this program, students will be able to:

- Perform and understand essential skills for system administrators
- Understand and execute administrative tasks in systems
- Perform advanced management tasks
- Prepare for CompTIA Linux+ LX0-103 and LPIC-1 (Exam 101)
- Provide a base environment
- Execute common administrative tasks
- Understand and perform networking and related services
- Perform advanced management tasks for system administrators
- Prepare for CompTIA Linux+ LX0-104 and LPIC-1 (Exam 102)

## The CompTIA Linux+ with Command Line Program Detailed Objectives

### ESSENTIAL SKILLS

#### PERFORMING BASIC TASKS FROM A SHELL ENVIRONMENT

- Understand the file system layout in the FHS
- Know the location and purpose of the important files and directories as defined in the FHS
- Find files and commands on a Linux System
- Use Single Shell Commands and One-line Command Sequences
- Use and modify the Shell Environment
- Use and edit Command History
- Invoke commands inside and outside the defined path

#### PROCESSEING AND WORKING WITH TEXT FILES

- Use Streams, Pipes, and Redirects
- File Viewing Commands
- File Formatting Commands
- File Processing Commands
- Understand vi
- Edit text files with vi
- Use regular expressions to work with Text Files

- Search text patterns with grep

#### **PERFORMING BASIC FILE MANAGEMENT TASKS**

- Copy, move and remove files
- Use Wildcards
- Use other file management tools
- Create backups
- Analyze and extract tar backups
- Understand links and inodes
- Manage hard and symbolic links

#### **MANAGING PROCESSES**

- Run jobs in foreground and background
- Send signals to processes
- Monitor processes with top
- Select and sort processes with ps and related utilities
- Understand process priority
- Change process priority

#### **ADMINISTRATIVE TASKS**

##### **DESIGN HARD DISK LAYOUT**

- Allocate Filesystems and swap space
- Tailor the design to the intended use of the system
- Ensure the /boot partition conforms to the hardware architecture
- Understand basic LVM features

##### **CREATING PARTITIONS AND FILESYSTEMS**

- Understand GPT and MBR differences
- Manage MBR primary partition tables with fdisk
- Manage logical partitions with fdisk
- Basic knowledge of gdisk and parted with GPT
- Create filesystems
- Verify the integrity of the filesystems
- Monitor free space and inodes

##### **COMMON FILESYSTEM MANAGEMENT TASKS**

- Understand filesystem mounts
- Mount filesystems
- Configure filesystem mounting on boot
- Configure user mountable removable filesystems
- Understand disk quotas
- Manage disk quotas

##### **MANAGING PERMISSIONS**

- Understand Linux users and groups
- Understand file ownership
- Understand rwx permissions

- Manage access permissions on regular and special files and directories
- Understand special permissions
- Use access modes such as SUID, SGID, and Sticky Bit
- Modify the file creation mask

### **MANAGING SOFTWARE**

- Understand packages and meta package handlers
- Understand variations in Linux software management
- Install, reinstall, upgrade, and remove packages using RPM and YUM
- Obtain information on RPM packages
- Understand Debian/Ubuntu package management
- Find packages containing specific files
- Obtain package information about Debian packages

## **ADVANCED MANAGEMENT TASKS**

### **SYSTEM ARCHITECTURE**

- Enable and disable integrated peripherals
- Configure systems with or without external peripherals
- Differentiate between the various types of mass storage devices
- Differentiate between Coldplug and Hotplug devices
- Determine hardware resources for devices
- Employ tools and utilities to list various hardware information
- Employ tools and utilities to manipulate USB devices
- Gain a conceptual understanding of sysfs, udev, dbus

### **BOOT THE SYSTEM**

- Understand the GRUB and GRUB2 differences
- Provide common commands to the boot loader and options to the kernel at boot time
- Demonstrate knowledge of the boot sequence from BIOS to boot completion
- Understand SysVinit and systemd
- Demonstrate awareness of Upstart
- Check boot events in the log files

### **MANAGING THE BOOT SEQUENCE**

- Set the default runlevel or boot target
- Change between runlevels / boot targets using single user mode
- Shut down and reboot from the command line
- Alert users before making changes

### **INSTALL A BOOT MANAGER**

- Provide alternative boot locations and backup boot options
- Install and configure a boot loader such as GRUB
- Perform basic configuration changes for GRUB2

### **MANAGING SHARED LIBRARIES**

- Identify shared libraries

- Identify the typical locations of shared libraries
- Load shared libraries

## PROVIDING A BASE ENVIRONMENT

### USING AND CUSTOMIZING THE SHELL ENVIRONMENT

- Set environment variables at login or when spawning a new shell
- Use bash functions
- Maintain skeleton directories for new users
- Set the command search path

### MANAGING PRINTING

- Understand Linux printing
- Create a Basic CUPS configuration
- Configure a text-only printer
- Oversee print job Processing
- Manage user print queues
- Troubleshoot general printing problems

### MANAGING USER AND GROUP ACCOUNTS

- Add, modify and remove users
- Add and modify groups
- Manage user/group information in password/group databases
- Create and manage special purpose and limited accounts
- Understand group membership

## PROVIDING A BASE ENVIRONMENT

### CONFIGURING SECURITY

- Audit a system to find files with SUID/SGID
- Manage password aging
- Analyze ports with netstat and nmap
- Set up limits on user logins, processes, and memory usage
- Configure sudo
- Determine which users have logged in and are currently logged in
- Set up host security
- Understand advanced security such as SELinux and Apparmor

### SCHEDULING JOBS

- Create and manage at jobs
- Create and manage cron jobs
- Configure user access to cron and at services
- Configure anacron

### MAINTAINING SYSTEM TIME

- Understand Linux time

- Set system date and time
- Set the hardware clock
- Configure UTC and local time

### **CONFIGURING SYSTEM LOGGING**

- Understand Syslog facilities, priorities, and destinations
- Configure Syslog
- Read Log files and configure Logrotate
- Log in Non-syslog services
- Understand journald, rsyslog and syslog-ng

## **NETWORKING AND RELATED SERVICES**

### **CONFIGURING NETWORKING**

- Understand IP protocol fundamentals
- Configure network interfaces with ip and ifconfig
- Create basic static TCP/IP host configuration
- Understand routing
- Set a default route
- Configure client side DNS
- Apply network troubleshooting basics

### **MANAGING MTA BASICS**

- Understand mail handling
- Create email aliases
- Know common Linux MTA programs
- Configure email forwarding

### **USING SSH**

- Use ssh, scp and sftp
- Change common client and server settings
- Configure SSH host keys
- Understand SSH port tunnels
- Create SSH port tunnels
- Perform basic GnuPG configuration, usage, and revocation
- Use GnuPG in email
- Use GnuPG to encrypt files

## **ADVANCED MANAGEMENT TASKS**

### **CUSTOMIZING AND WRITING SHELL SCRIPTS**

- Select the shell interpreter through the shebang
- Manage the location, ownership, execution and Suid-rights of scripts

- Understand shell script basic elements
- Work with read and arguments
- Use here documents
- Understand return values
- Perform tests
- Use command substitution
- Use loops and conditional tests
- Perform conditional mailing to superuser

#### **ACCESSIBILITY AND INTERNATIONALIZATION**

- Understand keyboard accessibility settings
- Understand visual settings and themes
- Understand assistive technologies basics
- Configure locale settings and environment variables

#### **SQL DATA MANAGEMENT**

- Understand SQL databases
- Create an example database and basic data manipulation
- Use basic SQL commands

#### **MANAGING USER INTERFACES AND DESKTOPS**

- Understand X configuration files
- Verify video card support
- Get X display information
- Manage a font server
- Set up a display manager

## **LINUX COMMAND LINE**

#### **ACCESSING THE LINUX COMMAND LINE INTERFACE**

- Understand the uses of the Linux command line interface
- Access the command line locally: Text login
- Access the command line locally: GNOME menus (CentOS)
- Access the command line locally: GNOME Shell (Fedora)
- Access the command line locally: KDE (Kubuntu)
- Access the command line remotely: ssh command (Linux or Mac OSX)
- Access the command line remotely: Graphical program
- Run commands from the bash shell
- Recall previous commands with history shortcuts

#### **GETTING HELP WITHIN THE SYSTEM**

- Use the man pages
- Navigate the info pages
- View syntax with --help
- Identify available documentation with whatis and man -k
- Interpret usage syntax

### **MANIPULATING FILES**

- Understand navigation
- Read files
- Organize files
- Employ less typing with TAB completion

### **MANAGING A LARGE NUMBER OF FILES**

- Use filename-expansion wildcards to organize files
- Archive files with tar and gzip
- Transfer files to or from a remote system with scp and rsync
- Download files from a remote system with wget or curl
- Use echo to preview command expansion

### **EDITING FILES FROM THE COMMAND LINE**

- Choose an editor
- Edit files with nano
- Edit files with vim
- Do advanced edits with vim and sed
- Set the default editor

### **ACCESS CONTROL: BASIC FILE PERMISSIONS**

- View basic permissions
- Identify owner and group membership
- Escalate privilege with su and sudo
- Change file permissions
- Change file owner and group
- String commands together

### **LOCATING FILES ON THE SYSTEM**

- Use locate to find files by name
- Use find to locate files by name, date, owner, size, and more
- Identify text files containing a specific string using grep
- Search the content of a file for patterns
- Protect special characters with quotes

### **PROCESS MANAGEMENT**

- List processes running on a system
- Manage a running process
- View available system resources
- Save the output of a command to a file
- Use command substitution

### **BASIC BASH SHELL CONFIGURATION**

- Create shortcuts with alias
- Customize environment variables
- Configure shell options
- Save configuration by editing login and shell startup scripts



