



CompTIA Linux+ Certification Exam 1 Objectives

EXAM NUMBER: LX0-103



About the Exam

Candidates are encouraged to use this document to prepare for the CompTIA Linux+ LX0-103 exam. In order to receive CompTIA Linux+ certification, a candidate must pass two exams: CompTIA Linux+ LX0-103 and CompTIA Linux+ LX0-104. The CompTIA Linux+ certification offers a framework for acquiring working knowledge of Linux for IT professionals working as junior-level systems administrators, as well as those working in web and software development. Successful candidates will have the following skills:

- **Work at the Linux command line**
- **Perform easy maintenance tasks including assisting users, adding users to a larger system, executing backup & restore and shutdown & reboot**
- **Install and configure a workstation (including X) and connect it to a LAN or a stand-alone PC via modem to the Internet in the design of capture solutions, while addressing security requirements**

EXAM DEVELOPMENT

CompTIA exams result from subject-matter expert workshops and industry-wide survey results regarding the skills and knowledge required of an entry-level IT professional.

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PLEASE NOTE

The lists of examples provided in bulleted format are not exhaustive lists. Other examples of technologies, processes or tasks pertaining to each objective may also be included on the exam although not listed or covered in this objectives document. CompTIA is constantly reviewing the content of our exams and updating test questions to be sure our exams are current and the security of the questions is protected. When necessary, we will publish updated exams based on existing exam objectives. Please know that all related exam preparation materials will still be valid.

TEST DETAILS

Required exam	LX0-103
Number of questions	60
Type of questions	Multiple choice
Length of test	90 minutes
Recommended experience	A+, Network+ and at least 12 months of Linux administration experience
Passing score	500 (on a scale of 200–800)

EXAM OBJECTIVES (DOMAINS)

The table below lists the domains measured by this examination and the extent to which they are represented:

DOMAIN	PERCENTAGE OF EXAMINATION
101 System Architecture	14%
102 Linux Installation and Package Management	18%
103 GNU and Unix Commands	43%
104 Devices, Linux Filesystems, Filesystem Hierarchy Standard	25%
Total	100%



101 System Architecture

101.1 Determine and configure hardware settings.

- Enable and disable integrated peripherals
- Configure systems with or without external peripherals, such as keyboards
- Differentiate between the various types of mass storage devices
- Know the differences between coldplug and hotplug devices
- Determine hardware resources for devices
- Tools and utilities to list various hardware information (e.g., `lsusb`, `lspci`)
- Tools and utilities to manipulate USB devices
- Conceptual understanding of `sysfs`, `udev`, `dbus`
- The following is a partial list of the used files, terms and utilities:
 - `/sys`
 - `/proc`
 - `/dev`
 - `modprobe`
 - `lsmod`
 - `lspci`
 - `lsusb`

101.2 Boot the system.

- 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
- Understanding of `SysVinit` and `systemd`
- Awareness of `Upstart`
- Check boot events in the log file
- The following is a partial list of the used files, terms and utilities:
 - `dmesg`
 - `BIOS`
 - `bootloader`
 - `kernel`
 - `initramfs`
 - `init`
 - `SysVinit`
 - `system`

101.3 Change runlevels/boot targets and shutdown or reboot system.

- Set the default runlevel or boot target
- Change between runlevels/boot targets including single user mode
- Shut down and reboot from the command line
- Alert users before switching runlevels/boot targets or other major system events
- Properly terminate processes
- The following is a partial list of the used files, terms and utilities:
 - `/etc/inittab`
 - `shutdown`
 - `init`
 - `/etc/init.d`
 - `telinit`
 - `system`
 - `systemctl`
 - `/etc/systemd/`
 - `/usr/lib/systemd/`
 - `wall`



102 Linux Installation and Package Management

102.1 Design hard disk layout.

- Allocate file systems and swap space to separate partitions or disks
- Tailor the design to the intended use of the system
- Ensure the /boot partition conforms to the hardware architecture requirements for booting
- Knowledge of basic features of LVM
- The following is a partial list of the used files, terms and utilities:
 - /(root) filesystem
 - /var filesystem
 - /home filesystem
 - /boot filesystem
- swap space
- mount points
- partitions

102.2 Install a boot manager.

- Providing alternative boot locations and backup boot options
- Install and configure a boot loader such as GRUB Legacy
- Perform basic configuration changes for GRUB 2
- Interact with the boot loader
- The following is a partial list of the used files, terms and utilities:
 - menu.lst, grub.cfg and grub.conf
 - grub-install
 - grub-mkconfig
 - MBR

102.3 Manage shared libraries.

- Identify shared libraries
- Identify the typical locations of system libraries
- Load shared libraries
- The following is a partial list of the used files, terms and utilities:
 - ldd
 - ldconfig
 - /etc/ld.so.conf
 - LD_LIBRARY_PATH



102.4

Use Debian package management.

- Install, upgrade and uninstall Debian binary packages
 - Find packages containing specific files or libraries that may or may not be installed
 - Obtain package information such as version, content, dependencies, package integrity and installation status (whether or not the package is installed)
- The following is a partial list of the used files, terms and utilities:
 - /etc/apt/sources.list
 - dpkg
 - dpkg-reconfigure
 - apt-get
 - apt-cache
 - aptitude
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102.5

Use RPM and YUM package management.

- Install, re-install, upgrade and remove packages using RPM and YUM
 - Obtain information on RPM packages such as version, status, dependencies, integrity and signatures
 - Determine what files a package provides, as well as find which package a specific file comes from
- The following is a partial list of the used files, terms and utilities:
 - rpm
 - rpm2cpio
 - /etc/yum.conf
 - /etc/yum.repos.d/
 - yum
 - yumdownloader
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103 GNU and Unix Commands

103.1 Work on the command line.

- Use single shell commands and one-line command sequences to perform basic tasks on the command line
- Use and modify the shell environment including defining, referencing and exporting environment variables
- Use and edit command history
- Invoke commands inside and outside the defined path
- The following is a partial list of the used files, terms and utilities:
 - bash
 - echo
 - env
 - export
 - pwd
 - set
 - unset
 - man
 - uname
 - history
 - .bash_history

103.2 Process text streams using filters.

- Send text files and output streams through text utility filters to modify the output using standard UNIX commands found in the GNU textutils package
- The following is a partial list of the used files, terms and utilities:
 - cat
 - cut
 - expand
 - fmt
 - head
 - od
 - join
 - nl
 - paste
 - pr
 - sed
 - sort
 - split
 - tail
 - tr
 - unexpand
 - uniq
 - wc

103.3 Perform basic file management.

- Copy, move and remove files and directories individually
- Copy multiple files and directories recursively
- Remove files and directories recursively
- Use simple and advanced wildcard specifications in commands
- Use find to locate and act on files based on type, size or time
- Usage of tar, cpio and dd
- The following is a partial list of the used files, terms and utilities:
 - cp
 - find
 - mkdir
 - mv
 - ls
 - rm
 - rmdir
 - touch
 - tar
 - cpio
 - dd
 - file
 - gzip
 - gunzip
 - bzip2
 - xz
 - file globbing



103.4 Use streams, pipes and redirects.

- Redirecting standard input, standard output and standard error
- Pipe the output of one command to the input of another command
- Use the output of one command as arguments to another command
- Send output to both stdout and a file
- The following is a partial list of the used files, terms and utilities:
 - tee
 - xargs

103.5 Create, monitor and kill processes.

- Run jobs in the foreground and background
- Signal a program to continue running after logout
- Monitor active processes
- Select and sort processes for display
- Send signals to processes
- The following is a partial list of the used files, terms and utilities:
 - &
 - bg
 - fg
 - jobs
 - kill
 - nohup
 - ps
 - top
 - free
 - uptime
 - pgrep
 - pkill
 - killall
 - screen

103.6 Modify process execution priorities.

- Know the default priority of a job that is created
- Run a program with higher or lower priority than the default
- Change the priority of a running process
- The following is a partial list of the used files, terms and utilities:
 - nice
 - ps
 - renice
 - top

103.7 Search text files using regular expressions.

- Create simple regular expressions containing several notational elements
- Use regular expression tools to perform searches through a filesystem or file content
- The following is a partial list of the used files, terms and utilities:
 - fgrep
 - sed
 - regex(7)
 - grep
 - egrep

103.8 Perform basic file editing operations using vi.

- Navigate a document using vi
- Use basic vi modes
- Insert, edit, delete, copy and find text
- The following is a partial list of the used files, terms and utilities:
 - i, o, a
 - c, d, p, y, dd, yy
 - ZZ, :w!, :q!, :e!
 - vi
 - /, ?
 - h, j, k, l



104 Devices, Linux File Systems and File System Hierarchy Standard

104.1 Create partitions and file systems.

- Manage MBR partition tables
- Use various mkfs commands to create various file systems such as:
 - ext2/ext3/ext4
 - XFS
 - VFAT
- Awareness of ReiserFS and Btrfs
- Basic knowledge of gdisk and parted with GPT
- The following is a partial list of the used files, terms and utilities:
 - fdisk
 - gdisk
 - parted
 - mkfs
 - mkswap

104.2 Maintain the integrity of file systems.

- Verify the integrity of file systems
- Monitor free space and inodes
- Repair simple file system problems
- The following is a partial list of the used files, terms and utilities:
 - du
 - df
 - fsck
 - e2fsck
 - mke2fs
 - debugfs
 - dumpe2fs
 - tune2fs
 - xfs tools (such as xfs_metadump and xfs_info)

104.3 Control mounting and unmounting of file systems.

- Manually mount and unmount file systems
- Configure file system mounting on bootup
- Configure user mountable removeable file systems
- The following is a partial list of the used files, terms and utilities:
 - /etc/fstab
 - /media
 - mount
 - umount

104.4 Manage disk quotas.

- Set up a disk quota for a file system
- Edit, check and generate user quota reports
- The following is a partial list of the used files, terms and utilities:
 - repquota
 - quotaon
 - quota
 - edquota



104.5 Manage file permissions and ownership.

- Manage access permissions on regular and special files as well as directories
 - Use access modes such as `suid`, `sgid` and the sticky bit to maintain security
 - Know how to change the file creation mask
 - Use the group field to grant file access to group members
- The following is a partial list of the used files, terms and utilities:
 - `chmod`
 - `umask`
 - `chown`
 - `chgrp`
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104.6 Create and change hard and symbolic links.

- Create links
 - Identify hard and/or soft links
 - Copying versus linking files
 - Use links to support system administration tasks
- The following is a partial list of the used files, terms and utilities:
 - `ln`
 - `ls`
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104.7 Find system files and place files in the correct location.

- Understand the correct locations of files under the FHS
 - Find files and commands on a Linux system
 - Know the location and purpose of important file and directories as defined in the FHS
- The following is a partial list of the used files, terms and utilities:
 - `find`
 - `locate`
 - `updatedb`
 - `whereis`
- `which`
 - `type`
 - `/etc/updatedb.conf`