

LPIC level 1

Exam 101: Detailed Objectives

Objectives: Exam 101

This is a required exam for LPIC-1 or LPI certification Level 1. It covers basic skills for the Linux professional that are common across all distributions of Linux.

IMPORTANT INFORMATION:

These are the current 101 objectives, which are valid effective 2009-04-01.

Each objective is assigned a weighting value. The weights range roughly from 1 to 10 and indicate the relative importance of each objective. Objectives with higher weights will be covered in the exam with more questions.

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Topic 101: System Architecture

101.1 Determine and configure hardware settings

Weight 2

Description Candidates should be able to determine and configure fundamental system hardware.

Key Knowledge Areas

- Enable and disable integrated peripherals.
- Configure systems with or without external peripherals such as keyboards.
- Differentiate between the various types of mass storage devices.
- Set the correct hardware ID for different devices, especially the boot device.
- 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, etc.)
- Tools and utilities to manipulate USB devices
- Conceptual understanding of sysfs, udev, hald, 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

Weight 3

Description Candidates should be able to guide the system through the booting process.

Key Knowledge Areas

- 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.
- Check boot events in the log files.

The following is a partial list of the used files, terms and utilities:

- /var/log/messages
- dmesg
- BIOS
- bootloader
- kernel
- init

101.3 Change runlevels and shutdown or reboot system

Weight 3

Description Candidates should be able to manage the runlevel of the system. This objective includes changing to single user mode, shutdown or rebooting the system. Candidates should be able to alert users before switching runlevel and properly terminate processes. This objective also includes setting the default runlevel.

Key Knowledge Areas

- Set the default runlevel.
- Change between run levels including single user mode.
- Shutdown and reboot from the command line.
- Alert users before switching runlevels or other major system event.
- Properly terminate processes.

The following is a partial list of the used files, terms and utilities:

- /etc/inittab
- shutdown
- init
- /etc/init.d
- telinit

Topic 102: Linux Installation and Package Management

102.1 Design hard disk layout

Weight 2

Description Candidates should be able to design a disk partitioning scheme for a Linux system.

Key Knowledge Areas

- Allocate filesystems 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.

The following is a partial list of the used files, terms and utilities:

- / (root) filesystem
- /var filesystem
- /home filesystem
- swap space
- mount points
- partitions

102.2 Install a boot manager

Weight 2

Description Candidates should be able to select, install and configure a boot manager.

Key Knowledge Areas

- Providing alternative boot locations and backup boot options.
- Install and configure a boot loader such as GRUB.
- Interact with the boot loader.

The following is a partial list of the used files, terms and utilities:

- /boot/grub/menu.lst
- grub-install
- MBR
- superblock
- /etc/lilo.conf
- lilo

102.3 Manage shared libraries

Weight 1

Description Candidates should be able to determine the shared libraries that executable programs depend on and install them when necessary.

Key Knowledge Areas

- 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

Weight 3

Description Candidates should be able to perform package management using the Debian package tools.

Key Knowledge Areas

- Install, upgrade and uninstall Debian binary packages.
- Find packages containing specific files or libraries which may or may not be installed.
- Obtain package information like 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

102.5 Use RPM and YUM package management

Weight 3

Description Candidates should be able to perform package management using RPM and YUM tools.

Key Knowledge Areas

- 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

Topic 103: GNU and Unix Commands

103.1 Work on the command line

Weight 4

Description Candidates should be able to interact with shells and commands using the command line. The objective assumes the bash shell.

Key Knowledge Areas

- 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
- exec
- export
- pwd
- set
- unset
- man
- uname
- history

103.2 Process text streams using filters

Weight 3

Description Candidates should be able to apply filters to text streams.

Key Knowledge Areas

- 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

Weight 4

Description Candidates should be able to use the basic Linux commands to manage files and directories.

Key Knowledge Areas

- 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.
- Using 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
- file globbing

103.4 Use streams, pipes and redirects

Weight 4

Description Candidates should be able to redirect streams and connect them in order to efficiently process textual data. Tasks include redirecting standard input, standard output and standard error, piping the output of one command to the input of another command, using the output of one command as arguments to another command and sending output to both stdout and a file.

Key Knowledge Areas

- 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

Weight 4

Description Candidates should be able to perform basic process management.

Key Knowledge Areas

- 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
- killall

103.6 Modify process execution priorities

Weight 2

Description Candidates should be able to manage process execution priorities.

Key Knowledge Areas

- 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

Weight 2

Description Candidates should be able to manipulate files and text data using regular expressions. This objective includes creating simple regular expressions containing several notational elements. It also includes using regular expression tools to perform searches through a filesystem or file content.

Key Knowledge Areas

- 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:

- grep
- egrep
- fgrep
- sed
- regex(7)

103.8 Perform basic file editing operations using vi

Weight 3

Description Candidates should be able to edit text files using vi. This objective includes vi navigation, basic vi modes, inserting, editing, deleting, copying and finding text.

Key Knowledge Areas

- 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:

- vi
- /, ?
- h,j,k,l
- i, o, a
- c, d, p, y, dd, yy
- ZZ, :w!, :q!, :e!

Topic 104: Devices, Linux Filesystems, Filesystem Hierarchy Standard

104.1 Create partitions and filesystems

Weight 2

Description Candidates should be able to configure disk partitions and then create filesystems on media such as hard disks. This includes the handling of swap partitions.

Key Knowledge Areas

- Use various mkfs commands to set up partitions and create various filesystems such as:
 - ext2
 - ext3
 - xfs
 - reiserfs v3
 - vfat

The following is a partial list of the used files, terms and utilities:

- fdisk
- mkfs
- mkswap

104.2 Maintain the integrity of filesystems

Weight 2

Description Candidates should be able to maintain a standard filesystem, as well as the extra data associated with a journaling filesystem.

Key Knowledge Areas

- Verify the integrity of filesystems.
- Monitor free space and inodes.
- Repair simple filesystem 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 filesystems

Weight 3

Description Candidates should be able to configure the mounting of a filesystem.

Key Knowledge Areas

- Manually mount and unmount filesystems.
- Configure filesystem mounting on bootup.
- Configure user mountable removeable filesystems.

The following is a partial list of the used files, terms and utilities:

- /etc/fstab
- /media
- mount
- umount

104.4 Manage disk quotas

Weight 1

Description Candidates should be able to manage disk quotas for users.

Key Knowledge Areas

- Set up a disk quota for a filesystem.
- Edit, check and generate user quota reports.

The following is a partial list of the used files, terms and utilities:

- quota
- edquota
- repquota
- quotaon

104.5 Manage file permissions and ownership

Weight 3

Description Candidates should be able to control file access through the proper use of permissions and ownerships.

Key Knowledge Areas

- 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

104.6 Create and change hard and symbolic links

Weight 2

Description Candidates should be able to create and manage hard and symbolic links to a file.

Key Knowledge Areas

- Create links.
- Identify hard and/or softlinks.
- 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

104.7 Find system files and place files in the correct location

Weight 2

Description Candidates should be thoroughly familiar with the Filesystem Hierarchy Standard (FHS), including typical file locations and directory classifications.

Key Knowledge Areas

- Understand the correct locations of files under the FHS.
- Find files and commands on a Linux system.
- Know the location and purpose of important files 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