The Top 50 Things to Know to Pass the LPIC Exam 102

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The Linux Professional Institute has plans for three levels of certification, with each level consisting of two exams that you must pass. Last month, I looked at exam 101, the first test in the first level (the upper two levels are still in development). This month, I'll focus on exam 102 (full name known by VUE is 117-102). The following list of fifty key points to know is excerpted from the upcoming book, *LPI General Linux 1 Exam Cram (Exam 102)*, to be published in March 2001 by The Coriolis Group (ISBN: 1-57610-962-3). Used with permission.

Hardware and Architecture

1. The /proc/interrupts file shows what interrupts are currently in use on your system.

2. Linux supports standard serial, parallel, and joystick ports in use today. Serial UART types 8250, 16450, 16550, and 16550A are supported and the /dev directory contains a file for each port/device supported. The setserial command can be used to list and alter configuration.

3. The dmesg command can show what devices (such as lp) that Linux found during boot.

4. The fdisk command is used for the partitioning of the hard drive. The filesystem structure can be created with newe2fs. Partitions are mounted using the mount command and unmounted using umount.

5. The ifconfig command is the most common for setting and displaying network card parameters. ping is used to send ICMP messages that echo back and show a host is accessible via the network. The sndconfig utility, from Red Hat, can be used to configure the sound card options, while minicom can be used for verifying modem operations.

6. PPP - the point-to-point protocol is the most common dial-up protocol used with Linux. /etc/ppp/options holds options used by pppd for all connections, and scripts can be created for automating operations. The two most common PPP authentication protocols are PAP - Password Authentication Protocol and CHAP - Challenge Handshake Authentication Protocol.

Linux Installation and Package Management

7. The first IDE drive is represented as hda, while the first partition on it is hda1. The first SCSI drive is represented as sda, while the first partition on it would be sda1.

8. The size of the swap partition should be at least equal to the size of memory, and the root partition should be sized as small as you can make it. The more data/user partitions

you have, the easier it is to backup only a portion of the system, invoke quotas and perform similar administrative tasks.

9. Once a partition table has been updated, you must create the filesystem (format the disk). The mke2fs utility can be used to make the filesystem.

10. The /etc/lilo.conf file contains the information required for LILO to load a kernel and boot the system. If you edit this file, you must run /sbin/lilo to install the LILO bootloader.

11. The most common method of sending multiple files for installation is as a tarball - a single file created by tar and compressed with gzip. With tar, the "x" command is used to extract files, while its opposite is "c" - used to create files. The "v" option provides verbose output - listing each file as it is processed, and "f" is used to signify a filename.

12. Programs are compiled using the make command. make uses a Makefile to find parameters and options to use in the build. Scripts named "configure" are used to configure the software per the environment and may do so by prompting for values from the person doing the installation.

13. Shared libraries allow applications to use a core set of routines and not need to be recompiled when a function changes. The ldd command is used to see what shared libraries a program is dependent upon. The ldconfig command is used to update and maintain the cache of shared library data. The current cache can be seen using the command "ldconfig -p".

14. Package managers include Red Hat's Package Manager (RPM), and Debian's (dpkg). The purpose of both is to simplify working with software.

15. The rpm options include:

- -i for installing packages
- -e for removing packages
- -V for verifying packages installed on the system (-Va verifies all)
- -q for querying what packages belong to what files (-qf allows you to specify a file to see what package it belongs in)
- -b for building a package
- -p to print/display information

16. With dpkg, you use the dselect command to use a graphical interface. To avoid using such, the following options apply from the command line:

- -i to install packages
- -l to list information about the package
- -c to list all files in the package
- -r to remove the package

- -I to print information about the package including the section of the Debian system, the version number and any package dependencies that exist

Kernel

17. The lsmod command is used to list loaded modules. The insmod command is used to install a module. The rmmod command is used to remove a module from the system. The modinfo command will print information about a module.

18. The modprobe utility can probe and install a module and its dependents, while the depmod utility will determine and show any module dependencies that exist.

19. The conf.modules and moddules.conf files are one and the same and which one is used on your system depends on the Linux vendor.

20. Kernel software is typically named linux-x.y.z where x.y.z represent the version number.

21. The make config command executes a command line oriented view allows you to respond interactively during the kernel build.

22. The make xconfig command can be used to load an X-based interface for interacting with during the kernel build.

23. Dependencies for the kernel can be created using the command make dep. After a new kernel is created, the /etc/lilo.conf file should be manually adjusted and LILO run once more to reflect the change..

Text editing, Processing, Printing

24. Navigation within vi can be accomplished using the following keyboard keys:

- h - moves left
- l - moves right
- j - moves down
- k - moves up

25. The following keys hold special meaning in vi:

- c - for changing text
- d - for deleting text
- i - for inserting text
- o - to open a line below the current one in insert mode
- O - to open a line above the current one in insert mode
- p - to place text (copy)
- r - to replace a single character
- R - to enter replace text mode
- u - to undo an action

- x - to remove a single character
- y - to copy text

26. The lpc utility is the main one used to manage the print service, while lpq is the primary tool for looking at and interacting with the print queue.

27. The lpr command is used to submit jobs to the print service, and there are a wide number of options that can be used with it, including:

- -b to suppress a banner
- -K to specify a number of copies to print
- -# the same as -K
- -m to send error messages via mail
- -T to signify a title page
- -w to define the width

28. The /etc/printcap file is a database defining what each known printer is capable of. It is read once by lpd at starup.

29. The lpd.perms file hods the permissions for the lpd service and can affect the operation as such utilities as lpc and lpq.

30. The lpd.conf file is used to configure the actual lpd service. There are 180 options that can be configured.

31. The lprm command is used to remove print jobs, and lprm -a will attempt to remove all spooled jobs.

Shells, Scripting, Programming, Compiling

32. The /etc/profile configuration file is executed whenever a user logs in. Following that, what other configuration files execute within the user's home directory are based upon what shell they are using. For bash, the shell first looks for .bash_profile: if it does not find it, will then look for .bash_login, followed by .profile. When the user logs out, the .bash_logout file can hold commands to execute.

33. While other configuration files run only when the user logs in or out, the .bashrc file can execute each time a shell is run. The .inputrc file is used to configure key bindings.

34. Shell scripts must have executable permissions to run, or be called by a shell (sh script). The normal exit status of any script or application is 0 and anything else signifies a non-normal exit.

35. Every script file should begin with "#!" followed the full path of the interpreter to be used to run the script.

36. Variables can be given at the command line, and referenced as $1 and on, or be entered into the executing file with the read command. The shift command will turn $2 into $1, $3 into $2, and so on.
37. Logic can be added to scripts by testing conditions with test or [. Commands can execute using if - then - fi deviations, or through looping (while, until, or for). You can leave a script with the exit command, or leave a loop with break.

X
38. X troubleshooting can be done with -showconfig to see what is currently there. Startup is accomplished with startx, which contains the command exec xinit.

39. Parameters that can be used with xterm include:

- -bd to set the border color
- -bg to set the background color
- -fg to set the foreground color
- -fn to set the font

Networking Fundamentals
40. The /etc/services file identifies which common services are associated with which ports. Among the common port assignments are: 20&21 - FTP, 23 - Telnet, 25 - SMTP, 53 - DNS, 80 - HTTP, 110- POP3, 119- NNTP, 143- IMAP, and 161 - SNMP.

41. DHCP can be used to automatically issue IP addresses, or you can enter them manually. IP addresses are 32-bit entities given as four octets separated by periods. The first octet identifies the class of the network:

- 1-126 is Class A
- 128-191 is Class B
- 192-223 is Class C

The IP addresses must be unique within the world in which they communicate. If the host is connected only to two other computers, then the address need only be unique among the other computers; if the computer is connected to the Internet, the address needs to be unique within the world.

42. There are a number of private IP addresses set aside for use by private networks. One private range exists within each class, and these include:

- 10.x.x.x for Class A
- 172.16.x.x - 172.31.x.x for Class B
- 192.168.x.x for Class C

43. The subnet mask, also known as the netmask, identifies whether a host to be reached is local or on a remote network, The default subnet mask for Class A addresses is 255.0.0.0; for Class B is 255.255.0.0; for Class C is 255.255.255.0.

Networking Services
44. The inetd is the superdaemon which brings up the networking services. It reads its configuration file (/etc/inetd.conf) upon startup to determine what services to run.

45. Access to hosts can be configured using either a hosts.allow or hosts.deny file. The /etc/exports file is used by NFS to signify which partitions to load for file sharing. SMB (Server Message Blocks) is used for communication by Windows-based systems, while NMB (NetBIOS Message Block) allows Linux to identify resources on Windows-systems.

46. sendmail.cf is the primary configuration file for the sendmail service. /etc/aliases holds the mail aliases, while /var/spool/mqueue is the mail queue. mailq can be used to see the status of what exists in the mail queue, while newaliases can be used to build or rebuild the aliases file.

47. Apache can be used to provide web services using the httpd daemon. The configuration files are access.conf and srm.conf.

Security
48. As a component of administrative security, you should configure the umask value in the /etc/profile to reduce the permissions assigned to new files when created by users.

49. Many daemons runs with either SUID or SGID permissions. To prevent giving away too much permission and causing problems, the owner and group associated with daemons should be as minimal as possible.

50. Shadow passwords for users and groups should be used to add security to the system. Quotas should be used to restrict the amount of storage space each user can consume on the system. You should also implement a regular regimen of expiring passwords and requiring a minimum of 6-8 characters for each.